

Effectiveness of Antitrust Sanctions on Modern International Cartels

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Abstract This paper assesses the antitrust fines and private penalties imposed on the participants of 260 international cartels discovered during 1990–2005, using four indicators of enforcement effectiveness. First, the United States is almost always the first to investigate and sanction international cartels, and its investigations are about seven times faster than EU probes. Second, US investigations were more likely to be kept confidential than those in Europe, but the gap nearly disappeared since 2000. Third, median government antitrust fines average less than 10% of affected commerce, but rises to about 35% in the case of multi-continental conspiracies. Civil settlements in jurisdictions where they are permitted are typically 6 to 12% of sales. Canadian and US fines and settlements imposed higher penalties than other jurisdictions. Fourth, fines on cartels that operated in Europe averaged a bit more than half of their estimated overcharges; those prosecuted only in North America paid civil and criminal sanctions of roughly single damages; and global cartels prosecuted in both jurisdictions typically paid less than single damages.

Keywords anti-trust sanction · cartel · optimal deterrence

JEL Classification L12 · L42 · K22 · B14 · F29

1 Introduction

Since 1987 criminal conduct affecting the U.S. economy has been sanctioned according to frequently updated U.S. Sentencing Guidelines (USSG Advisory Group 2003).¹ Other jurisdictions adopted comparable anti-cartel guidelines or

¹In January 2005, the US Supreme Court declared the Guidelines unconstitutional, virtually guaranteeing that the Congress would pass overriding legislation (Cohen and Fields, 2005). Since that time most federal judges have continued to apply the Guidelines in an advisory manner.

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practices for imposing government sanctions. Most mature antitrust regimes appeal to optimal-deterrence theories to justify the size of imposed monetary sanctions (ICN, 2005). Yet there are few, if any, studies that evaluate the efficacy of anti-cartels enforcement in general or the optimality of cartel sanctions in particular.

The past decade has witnessed an upsurge in prosecutions of international cartels (Connor, 2004b). Data collected on these prosecutions offer an opportunity to gain information on the size, duration, and harmfulness of cartel conduct. These data in turn permit the development of indicators of the effectiveness of cross-jurisdictional cartel enforcement policies and sanctions. In this paper, four quantitative measures of anticartel actions are calculated for a large sample of international cartels punished by several antitrust authorities.

1.1 Objective

The purpose of this paper is to assess the magnitude and pattern of global antitrust sanctions imposed on modern international cartels. Although there is a small literature that examines prosecutions of individual cartels or single jurisdictions, it is believed that this paper is the first to examine and measure quantitatively a large multi-jurisdictional sample. By doing so, this paper can contribute critical information for the on-going debate about the effectiveness of global antitrust sanctions to deter international price-fixing conduct.²

1.2 Scope

Although some attention is paid to the pattern of enforcement practices, the primary focus of this paper is on all types of monetary and penal antitrust sanctions that have been imposed on participants in private international cartels discovered between January 1990 and August 2005. Monetary penalties include *fines* imposed by antitrust authorities on both corporations and individuals. Monetary sanctions also include *payments* made by defendants in private suits to both direct and indirect buyers of cartelized products; most often these payments are made as a result of *settlements* made out of court prior to trial, but in a few cases are *litigated judgments* of a trial judge or jury.³ Sanction amounts do not include the legal fees and costs of defendants, which may be substantial but are almost never revealed.⁴ However, payments made by defendants to settle private class-action suits do include the legal fees and costs incurred by plaintiffs in prosecuting their cases.⁵

This paper analyses only what Evenett et al. (2001) call “Type I” and the OECD calls “hard-core” cartels. A *cartel* is a group of two or more independent sellers who

² For a thoughtful and nuanced exposition of the deterrence objective of antitrust fines, see Wils (2006: 190–201).

³ In common-law countries with class-action statutes, out-of-court settlements are subject to approval by the supervising judge.

⁴ Other possible sanctions are not measured. These include the money value of prison sentences, stockholders’ suits for mismanagement, and reputational losses.

⁵ In the United States, among the 23 largest class-action awards for price fixing in 1972–1999, legal fees ranged from 7 to 36% of the net recovery to the plaintiffs (Connor, 2001: 471). This ratio has trended downward over time and as size of the case increased.

agree to fix or control prices or output in a given market (Dick, 1998). *International* cartels are those that have participants from two or more countries;⁶ the qualifier does not necessarily refer to the geographic scope of the cartel's agreement, but the two tend to be related. *Type I* or *private* cartels are those that operate without the protection of national sovereignty; they can be indicted for antitrust violations. Legally registered export cartels are considered private arrangements, but not mandatory cartels nor those established either by parliamentary statutes or by treaties among nations. Private cartels may contain state-owned or controlled corporations.

Finally, this paper examines only those international cartels that were "discovered". By *discovered* is meant information that an antitrust authority had opened a formal investigation⁷ or had indicted a member of an alleged cartel; was forced to pay a fine by a recognized antitrust authority; was found liable for damages in a private suit; pleaded guilty to a criminal indictment; agreed to pay damages in an out-of-court settlement; or accepted a consent decree.⁸ The choice of 1990 is somewhat arbitrary, but is meant to capture the beginning of the current level of and harmonization of antitrust sanctions in the United States,⁹ the EU,¹⁰ and Canada.¹¹

⁶ The DOJ definition refers to either corporate (ultimate parent) members (nationality determined by location of the headquarters or country of incorporation) or managers' nationalities. In practice, in this paper corporate composition is the key indicator.

⁷ In the United States this means that a grand jury is empanelled; in most other jurisdictions formal probes are signaled by news of a "raid" by police to search for documents or interview managers.

⁸ By "prosecuted" I mean to include payments of civil penalties for violations of competition regulations as in the EU, criminal indictments, and announced formal investigations. The latter typically result in fines or guilty pleas.

⁹ In 1990, an increase in the US statutory cap on antitrust fines (*\$10 million per company) became law. In 1993, the DOJ announced a policy of automatic leniency for the first cartel member to confess that met certain predictable conditions, a policy shift that proved widely effective. The increase in the statutory cap on fines to *\$100 million became effective for conduct after mid 2005, but this change does not affect the data used in the present study.

¹⁰ In Europe, Harding and Joshua (2003) conclude that "... European law has over [1890–1990] caught up with American law" (p. 270) in the sense that cartels are now subject to "categorical censure". Since the 1970s in Europe, "... the classic price-fixing, market-sharing cartel has... been driven underground and become strongly prohibited..." (p.229). Unannounced inspections of suspected cartel behavior began in the late 1980s. In 1998 the EC issued guidelines for the calculation of price-fixing fines that explained practices being followed during the 1990s (Harding and Joshua, 2003: 242). Moreover, in 1996 the EC issued its first leniency notice, which was revised in 2002 in a way that closely mimicked the US policy. Therefore, by the late 1990s, the EU had also developed a set of government anti-cartel sanctions for corporations that were similar to those in the United States and Canada (Harding and Joshua, 2003: 216–222).

¹¹ Canada's current antitrust law dates from 1986. In 1992, Ontario, Canada passed a major piece of legislation that promulgated rules for private class actions, and other provinces followed soon after (Goldman et al., 2003: 4). Private compensatory suits were little used until the 1992 rules change was promulgated (Goldman et al., 2003). Passage precipitated a large number of suits against members of international cartels in Canada. Along with Canada's nearly per se condemnation of price fixing as a criminal act, the addition of feasible compensatory suits brought Canada's legal structure very close to the US model.

2 Literature review

Although subsidiary goals are sometimes mentioned, the consensus of enforcement officials is that the overarching goal of the antitrust laws is optimal deterrence (ICN, 2005). Specific deterrence will be achieved if participants in a price-fixing scheme anticipate that the costs of forming and operating a cartel will exceed the net harm to others divided by the probability of detection (Landes 1983: 666–668). Antitrust officials frequently opine that cartel fines and settlements exceed a cartel's illegal profits, but these claims are at best *ex post* assertions that say little about *ex ante* optimality. In a provocative essay Crandall and Winston (2003) assert that antitrust policy has been ineffective in either raising consumer welfare or in deterring anticompetitive conduct: “We find little empirical evidence that past [antitrust] interventions have significantly deterred anticompetitive behavior” (p. 4).¹² To support their view that the prosecution of overt price fixing is misdirected, they cite five empirical studies of overt collusion that find no upward effects on prices of conspiracies convicted in US courts.¹³ Defendants' lawyers such as Denger (2003, 2005) also decry the prevalence of excessive price-fixing fines and private settlements imposed on members of modern cartels. Antitrust officials note that the controversy over whether antitrust payments are excessive is largely attributable to the “...difficulty of gathering useful data” (Graubert, 2003).

While deterrence may have improved marginally in the 1990s, scholars of modern international cartels generally believe that current competition policies cannot significantly deter recidivism because they are “...oriented towards addressing harm done in domestic markets... [or] merely prohibit cartels without [sufficiently strong sanctions]” (Evenett et al., 2001: 1222). Moreover, empirical evidence from the last two decades demonstrates a significant degree of continued cartel formation and multiple convictions of scores of firms for price fixing. Recidivism suggests that either greater sanctions ought to be applied or that a multilateral approach implemented in order to approach optimal deterrence of international price fixing.¹⁴

Analyses of the antitrust prosecutions and convictions in single legal jurisdictions are commonplace but shed little light on deterrence. Gallo et al. (2000) review the enforcement of the Sherman Act by the US DOJ for the period 1955–1997. This paper describes the number antitrust cases by type and outcome over time, but it collects only limited information on the characteristics of the prosecuted cartels.¹⁵

¹² For rebuttals see Baker (2003), Werden (2003), and Kwoka (2003).

¹³ We should note that space constraints do not appear to be responsible for such a skimpy treatment of this topic, for they list 59 references. The choice of two of the articles is unfortunate, because both are methodologically deeply flawed. Newman (1948) is critiqued in Connor (2004a); Sproul (1993) is criticized by Werden (2003). Two other studies focus on an odd alleged episode of price fixing, the so-called Overlap group of 23 elite US universities that met regularly to allocate needs-based graduate scholarships; this practice was permitted to continue under a consent decree that limited the degree of detail shared. A survey of hundreds of cartels finds that median overcharges are 25% of affected sales (Connor and Lande, 2005).

¹⁴ One way of increasing sanctions without changing the statutes is to extend standing to foreign buyers to permit them to sue for private damages in US courts. On the *Empagran* case, see Davis (2003) and Bush et al. (2004).

¹⁵ Gallo et al. find only 34 international cartels during 1955–1989, or 2.3% of all such cases. In the late 1990s the international rate rose to above 50% (Connor, 2001). For all cartels, membership size (an average of four), affected sales (870 million 1982 dollars), and duration (5.4 years) are recorded. Mean corporate and individual fines were \$105,000 and \$21,000, respectively.

Similar less detailed compilations of prosecution statistics are available for other jurisdictions, but analyses of international cartels are few. Guersent (2001) summarizes conduct and sanctions taken against 19 international cartels by the EC from July 2001 to December 2003. Perhaps the most detailed survey of modern international cartels appears in a working paper by Levenstein and Suslow (2002). The paper aims at describing the structure of cartel markets (numbers, concentration, and demand features) and assessing three dimensions of cartel performance: stability, duration and overcharges. Levenstein and Suslow (2002: Table 15) cite several studies of the interwar period and information on 35 international single-episode cartels prosecuted by the DOJ and EC from 1990 to 2001. However, this working paper does not document the antitrust consequences of the cartels' behavior.¹⁶

The Organization of Economic Co-Operation and Development (OECD) for several years has had an active program for the consideration of a common policy approach towards international cartels. Its report *Hard Core Cartels* summarizes a unique survey of its member countries' experiences in sanctioning such cartels (OECD, 2003). The EU and 14 members provided data (fines, affected commerce, or harm) on 38 convictions of 27 international cartels; while most of these data are public knowledge, some are unique (OECD, 2003, Annex A). These data have been incorporated into the present paper.

3 Description of the sample

The sample consists of 260 private international cartels that were discovered between January 1990 and July 2005 (Table 1). Of these 260 cartels, 69 (or 27%) were *global* conspiracies. Global cartels are defined as ones in which price fixing was applied across at least two continents; many operated in as many as six continents, but most fixed prices in the "Triad" of Western Europe, North America, and East Asia. Non-global cartels colluded within only one continent or one nation. The largest number of non-global international cartels were active in Europe, of which 52 (20%) were "EU-wide" (active in several countries of the EU), 59 (23%) were confined within the borders of one EU Member State, and six (2.3%) were found in Eastern Europe. Most of the remaining 27 cartels were located in East Asia. With the exception of Korea and Australia, the small number of cartels discovered outside of North America and Western Europe primarily reflects the fact that the antitrust authorities of those regions are new, understaffed, and not aggressive in pursuing or careless about reporting probes of international cartels (Connor, 2004b).

3.1 Prosecution patterns

Information was found on a total of 387 legal actions, a term that includes the launching of an official investigation, filing of a private antitrust damages suit, or the imposition of one or more legal sanctions. Of the 260 sampled cartels, in about 21 instances the official investigation had been terminated by mid 2005, either because the allegations of illegal activity proved baseless or because the evidence of guilt was

¹⁶ A more recent paper by Levenstein et al. (2003) does cite antitrust fines for two modern cartels in Table 2, but it does not aim to analyze cartel sanctions in a cross-sectional manner.

Table 1 Private international cartels discovered 1990–2005.

Type	Geographic location of cartel					
	Global scope Number	NAFTA	EU-wide	European nations	Other region	Total actions
Antitrust Authority Prosecuting						
US courts	35 DOJ 34 Private	40 DOJ 18 Private	0	0	1 DOJ	128
Canada courts	24 CBC 13 Private	14 CBC 5 Private	1	0	0	56
European Commission	30	0	27	1	0	58
EU Member State	0	0	0	43	0	43
Other Europe	0	0	0	5	0	5
Oceania	3	0	0	0	2	5
Africa	0	0	0	0	1	1
Asia	4	0	0	0	11 2 Private	17
Latin America	1	0	0	0	1	2
Total\Cartels	69	47	52	65	27	260
Investigation only ^a	31	18	24	18	11	102
Total convictions	114	77	28	49	17	285
Product type						
Raw material	1	0	1	0	0	2
Intermediate indus. input	56	34	30	18	12	150
Capital input	0	0	2	2	5	9
Generic consumer	0	2	10	7	5	24
Differentiated consumer	2	6	2	16	1	27
Services	10	5	8	22	4	49
Total	69	47	52	65	27	260

Source: Table 8

^a Still underway (81) or ended in dismissal (21) by mid 2005. Fines, consent decrees, settlement agreements, and warnings are classified as convictions.

insufficient. In a few cases private suits were filed and settlements were made even though a government investigation ended without an indictment.¹⁷ These data demonstrate that antitrust authorities are by and large cautious about opening formal investigations in the sense that 90 to 95% of the cases investigated conclude with sanctions of some sort.

Excluding the 21 cartels with closed investigations, 81 (34%) appear to be under investigation as of August 2005.¹⁸ For these cartels, no sanctions are yet available. The ratio of cartels under investigation is highest for EU-wide cartels (40%), relatively high for global cartels (34%), and lowest for those in North America (24%). However, for 165 (77%) cartels sanctions data are essentially complete, highest for North American (83%) and European national (74%) cartels and about 55 to 65% for those in other locations. In the case of global cartels and those in jurisdiction that permit private suits, sanctions are levied in stages. Some of these

¹⁷ Perhaps the best documented of these cases is the high fructose corn syrup cartel; direct buyers settled for \$611 million after the DOJ dropped its investigation as part of a deal to obtain a guilty plea from Archer Daniels Midland Company for its price fixing in a different market (Connor, 2001).

¹⁸ Antitrust authorities do not always announce closure; occasionally the only source of information on termination comes from press releases or financial reports of companies formerly being investigated.

cartels are no longer in the purely investigatory stage, but they are not complete either. Therefore, in this paper a few of the observations will be reported with somewhat incomplete sanctions data.

Consent decrees (only ten unaccompanied by monetary sanctions) are the least common sanction, accounting for only 6% of the sanctioned cartels. Cartel investigations that end with consent decrees only are rare in North America.¹⁹ The EU sometimes uses this sanction also, but it is the favorite sanction of the Japan Fair Trade Commission.

Most cartels that are investigated pay monetary fines or settlements. This study focuses on the 275 instances of monetary cartel sanctions. The vast majority (75%) of such outcomes was imposed in cases prosecuted by government entities; the remaining 25% were the result of private damage suits in the United States and Canada.²⁰ Global cartels were frequently prosecuted by multiple antitrust authorities and by buyers in North America. The 38 sanctioned global cartels in the sample paid government fines in at least 67 instances and settled suits by purchasers 47 times (Table 1). Cartels in the NAFTA area similarly faced multiple legal actions. However, outside North America indicted cartels almost always had to deal with one antitrust authority.

3.2 Industry pattern

Table 1 shows the numbers of cartels classified into six general types of goods: raw materials, four kinds of manufactures, and services. The great majority (80%) of the sample cartels sold manufactures. There are only two raw materials cartels, but the number of service-sector cartels is high by historical standards.²¹ The most prominent services are in the construction, transportation, finance, and insurance industries (Table 8).

Within manufacturing, producer goods dominate the sample. Cartels in markets for industrial intermediate goods account for 72% of manufacturing cartels and 58% of the total sample. The global and NAFTA cartels were especially concentrated in industrial intermediates. Only nine cartels (3%) sold industrial capital goods. Nearly all the industrial manufactures are homogeneous products. The single most important manufacturing industry group is chemicals (30% of the cartels), with organic chemicals far more common than inorganic. Other manufactures well represented include food and tobacco (8%), nonmetallic minerals (8%), paper (5%), and rubber and plastic (5%). About 20% of the sample consisted of final manufactured consumer products, half standardized and half differentiated goods. Most of the branded consumer goods represented in the sample were sold direct by manufacturers in bulk; for example, most of the pharmaceuticals were sold to national health organizations, not to retailers or consumers; similarly, a number of beer cartels colluded in contract sales of kegs to the foodservice channel.

¹⁹ The two cases were handled by the Federal Trade Commission (which has no criminal powers) rather than the DOJ.

²⁰ Two cartels operating in other regions also were subject to compensatory suits. For example, a cartel that rigged bids on water treatment plants built under contracts with USAID funding in Egypt was both fined and paid single damages to the US government.

²¹ Service-sector cartels were rare in the interwar era (Stocking and Watkins, 1948). Of course, services now account for a larger share of the economies of high income countries than 50 years ago.

The industrial distribution of the sampled international cartels differs considerably from samples drawn from the early twentieth century. Stocking and Watkins (1947: 469–492) provide a fairly complete list of 127 international cartels active in the interwar period. Their compilation is dominated by manufactures (86%), but is relatively heavy in raw agricultural and mining materials (11% of the cartels) but is light in services (3%) compared to the modern cartel sample. Within manufacturing the interwar cartels had a similar emphasis on producer intermediate inputs and chemicals in particular.

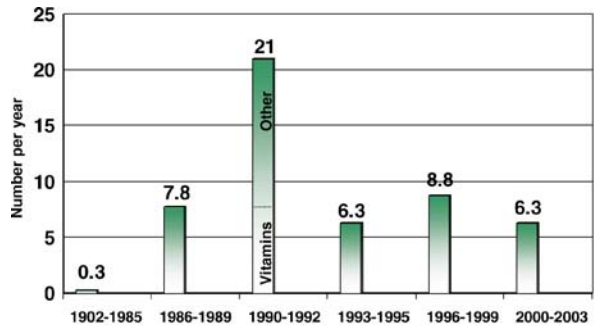
4 Measures of effectiveness

The data collected on international cartels for this paper suggest four indicators of enforcement effectiveness by antitrust authorities. First, the speed with which the agencies investigate, negotiate, and impose sanctions may be analyzed. Generally, long delays in the administration of justice are regarded as bad public policy. Holding constant the probability of Type I and Type II enforcement errors, speed of adjudication is a desirable characteristic in the administration of justice. One can imagine an investigation that is too short for an adequate judgment about probable cause, but the main complaint of defendants is about excessive length and the consequent period of uncertainty about prosecution or the size of sanctions, especially if the investigation becomes public, as many do. Plaintiffs in private litigation too have an interest in quick conclusions to suits, which defendants habitually delay as far as possible (Adams and Metlin, 2002). In the absence of prejudgment interest, delays in antitrust proceedings reduce the deterrence value of fines and settlements. A peculiar feature of international cartels is that when a probe, fine, or guilty plea is made in one jurisdiction, it tends to trigger follow-on investigations by antitrust authorities in other jurisdictions. Although court trials are rare for either criminal or civil prosecutions, they can add several years to a final determination of guilt; in the EC, appeals about the sizes of the EC cartel fines are common, but as these are by choice of the fined companies, this aspect of speed will not be studied.

A second indicator is the pattern of cartel formation over time. The simple notion underlying this measure of enforcement effectiveness is that as information becomes available to business persons about increases in maximum legal price-fixing penalties, in the probability of detection, or in harshness of actual sanctions corporate decision makers will raise their expectations concerning the costs of illegal behavior. This information is likely to arise from several sources: legal advisors, business and trade publications, and the informal exchange of information between business persons. The lags in learning and in forming expectations may be considerable. Therefore, conclusions about the relationships between milestones in anticartel laws or enforcement actions and decreases in cartel formations will require long periods of analysis.

A third measure of effectiveness is the size of a company's fine relative to its sales during the cartel period; alternatively, the fines on all members of a cartel can be compared to affected sales of the total market. Although these ratios have no direct relationship to economic deterrence, they are the most frequently cited measure of a successful prosecution in legal discussions. Judicial opinions on the fairness of proposed class-action settlements inevitably focus on the recovery/sales

Figure 1 Rates of formation: all international cartel episodes.



Note: Dates are years of initial operation; planning and initial agreements may have occurred earlier.

ratio proposed relative to the same ratios from other settlements. Class counsel likewise highlights this ratio when defending a settlement from criticisms about a particular deal. Recoveries above 10% or even 5% of sales are cited as successful results for plaintiffs. Some students of cartels opine that fines as high as 150% of affected sales are necessary for absolute deterrence (Wils, 2001). Despite the absence of a firm economic defense for the fine/sales ratio,²² this index is broadly computable and is a rough indicator of the rigorousness of anticartel enforcement over time or across jurisdictions.

The fourth measure of enforcement effectiveness is the ratio of monetary sanctions to the cartels overcharge.²³ This index bears directly on the question of economic deterrence. Unfortunately, it is the most difficult to compute and is the most likely to contain measurement errors. Nevertheless, this paper analyses more than 200 ratios of penalties to overcharges, a sample many times larger than has appeared in previous publications.

4.1 Rates of international cartel formation

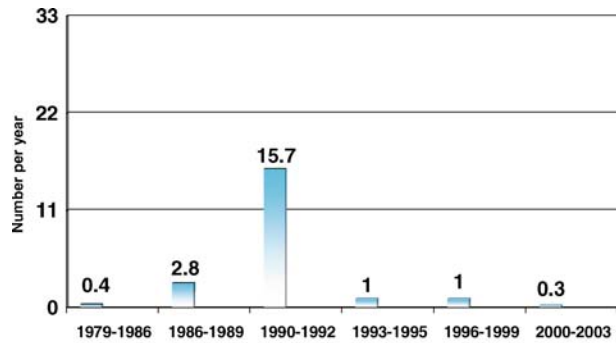
An informal analysis of cartel formation is provided in Figures 1, 2, 3 and 4. In every geographic region, the annual rates of cartel formation (the year the cartel began fixing prices) peaks in the early 1990s. The increase in formation rates from the 1980s to the 1990s is particularly striking and informative. The acceleration in new cartels is apparent for all types of international cartels, global, European, and North America.

The NAFTA-area cartels began at a slightly earlier time than the other two types (cf., Figure 4 with Figures 2 and 3). During the 1981–1988 Reagan administration, the resources of the US DOJ were directed primarily at small scale bid-rigging conspiracies (Connor, 2001: 67). Attention to international cartel enforcement rose

²² From a compensation or deterrence standpoint, optimal fines should relate to the antitrust injuries caused by the cartel. While damages in some situations should be based upon lost profits, in US federal law damages are customarily computed from overcharges (Hovenkamp, 1999: 658–659). The size of civil damages is positively related to the overcharge percentage and affected sales. Cartel fines, however, are computed almost solely from affected sales (Connor, 2005). Because of the reluctance of the courts to bankrupt defendants, maximum fines are set relative to profits or liquid assets in order to take into consideration a company's ability to pay.

²³ Of course, the best denominator would be the sum of the overcharge and the deadweight loss, but the latter is even more difficult to compute in cartel cases than the overcharge.

Figure 2 Rates of formation: global cartel episodes.



Source: Spreadsheet dated August 2005

slightly during the Bush *per se* administration, but really became a major priority of the DOJ only after 1992. US legal sanctions increased in 1987 when price fixing was made a felony and in 1990 when the statutory corporate fine was raised to \$10 million; however, the DOJ seems not to have implemented these new powers until after 1992 or 1993 (Spratling, 1999, 2001). The fall-off on new cartel formations in North America is consistent with the threat of the DOJ's enhanced prosecutorial powers, a more effective amnesty program, and, after the DOJ's singular victories in the lysine and citric acid cases in 1995–1996, with the demonstrated ability to win in court. The notable decline in new cartel formations after 1997 is suggestive of a deterrence effect, but only a longer time period will allow for a more definitive conclusion.²⁴

Europe began successful prosecution of international cartels in 1969, but significantly increased the priority to investigate such cases only from the mid 1990s.²⁵ Figure 3 demonstrates a peak in cartel formation in 1993–1995 and a notable decline after 1995. Again, although time will tell if the post-1995 decline is not just a statistical illusion, the pattern is consistent with increased cartel deterrence after 1995.

Finally, global-cartel initiations also peaked in 1989–1992; those formed prior to 1989 are mostly shipping conferences, which operated in a grey area of the law. Though too early to tell, the successful prosecutions of several high-profile global cartels in the late 1990s may well have had a chilling effect on would-be global cartelists.

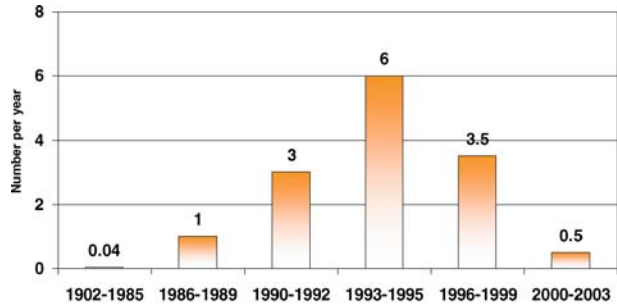
4.2 Confidentiality and speed of investigations

Table 2 summarizes information available on investigative time lags in 301 enforcement actions with respect to international cartels prosecuted from 1990 to 2005. The table shows the percentage of cases for which there were no lags between the first public notice and the announcement of the sanction by the antitrust

²⁴ The decline after 1992 is partly attributable to the sample's termination date. Because no data are collected after 2003 there is a ceiling on formations, which tend to lead discoveries by about six years. A decline in cartel formation was detected throughout the twentieth century by Connor and Bolotova (2006).

²⁵ Competition Commissioner van Miert reorganized DG-4, creating a cartel unit around that time; Commissioner Monti dates the resurgence in anticartel enforcement from 1998. The member states began separate enforcement of international cartels about 1997.

Figure 3 Rates of formation: European cartel episodes.



Source: Spreadsheet dated August 2005

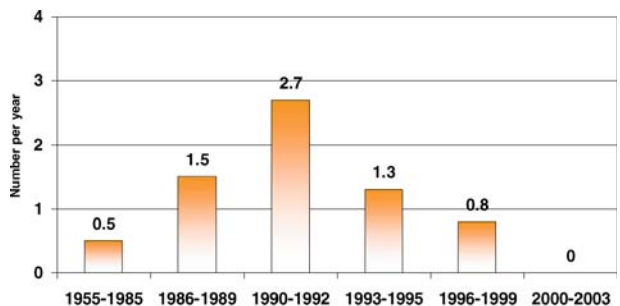
authority (guilty plea, indictment, fine, or consent decree). In other words, these percentages are indicators of how frequently investigations are kept secret by various antitrust authorities. Confidentiality is valued by defendants, some of which may be cleared by an investigation.

The percentages may reflect the investigative procedures of the antitrust authority or the tradition of reporting antitrust matters by various national press organizations. In the United States, grand jury proceedings are secret, but their existence may become known if someone asked to testify voluntarily reveals it. In the EU the opening of a formal investigation usually is preceded by a raid on the corporate offices of suspected cartel members. If these raids come to the attention of the press, the companies involved or the EC itself may issue press releases confirming the raids. In other cases an investigation takes place without raids or other public events.

On average, 33% of the investigations were kept secret until the day sanctions were announced. Secrecy was less common in matters being investigated by the European Commission than any other antitrust authority. The US grand jury system is somewhat more effective in maintaining confidentiality, but so are the non-public administrative hearings used by other European antitrust commissions. The frequent use of “dawn raids” by the EC makes most of its investigations public at an early stage of investigation.

Another pattern of note in Table 2 is the different degrees of confidentiality accorded suspected members of global cartels compared to more localized cartels. In North America there is a lower proportion of global-cartel investigations kept secret than domestic-cartel probes, whereas in all other jurisdictions the reverse is true. The main reason for this difference is the fact that the DOJ tends to be a first-

Figure 4 Rates of formation NAFTA area cartel episodes.



Source: Spreadsheet dated August 2005

Table 2 Cartel investigations kept secret by antitrust authorities.

Cartel geographic types	Location of antitrust authority				
	US Mean percent	Canada	EU	Other Europe	Other
Global scope	33 ⁴⁹	20 ²⁶	40 ⁴³	50 ²	5 ⁸
NAFTA area	48 ³¹	75 ¹²	–	–	0 ¹
EU wide	–	–	11 ⁴⁵	20 ⁵	–
European nations	–	–	0 ³	36 ⁵⁹	–
Africa, Asia & Latin America	–	–	–	–	53 ¹⁷
All regions	39 ⁸⁰	37 ³⁸	24 ⁹¹	35 ⁶⁶	36 ²⁶

Superscripts indicate number of prosecutions. Total is 301.

mover in investigating global cartels. The EC and other national antitrust authorities mostly react to investigations that began in the United States.

Table 3 contains data about the average length of investigations. The DOJ dispatches more localized cartels with amazing alacrity compared with more complex and challenging global-cartel cases. The US DOJ is typically the first mover in global cartel cases, followed first by Canada and second by the EC.²⁶ In the United States, the average time between “first notice” (generally news accounts of raids or leaks about grand-jury investigations) and the first cartel case to be sanctioned is almost four months for North American cases.²⁷ Prosecutions of global cartels are more difficult than for other international cartels. The time required by the DOJ is four times longer for global than for more localized cartels. However, the raid-to-sanction lag is far shorter in the United States than for EC cases, which take slightly more than two years for both global and regional cartels.²⁸ European national antitrust authorities investigate cartels fairly speedily (less than 7 months), which may be related to the smaller size of the cartels prosecuted, greater prosecutorial resources, or the familiarity of agencies’ staffs with local markets. Note that the European figures include only the period after a formal investigation begins. Prior to obtaining search warrants, an antitrust authority may spend many months determining probable cause (as in lysine and vitamins), though a few months is probably more typical.

The final analysis of speed concerns lags between jurisdictions in the case of overlapping prosecutions. In the lysine case, the DOJ began its undercover investigation in November 1992, raided corporate headquarters in June 1995, and negotiated the first guilty pleas in September 1996; EC fines came more than 5 years later. Are such long leader–follower lags typical?

Table 3 shows that the lysine case was atypically long. On average, the lag from the date a guilty plea is made in the United States to the date a cartel fine is imposed by the EC is 25 months. This is a minimum figure, because under

²⁶ In 18 instances, US action on global cartels predated EC action; in 15 cases, Canadian prosecution predated EC fines. In only three cases has the EC completed its work in advance of one of the North American authorities.

²⁷ News about a grand jury is often revealed at the same time a conviction is announced; these data report only on cases where there are no simultaneous announcements.

²⁸ Time series data are fairly thin, but there is some evidence that the EC is moving its cases through more rapidly in the 2000s than in the 1990s.

Table 3 Lags in international cartel enforcement, 1990–2005.

Cartel locational type	US Mean months	Canada	EU	Other Europe	
Lag from date of first notice ^a					
Global scope	15.1	10.7	27.1	–	
NAFTA area	3.7	10.0	–	–	
EU wide	–	0.0	26.3	–	
European nations	–	–	53.0	6.7	
Asia & Latin America	–	–	–	–	
Lag from jurisdiction to jurisdiction					
		US to Canada	US to EU	Canada to EU	US Govt.to Private
Global scope		9.5	25.2	6.3	17.8 ^b
NAFTA area		16.5	–	–	39.8
EU wide		–	–	–	–
European nations		–	–	–	–
Asia & Latin America		–	–	–	–

^a Measures the time between a raid that is reported publicly and the date the first corporate participant is fined. Cases of no lags are not calculated in these columns.

^b A mean of eight cases. In 15 other global cases settlements of private suits preceded US government suits by an average of 12.5 months.

cooperative arrangements in force since the 1990s, the EC is informed in advance about US programs in investigations on many cases; the average length of advance notification is unknown. Canada, on the other hand, responds far more quickly to the news of US guilty pleas or indictments. The CCB has had longer and more intimate working arrangements with the US DOJ, has had a corporate leniency program in place long before the EC, and unlike the EC does its work without protracted multi-stage administrative hearings.

Finally, Table 3 shows that negotiations that result in private settlements are lengthy, concluding about 18 to 40 months from the time a first criminal conviction is obtained.

4.3 Monetary sanctions relative to sales

From 1974 to 2004, changes in US antitrust laws have permitted notably higher fines.²⁹ Cohen and Scheffman (1989) provide useful historical benchmark data for US price-fixing fines. From 1955 to 1974 when the statutory maximum fine was set at \$50,000, the average fines for corporations and individuals amounted to only 0.4% of the cartel's affected sales. During 1974–1980, when the maximum corporate fine was raised to \$1 million, the average price-fixing fines rose to 1.4% of affected commerce. However, mostly as a result of plea bargaining, corporations paid average 1974–1980 fines of \$140,000, which represents an 86% discount from the maximum statutory fine. In the late 1980s the U.S. Sentencing Commission adopted guidelines that specified 20% of affected sales as the “base fine,” with several aggravating factors allowing fines to rise as high as 80% of affected sales and mitigating factors permitting downward departures that could drive the recommended fine to as low as 15% of affected sales (Connor and Lande, 2005). A survey

²⁹ DOJ antitrust officials have requested and testified in favor of these changes.

of cases in the mid 1980s reported average corporate U.S. price-fixing fines rose slightly to \$160,000 per company (Connor and Lande, 2005). In 1987, when price fixing was made a felony, it became possible for US courts to impose fines equal to double the antitrust damages.³⁰ The “double the harm” standard has been applied whenever fines exceed the statutory maximum. In 1990, the maximum corporate price-fixing fine was raised from \$1 million to \$10 million and in April 2004 to \$100 million.

In the United States, the DOJ has certainly responded to the demonstrated political will for greater cartel fines. Average antitrust fines for price fixing by international cartels since 1990, as a proportion of affected sales, have risen 11-fold since 1970–1980 and 40-fold since 1955–1974.³¹ In the EU, Canada, and other national jurisdictions active in sanctioning cartels, there have been few changes in laws permitting harsher fines in the last 20 or 30 years,³² yet average fines have pushed upward in those jurisdictions as well (Connor, 2004b).

There are 346 ratios of sanctions for international price fixing divided by a cartel’s affected sales available for analysis (Table 4).³³ In some cases, affected sales are known only for one or two jurisdictions but are unavailable for other parts of the world; these observations are reported under the appropriate jurisdiction(s). However, if reasonably accurate overcharge or sales figures cannot be found for one region in which a global cartel was known to operate, the total-sales column may not be computable; likewise, in a few cases global sales are known but not regional affected sales. If affected sales are only known as a range, the mid point is used. These ratios are systematically overstated because no adjustments are made for the time value of money.³⁴

On average for all types of cartels, the U.S. DOJ and CCB have imposed median³⁵ corporate fines equal to 11.1 and 16.9% of cartelized sales *in their jurisdictions*. The EC and European national agencies (overwhelmingly located within the EU) assess fines that average 2 to 6% of EU affected sales.³⁶ In North

³⁰ To be more precise, the fines are to be double the harm or double the illegal profits, *whichever is greater*. In the context of a particular cartel episode, the overcharge will be greater than or equal to the monopoly profits.

³¹ Few of these cases were international (Connor, 2004a).

³² The UK, Australia, and New Zealand seem to be the main examples.

³³ If a cartel operated in only one of the regions identified, the “total sales” ratio is double counted, but if a cartel fixed prices in two or more regions, then the total-sales ratio is unique. About half of the cartels have such ratios available.

³⁴ In general, fines and settlements are paid about two to four years after the cessation of overt collusion. The typical cartel successfully raises prices for 6 to 7 years, some much longer. Therefore, on average the profits from price fixing accrue roughly six years earlier than the years the sanctions must be paid. For example, in the frequently studied 1990–1999 global cartels in the bulk vitamins market, Bernheim et al. (2004) estimate that the net present value the cartels’ sales was 2.5 times the value of the money used to pay penalties in 1999–2004.

³⁵ The distribution of fines/sales ratios is positively skewed. Median fines for all types of cartels are lower than mean fines in every jurisdiction. In addition, while data on government fines are almost always made public, for cartels of all types and sizes, smaller private settlements are often unreported (because they are deemed not newsworthy) or news of them is delayed. In such situations, the *median* sanction is a better indicator of central tendency than the mean.

³⁶ This figure is within the range of 2 to 15% suggested as the typical EC practice in the 1990s (Wils, 2001). In most EU cartel cases, affected sales are calculated for the European Economic Area, which consists of the EU proper and those members of the European Free Trade Agreement that did not join the EU.

Table 4 Cartel sanctions relative to affected sales, 1990–2003.

Regional Cartel Types	Origin of Sanctions					
	US DOJ	CCB	EC	Other Govt. ^b	Private	Total ^c
	Median percentage ^a					
Global coverage	13.7 ³⁰	18.0 ²²	11.2 ²⁴	0.3 ⁴	24.6 ³²	6.2 ⁴⁴
EU-wide	–	1.5 ¹	2.2 ²⁵	–	–	2.1 ²⁵
European nations	–	–	2.4 ¹	3.1 ²⁴	6.7 ¹	3.0 ²⁹
North America	7.0 ¹⁴	13.1 ⁶	–	45.2 ¹	5.0 ¹⁷	7.7 ²⁵
Other regions	–	–	–	1.9 ¹⁰	45.3 ¹	2.1 ¹⁰
Median All types	11.1 ⁴⁴	16.9 ²⁹	5.9 ⁵⁰	2.4 ³⁹	12.5 ⁵¹	3.5 ¹³³

^a The median of the sanction/sales ratio. If either is a range, the midpoint of the range is used. The “private” column shows treble-damage suits.

^b Prosecutions by other national competition authorities include Italy (3.0%, median of 15 cases), Germany (9.5%, 4 cases), the Netherlands (3.4%, 3 cases), Sweden (2.9%, 2 cases), Norway (0.5%, 2 cases), Finland (4.5%, 1 case), Australia (2.4%, 1 case), France (0.4%, 3 cases), Korea (1.6%, 5 cases), Japan (1.25%, 1 case), UK (6.7%, 1 case), Hungary (3.4%, 1 case), Romania (3.0%, 1 case), Czech Republic (0.3%, 1 case), and Israel (0.2%, 1 case).

^c The number of observations sums vertically but not necessarily horizontally because total sales may refer to affected sales from one or two jurisdictions or to global geographic markets.

Source: Author’s spreadsheets of August 2005; superscripts indicate the number of observations.

America, private treble-damage suits against international cartels have won settlements that average 12.5% of affected commerce.³⁷ Thus, in the United States (and two or three cases in Canada) public fines and private recovery have typically amounted to about 25% of affected commerce—more than quadruple the European rates.

There is some variation in sanction rates by geographic location. Global cartels prosecuted by the US DOJ negotiated fines that averaged 13.7% of US affected sales, almost double the rate imposed on domestic conspiracies.³⁸ Recall that the guidelines for cartel fines start with a base fine that is 20% of affected US sales, and that fine ranges are supposed to be invariant to whether a cartel is global or national in its reach. This finding suggests that the DOJ and supervising judges are dispensing less generous downward departures from the guidelines’ ranges and applying higher culpability scores to global cartels than to domestic conspiracies.³⁹ Moreover, private plaintiffs in North America that sued global cartels extracted payouts were almost *five times* (24.6%) the settlement rates of more localized conspiracies (5%).⁴⁰ The

³⁷ Canada and the United States are virtually alone in the world in having legal systems that encourage private antitrust suits. Australia had one private damages suit against an international cartel (the vitamins cartel) in 2003, but similar suits are negligible or unknown in the rest of the world.

³⁸ Recall that although these “domestic” cartels affected prices only in North America, each of the domestic cartels had some non-US members.

³⁹ Connor (2004a) confirms with a much larger data set that throughout history international cartels have displayed significantly higher overcharge rates than domestic price-fixing schemes. Yet, this factor is not formally part of the criteria for setting cartel fines. The limited data available also suggests that, adjusted for market share, foreign-owned cartelists are not paying higher fines than participants headquartered in the United States.

⁴⁰ Class counsel frequently boast of settlements above 5% of affected sales, citing them as exceptionally high.

same pattern of collecting proportionately higher fines (per euro of EU affected sales) from global cartelists than from intra-EU cartels is observed in EC decisions. However, in Canada the difference in the intensity of fines imposed on global cartels as compared to local conspiracies is not so striking.⁴¹

The “Total” column of Table 4 tells a different story. The size of all monetary sanctions relative to a cartel’s sales in every region where it colluded is far lower—the median is only 3.5%. There is a dichotomy between cartels that affected markets in North America and those on all other areas. Cartels that colluded in Canada and the United States—including all the global cartels—paid median penalties of 6 to 8% of their total affected sales. However, cartels that had no operations in North America paid median sanctions of only 2 to 3% of their total affected commerce. Given that overcharges of cartels fixing prices in Europe, Asia, Africa, and Oceania have historically been higher than those in North America, anticartel sanctions are less likely to deter in the Old World than in the New World (Connor, 2004a).⁴²

Of the 44 global cartels that were sanctioned in at least one jurisdiction, 14 were quadruple-sanctioned: criminally by the United States and Canada, administratively by the EU, and civilly in the USA. These are the “Poster Children” of worldwide anticartel enforcement—the examples cited by defendants’ counsel as dreaded examples of excessive prosecutorial zeal (e.g., Denger, 2003, 2005). Despite the geographically broad pattern of sanctions, these cartels paid mean monetary penalties of only 16.3% of the cartels’ global sales. An important feature of many global cartels is that they affected commerce in Asia, Australia, Latin America, and Africa (Connor, 2001, 2003). Discovered global cartels were usually sanctioned in North America and the EU, but rarely fined in the other continents.⁴³ There is, moreover, evidence that global cartels achieve higher overcharges in precisely those countries with weak or nonexistent antitrust regimes (Clarke and Evenett, 2003). These considerations point to a key factor that may explain why the historically high penalties in North America and Europe since 1990 do not yet deter global-cartel formation: even if antitrust detection has improved in the last decade, expected profits net of penalties are still large in the continents with weak anticartel enforcement.⁴⁴

Although monetary payouts for illegal cartel conduct have risen relative to earlier decades, how can we tell if the penalties are high or low? To assess the contemporary effectiveness of cartel penalties, I turn to data set on average achieved overcharges of private cartels that is as close to a universe of overcharge estimates that can be found in the economics literature. Connor (2006: Table 8) summarizes the overcharge rates (overcharges as a percentage of affected sales) for 770 cartel episodes according to their principal arena of operations.⁴⁵ In the third row of Table 5 the median penalty/

⁴¹ This result is driven in part by very high fines in a few national bid-rigging cases where the government was the victim. Moreover, Canadian cartel prosecutions involve a higher proportion of foreign participants than other jurisdictions.

⁴² There is every reason to suspect that the probability of discovery and conviction of cartel activity is lower in the Old World as well, which only reinforces this conclusion.

⁴³ Small fines were imposed by Australia and Korea for three of the 16 vitamins cartels.

⁴⁴ Simple Beckerian optimal-deterrence principles suggest that with cartel penalties averaging 16% of sales, with prosecution anticipated overcharges above 16% will not deter; alternatively with detection rates of 10 to 33%, expected cartel profits of only 1.6 to 5.3% of sales will motivate cartel formation. The vast majority of international cartels have higher returns (Connor and Lande, 2005). For a more nuanced optimal-deterrence analysis, see Wils (2006).

⁴⁵ The correspondence between the geographic regions in Tables 4 above and Table 8 of Connor (2006) is not perfect. The latter has a global-cartel category.

Table 5 Cartel penalties relative to cartel overcharge rates, by jurisdiction.

Ratio	Jurisdiction Imposing Sanctions					
	US DOJ Median percentage	Canada	EU	Other Govt.	Private	Total ^a
Penalties/Sales	11.1	16.9	5.9	2.4	12.5	3.5
Overcharges/Sales	20.3	20.3	42.7	20.1	20.3	24.6
Penalties/Overcharges ^b	55	83	14	12	62	14

^a Overcharge refers to the median of international cartel episodes that ended in 1990–2003.

^b The ratio of the first row to the second row of this table.

Sources: Table 4 above and median overcharges from Connor (2006: Table 8 and Figure 11).

sales ratios are compared to the median overcharge/sales ratios of the larger sample. By this criterion, settlements from private suits in North America do not on average fully compensate plaintiffs, but when added to US and Canadian fines, total penalties provide modest punitive damages. The EU and “other governments” (mainly Europe) are the least effective jurisdictions. European fines disgorge merely 12 to 14% of average overcharges. Because of the absence of penalties in most jurisdictions outside North America and the EU, on average only 14% of international-cartel overcharges are returned as antitrust penalties for the world as a whole.

To summarize, multi-continental cartels have generally experienced markedly higher sanctions relative to affected sales than more localized international cartels. Since 1990 the antitrust agencies of North America have levied median fines of 11 to 17% of jurisdictional affected sales. Private treble-damage suits in the United States recovered about 13% of US affected commerce. Private and government penalties combined approached double damages in North America. However, in all other jurisdictions government antitrust authorities have imposed median fines of only 2 to 6% of affected sales. These fines are low shares of the damages incurred, especially in the EU, and are not reinforced by civil liabilities. The median antitrust outlays from all sources public and private are a modest 3.5% of cartel sales in all the regions where price fixing occurred.⁴⁶ Because overcharges worldwide are several times larger than penalties, specific deterrence of global cartels is clearly suboptimal.

4.4 Sanctions relative to injury

Injury is measured by the average monopoly overcharge achieved by a cartel during the entire conspiracy period.⁴⁷ These figures range in their degree of precision and are in many cases recorded as fairly wide ranges. Estimates are available for 79 cartels. However, for many global cartels separate estimates are available for two or

⁴⁶ Recall that all these ratios are developed from nominal monetary figures. In net present value terms these ratios should be lowered by one-third to one-half.

⁴⁷ Adding the dead-weight or “social” loss due to price fixing would lower these ratios by 10 to 30%. Taking into consideration the unknown effects of umbrella pricing would raise the reported ratios, possibly by similar proportions. Peak overcharge rates (not shown here) are typically 50 to 100% higher than full-period overcharges (Connor 2004b).

Table 6 The severity of sanctions relative to the degree of injury.

Type of cartel	Origin of sanctions					
	US Median percent ^a	Canada	EC	Other govt.	Private suit	Total
Global scope	43.8 ²⁰	73.9 ¹⁸	43.6 ¹⁴	0.5 ⁶	124.2 ²³	42.3 ²⁹
No. America	12.5 ⁷	75.5 ²	–	–	49.3 ¹¹	40.9 ¹³
Other regions ^b	–	16.7 ¹	6.1 ¹⁵	36.2 ⁸	–	17.6 ²⁴
Govt. bid rigging ^c	141.2 ¹	111.8 ¹	–	28.8 ¹⁰	60.0 ¹	45.1 ¹³
All types	43.8 ²⁸	73.9 ²²	31.7 ²⁹	12.4 ²⁴	105.9 ³⁵	39.8 ⁷⁹

^a Based on a total of 217 observations. Superscripts indicate the number of observations. Observations in the “Total” column are unique if two or more sanctions were imposed on a given cartel.

^b Mostly Europe

^c The sample contains 35 government bid-rigging cartels; the rows above have private-sector buyers.

more of the continents on which they fixed prices. Therefore, Table 6 contains 217 estimates. *Median* measures of the sanction/overcharge ratios are preferred to the mean because of evident skewness in these ratios.⁴⁸

The median total sanction (government and private) on all types of international cartels is 39.8% of the estimated global overcharges—less than half of single damages.⁴⁹ There is considerable variation in the severity of government fines across jurisdictions. Again we see a dichotomy between the antitrust authorities in North America and those elsewhere: Canada has the harshest fines (74% of Canadian damages), followed by the United States (44%), the EC (32%), and those of other governments (12%) the lowest. Private settlements in the United States are slightly above single damages for global conspiracies but well below single damages for localized cartels;⁵⁰ US government and private penalties together amount to almost 150% of US damages.⁵¹ Outside North America, because there are virtually no private antitrust actions, international cartels pay out one-third or less of their overcharges. Less than 20% of the sampled cartels pay penalties in excess of single damages.

⁴⁸ The reader should note that the sizes of some of these sub-samples are perilously small to be highly confident about some differences. Note that a similar comparison of penalties and overcharges in Table 5 above is based on a larger number of grouped observations, but the ratios Table 6, because they are derived from cartel-level data, are more precise.

⁴⁹ It is possible that governments may treat bid-rigging against themselves with greater than average severity. Although there are only two such observations, US and Canadian government bid-rigging sanctions averaged two to three times the sanctions inflicted on cartels directed at private buyers. However, in Europe, government bid-rigging is not treated more harshly.

⁵⁰ This point was made about settlements a decade ago by Landes (1993). However, this paper does not adjust for the absence of prejudgment interest and other factors that lower the sanctions/damages ratio.

⁵¹ Under the most extreme application of US laws, an international cartel could in principle be liable for about 1200% of its US price-fixing damages. The DOJ can impose a fine based on double the domestic US harm and then use the cartel’s *global affected sales*, which is typically three to four times domestic sales (see Connor, 2003). Direct purchasers are entitled to treble damages, and indirect buyers to an equal amount in those states with *Illinois Brick* repealers. The total of the three sets of penalties is 10 to 12 times US damages. Thus, actual US cartel fines and settlements of 150% of damages since 1990 are about one-eighth of the theoretical legal maximum.

In the previous section global cartels were found to have a relatively high sanctions/affected sales ratios. Global cartels frequently are indicted in three or more jurisdictions, so one might expect their combined sanctions to be a much higher share of damages than more localized schemes. This turns out to be the case for prosecutions by the United States and the EU. Other European and Canadian sanctions were more lenient for global cartelists than the local ones. Private parties bringing suits against international cartels were more successful in settling with global conspirators than with those engaging in more localized conspiracies. Overall, the sanctions on global cartels as a proportion of damages are not much different than those on other international cartels.

From a historical perspective, cartel defendants are certainly suffering greater absolute monetary costs for antitrust violations than a few decades ago.⁵² The main reason is harsher penalties in North America, but in part that trend may be attributed to fines imposed by the EU and its Member States. By 2003 the EU's fines on international (including intra-EU) cartels had accumulated to \$3.6 billion (Connor, 2004a). Most European national competition authorities have become active in prosecuting cartels only in the last 5 or 10 years, yet these and other national authorities have imposed fines of at least \$1.5 billion on international cartels. For the United States, international-cartel fines from 1990 to 2003 amounted to \$2.3 billion.

Upward trends in themselves imply little about the deterrence power of corporate anticartel sanctions.⁵³ Indeed, as mentioned in the Introduction, these trends have led several commentators to conclude that current antitrust penalties are over-detering. Yet, the facts that dozens of international cartels continue to be discovered each year and recidivism is rampant suggest that under-deterrence is more typical (Connor, 2003). More importantly, the little that is known about cartel detection implies that to effectively deter, penalties should be three to ten times a cartel's global damages (Connor, 2005). This suggests that under-deterrence may be typical.

Connor and Lande (2005) have attempted to bridge this gulf by confronting US sentencing practices with an unparalleled amount of cartel-overcharge data. A principle conclusion is that international cartels successful in raising prices have typically overcharged buyers by about 43% of affected sales. Factoring in the probability of detection⁵⁴ suggests that an optimal fine should average 130 to 430% of damages. The distributions shown in Table 7 show that over-deterrence could have occurred in only a small minority of the instances. Only 8% of international cartels paid total world-wide penalties of 150% of damages or higher. Under-deterrence is far more typical in the sample.

⁵² Longer-term trends in the severity of fines would be desirable, but I have found only one earlier study of the ratio of fines to damages, an internal US DOJ survey by Sheer and Ho (1989) that found that the average 1988 corporate price-fixing fine was a mere 0.36% of the overcharges. The data in Table 6 show that US fines on international cartels since 1990 have been a hundred times harsher than those in 1988.

⁵³ I omit non-corporate sanctions in this paper. Only the United States has applied significant monetary and penal sanctions on individual managers, but incorporating individual penalties into a comprehensive deterrence assessment greatly complicates the analysis.

⁵⁴ Connor (2003: 67–68) found six estimates of or opinions about cartel-detection rates from US and European sources. The range was 10 to 33%. For some of the most common felonious property crimes (burglary, auto theft, and arson), US arrest rates in the 1990s vary from 13.8 to 16.5%, well within the range adopted here.

Table 7 Size distribution of international-cartel penalty/overcharge ratios.

Size range Percent	US Percent of column	Canada	EC	Other Govt.	Private Suit	Total
Zero	35	24	25	41	8	4
0.1–9.9	9	0	21	26	11	27
10–49.9	33	27	26	18	13	34
50–99.9	14	24	18	3	16	16
100–149.9	9	17	5	3	32	11
150–199.9	0	3	0	8	13	6
200 plus	0	3	5	3	8	2
Total	100	100	100	100	100	100

Source: Same as Table 6 above.

5 Summary and policy implications

Four indicators of the effectiveness of anti-cartel enforcement across five broad jurisdictions are devised and applied to information on international cartels discovered since 1990. First, the annual rate of newly formed cartels peaked in 1990–1992 for those cartels active either globally or in North America; observed cartel formations peaked slightly later in the EU. These temporal patterns correspond to significantly enhanced powers to detect and punish cartels in the respective jurisdictions.

Second, the characteristics of anti-cartel investigations vary across jurisdictions. Confidentiality of price-fixing investigations is highest for domestic cartels in North America and lowest for all types of cartels investigated by the European Commission. On average, slightly less than two-fifths of all international investigations are kept secret until the decisions are made public. With respect to the length of time spent on investigations, national antitrust authorities in all parts of the world take about 3 to 12 months to announce an initial decision. The European Commission's procedures require about 3 years for the average investigation. Assuming that antitrust authorities are equally error-prone, defendants would generally prefer quick, confidential investigations.

Third, as a proportion of affected sales in the jurisdiction, the combined effects of government fines and private settlements accrue to 24% in the United States and 29% in Canada. However, in all other jurisdictions penalties average from 2 to 6% of affected sales. Because of the low penalties outside North America, global cartels incur very small monetary penalties—about 4% of their world-wide affected commerce. Only a small minority of international-cartel penalties exceed the damages created by typical cartels.

Fourth, and most important for assessing deterrence, optimal penalties for modern international cartels are calculated to lie somewhere in the range of 130 to 430% of damages. Only about 10% of all actual penalties imposed by the world's antitrust authorities in 1990–2005 were inside the optimal range. The remaining observations fell in the sub-optimal range.

Given that specific-deterrence penalties are by and large sub-optimal, the objective of anti-cartel policies should be to lower the expected benefits (profits) of cartel behavior or raise the probability of detection and costs (penalties) of price fixing.

Other than vigilance in merger control, public policies can do little to change the structural features of markets that make cartels profitable, such as, inelastic demand, large numbers of buyers, sunk costs of entry, product homogeneity, and so forth. Policies can sometimes have salutary effects on exchange conditions, such as the publication of transaction prices in markets characterized by lack of transparency. However, in light of the effectiveness of sanctions noted above the principal role for antitrust is to develop rules, laws, and investigative procedures that make defections more likely, detection surer, and punishment harsher than at present.

It is clear from the geographic location of global cartel meetings that, as a general rule, United States territory was avoided because of its well-deserved reputation for tough anticartel enforcement. Instead, conspirators met in Switzerland, Mexico, Japan, Hong Kong, and several EU cities that were regarded as less risky. This behavioral pattern is an indicator that US detection rates are relatively high.

One investigative technique that has proven especially useful in discovering cartels is the DOJ's 1993 nondiscretionary Corporate Leniency Program (Delrahim, 2004). Similar programs have been subsequently adopted in more than ten other jurisdictions.⁵⁵ These policies increase the probability that cartel defectors will inform authorities about otherwise clandestine cartels (Spagnolo, 2006).⁵⁶ A novel variation is the "Amnesty Plus" program that rewards indicted companies if they inform the DOJ about collusive activity in a market not yet being investigated. More than three leniency applications per month were received by the DOJ in early 2003 (Pate, 2003). In 2006 the EC had a backlog of 80 such applications (Joshua, 2006). Kovacic (2001) has suggested extending the corporate leniency program by giving bounties to individuals who provide information about hidden cartels.

A second policy change that could increase effective cartel penalties concerns the status of wholly foreign purchasers from global cartels under the Sherman Act. In particular, should a non-US entity that buys cartelized products at artificially high prices outside the United States be permitted to seek treble damages in US courts? If such purchases are necessary in order to maintain the high US prices, the language of the Sherman Act would appear to permit standing by wholly foreign buyers (Bush et al., 2004). Permitting wholly foreign buyers to use US courts would by itself increase the expected financial losses from global cartels and, thus, increase deterrence.⁵⁷ Within the EU a similar issue is whether to permit plaintiffs in civil suits to form class actions and seek the most convenient legal forum in the Union.

Other policies that could increase cartel policies include basing fines on multiples of overcharges rather than arbitrary sales percentages, sharply increased penalties

⁵⁵ Spagnolo (2006: note 10) agrees with Hammond (2004) that the more mature US corporate leniency program has to date been the most effective in raising the perception among international cartel participants (many of them US companies) that the probability of detection is highest in US territory. Out of hundreds of known locations of conspiracy meetings, those held in the United States are rare.

⁵⁶ Spagnolo's position derives mainly from game theoretic considerations, because direct empirical verification of the effects of leniency programs is quite slim.

⁵⁷ On the other hand, such suits might strain US judicial resources or might have a negative impact on the number of DOJ leniency applications by international cartelists. Leniency applications might decline in the short run because the DOJ has no authority to intervene in private suits, and permitting wholly foreign plaintiffs to sue for treble damages would increase potential applicants' liability. The net effects on deterrence of these opposing forces is a matter in need of empirical analysis, but Stiglitz and Orszag (2004) conclude from economic principles that standing for wholly foreign buyers in US courts will tend to increase global-cartel deterrence.

for recidivists, encouragement of private damages suits, and wider use of criminal indictments for antitrust violations.⁵⁸ This last initiative is especially important because it reduces the number of safe havens for fugitives from antitrust jurisdictions that regularly indict individuals for cartel conduct.

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Appendix

Table 8 Sample

Continent	Geog location	Probe active over	Consent decree	Final	Market
NO	US				Adhesive label stock, US
NO	US		1	1	AIIC (Assn. Intl. Interpretes) US
GLOBAL	GLOBAL	1			Aluminum flouride ^m
AS	JP	1			Aluminum foil, JP ^m
GLOBAL	GLOBAL		1	1	Aluminum Metal
WE	US			1	Aluminum Phosphide, US
NO	US			1	Anti-anxiety drugs, US
WE	FI			1	Asphalt paving, Finland
WE	SW	1		1	Asphalt, Sweden ^m
WE	IT			1	Auditing services, IT
GLOBAL	GLOBAL	1			Automotive Refinishing Paint ^m
WE	FR			1	Ball and roller bearings, FR
WE	EU	1			Bananas ^m
GLOBAL	GLOBAL	1			Bathroom and kitchen fixtures ^m
AS	KO			1	Batteries manufacturing, auto, Korea
WE	FR			1	Beef, France
WE	EU		1		Beer, Belgian, HORECA channel
WE	EU				Beer, Belgian, Retail Private Label
WE	EU	1		1	Beer, Denmark ⁿ
WE	EU	1		1	Beer, France, HORECA ^f
WE	EU	1		1	Beer, Italy ⁿ
AS	KO			1	Beer, Korea
WE	EU			1	Beer, Luxembourg, HORECA
WE	EU	1			Beer, Netherlands, HORECA ^m
WE	EU	1			Beer, Portugal, HORECA ^m
WE	EU		1	1	Beer, Spain, HORECA ⁿ
GLOBAL	GLOBAL			1	Beta Carotene
WE	NL			1	Bicycles, NL
GLOBAL	GLOBAL			1	Biotin (Vitamin H)
WE	EU	1			Bitumen in NL, BL, and ES ^m
WE	SW			1	Bitumen, Sweden

⁵⁸ These policy reforms are especially needed in Japan (which until 2006 had an arbitrary maximum fine of 6% of sales for price fixing by manufacturers) and other industrialized Asian countries (Chemtob, 2000; Hammond, 2001).

Table 8 (Continued)

Continent	Geog location	Probe active over	Consent decree	Final	Market
LA	BR	1			Blood products, Brazil ^m
WE	EU			1	British sugar
NO	US			1	Bromines, US (possible EU)
WE	DE			1	Cable, high-voltage, Germany
NO	US			1	Cable-stayed bridges, US ⁿ
WE	EU	1			Calcium carbide ^m
NO	US			1	California bridge, US ⁿ
GLOBAL	GLOBAL			1	Canthaxanthin
GLOBAL	GLOBAL	1			Carbon black
GLOBAL	GLOBAL		1		Carbon cathode block
GLOBAL	GLOBAL	1			Carbon Electrical Product ^m
GLOBAL	GLOBAL		1	1	Carbon Fiber
OC	AU	1			Cardboard boxes, AU+NZ ^m
NO	US		1	1	Cardizem CD hypertension drug, US
WE	EU			1	Cartonboard
WE	IT			1	Cell phones, IT
WE	EU			1	Cement, white and gray
WE	DE			1	Cement I, Germany
WE	DE	1			Cement II, Germany ^m
LA	BR	1			Cement, Brazil ^m
EE	HU			1	Cement, Hungary
WE	IT			1	Cement, Italy (Lombardy)
AS	KO			1	Cement, Korea
NO	CA			1	Cement, Quebec, Canada
EE	RU			1	Cement, Romania
GLOBAL	GLOBAL			1	Choline chloride (Vitamin B4) ^f
WE	IT			1	Cigarettes, Italy
AS	JP		1	1	Circuit plates, printed, Japan
GLOBAL	GLOBAL			1	Citric Acid
EE	CZ			1	Coffee wholesaling, Czech Republic
EE	HU			1	Coffee wholesaling, Hungary
NO	CA			1	Compressed gas, CA
WE	NL			1	Compressed gases, NL
OC	AU			1	Compressors, Australia
WE	DE			1	Concrete, Eastern Germany
WE	NL			1	Construction of athletic tracks, NL
WE	UK	1			Construction, flat roof et al., UK ^m
NO	US			1	Construction, marine, US ⁿ
WE	NL	1			Construction, Netherlands ^m
GLOBAL	GLOBAL	1			Construction, Nigeria LNG plants ^m
WE	NO	1			Construction, Norway ^m
AF	AF			1	Construction, USAID in Egypt ⁿ
GLOBAL	GLOBAL		1		Copper Concentrate ^m
WE	EU	1		1	Copper plumbing fittings ^m
WE	EU			1	Copper tubes, industrial
WE	EU			1	Copper tubes, plumbing
NO	US		1	1	Corn Glucose Syrup, US
NO	US			1	Cosmetics, “prestige,” US
GLOBAL	GLOBAL	1			Creosote ^m
WE	EU			1	Danish air routes
WE	IT			1	Diabetes testing devices, IT
GLOBAL	GLOBAL			1	Diamonds, Industrial
WE	IT			1	Diesel Fuel, IT
AS	IL		1		Digital switches, Israel
WE	FR			1	Distribution, electrical appliances, FR

Table 8 (Continued)

Continent	Geog location	Probe active over	Consent decree	Final	Market
GLOBAL	GLOBAL	1			DRAMs ^m
NO	US	1			Drugs, over-the-counter, US ^m
GLOBAL	GLOBAL	1			DVD Players, 3C Pool ^m
WE	IT			1	Elevator repairs, IT
WE	EU	1			Elevators ^m
WE	FR	1			Employment services, FR ^m
WE	NL	1			Engineering services, NL ^m
GLOBAL	GLOBAL	1			EPDM, Synthetic Rubber ^m
WE	EU			1	Euro-Zone banks
AS	KO			1	Excavators manufacturing, Korea
NO	US			1	Explosives, commercial, US
NO	US			1	Ferrosilicon, US
WE	EU			1	Ferry services, Adriatic
WE	EU			1	Ferry services, English Channel
WE	EU	1			Ferry services, Nordic ^m
AF	ZA	1			Fertilizer, nitrogen, So. Africa ^m
GLOBAL	GLOBAL			1	Fine Arts (Art Auction Houses)
NO	US			1	Flat glass, US
GLOBAL	GLOBAL			1	Folic Acid (Vitamin B9)
AS	KO			1	Forklift manufacturing, Korea
NO	US	1		1	Foundry resins, US
WE	IT			1	Gas water heaters, IT
LA	MX			1	Gas, liquid propane (LPG), Toluca, Mex.
LA	CL	1	1?		Gasoline, Chile
EE	CZ			1	Gasoline, Czech Republic
WE	FR			1	Gasoline, FR
WE	IT			1	Gasoline, IT
WE	NL			1	Gasoline, NL
WE	ES			1	Gasoline, Spain
WE	SW			1	Gasoline, Sweden
WE	UK	1			Generic drugs, warfarin & penicillin ^m , UK
WE	IT			1	Glass (food) containers, IT
NO	US			1	Glass containers, US
WE	EU	1			Glass, flat and auto ^m
GLOBAL	GLOBAL	1			Glyphosate herbicide
NO	NO AM				Glyphosate, North America
GLOBAL	GLOBAL			1	Graphite Electrodes
GLOBAL	GLOBAL			1	Graphite, Extruded
GLOBAL	GLOBAL			1	Graphite, Isostatic Specialty Products
NO	US	1		1	High Fructose Corn Syrup, US
WE	NO			1	Hydro-Electric power equipment, NO
WE	EU	1			Hydrogen peroxide, derivatives II ^m
WE	IT			1	Infant Formula (Episode 1), Italy
WE	IT			1	Infant Formula (Episode 2), Italy
NO	CA			1	Insecticide, BT, CA
NO	CA			1	Insecticides, Syn. Forest, CA
NO	US	1			Insurance brokers, commercial, US ^m
WE	DE	1			Insurance, industrial property, DE ^m
WE	NL	1			Insurance, NL ^m
WE	IT			1	Insurance, non-life, Italy
EE	LI	1			Intravenous solutions, Lithuania ^m
NO	CA		1	1	Iron oxide, Canada
NO	CA			1	Iron pipe, Canada
WE	IT	1			Jet fuel, Italy ^m
NO	US			1	Linerboard, US

Table 8 (Continued)

Continent	Geog location	Probe active over	Consent decree	Final	Market
GLOBAL	GLOBAL			1	Lysine
NO	US			1	Magnetic audio tape, US
GLOBAL	GLOBAL	1			Magnetic Iron Oxide (MIO) ^m
NO	NO AM			1	Maltol, Synthetic, North Am.
WE	IT		1		Matches, IT
GLOBAL	GLOBAL				MCAA
GLOBAL	GLOBAL			1	MCC (microcrystalline cellulose)
GLOBAL	GLOBAL			1	Methionine
GLOBAL	GLOBAL			1	Methylglucamine
WE	EU	1			MMA (methyl methacrylate) ^m
WE	FR	1			Mobile phone operators in FR ^m
WE	NL			1	Mobile phone operators in NL
WE	UK	1			Mobile phone operators in UK ^m
WE	EU	1	1?		Mobile phone roaming fees, UK, DE ^m
NO	US	1			Moving and storage, Germany–US
GLOBAL	GLOBAL			1	MSG
GLOBAL	GLOBAL	1			Naphthalene ^m
WE	DE	1	1		Natural Gas, I, DE ^m
WE	DE	1			Natural Gas, II, DE ^m
GLOBAL	GLOBAL	1			Nitrile Rubber ^m
GLOBAL	GLOBAL				Nucleotides (Nucleic Acid)
GLOBAL	GLOBAL	1			Organic peroxides ^m
WE	EU	1			Oxo-alcohols ^m
NO	CA	1			Paper, Canada ^m
WE	EU			1	Paper, carbonless
WE	EU	1			Paper, cores ^m
WE	NO			1	Paper, corrugated cardboard, Norway
WE	EU		1		Paper, newsprint ^p
WE	EU	1			Paper, procurement of roundwood ^m
GLOBAL	GLOBAL	1			Paper, Publication (a/k/a Magazine) ^m
WE	EU	1			Paper, recovered ^m
GLOBAL	GLOBAL	1			Paper, Release Liner ^m
NO	NO AM			1	Paper, thermal fax, US and CA
GLOBAL	GLOBAL	1			Paraffin wax ^m
GLOBAL	GLOBAL	1			Parcel Tankers, Chemical Shipping ^m
WE	EU		1	1	Pay TV rights ^p
WE	IS	1			Petroleum, Iceland ^m
AS	JP		1?	1	Petroleum, Military fuel, JP
AS	KO			1	Petroleum, Military fuels, Korea
WE	IT			1	Pharmaceuticals, cholesterol, IT
WE	IT			1	Pharmaceuticals, obesity, IT
WE	IT			1	Pharmaceuticals, respiratory, IT
AS	US		1	1	Philippines telecom, US
WE	EU			1	Plasterboard
GLOBAL	GLOBAL	1			Plastic Additives: Heat Stabilizers ^m
GLOBAL	GLOBAL	1	1		Plastic Additives: Impact Modifiers ^m
NO	NO AM			1	Plastic dinnerware, US and CA
WE	EU	1			Plastic sacks, industrial ^m
GLOBAL	GLOBAL	1			Polychloroprene syn. rubber ^m
NO	US	1			Polyester staple, US and CA ^m
WE	EU	1			Polyethylene film ^m
NO	US	1			Polyols, polyester aliphatic, US ^m
WE	EU			1	Polypropylene plastic
AS	JP		1?	1	Polypropylene, Japan
WE	NL			1	Prawns, Netherlands

Table 8 (Continued)

Continent	Geog location	Probe active over	Consent decree	Final	Market
WE	EU	1	1?	1	Printer ink refill cartridges ^m
NO	US	1	1?		Printing, Holographic, US ^m
WE	EU			1	PVC (polyvinyl-chloride) plastic
WE	IT			1	Radiological media, IT
WE	IT			1	Recorded music, IT
GLOBAL	GLOBAL	1			Rubber Processing Chemicals ^m
NO	US		1	1	Seeds, Genetically Modified, US
WE	EU			1	Sewing needles
GLOBAL	GLOBAL			1	Shipping (Europe/Cent. W. Africa)
GLOBAL	GLOBAL			1	Shipping (Europe/Far East)
GLOBAL	GLOBAL			1	Shipping (French/African)
GLOBAL	GLOBAL		1	1	Shipping conference FEFC
WE	EU			1	Soda ash (sodium carbonate)
NO	NO AM			1	Sodium Erythorbate, North Am.
GLOBAL	GLOBAL			1	Sodium Gluconate
GLOBAL	GLOBAL			1	Sorbates
WE	NL			1	Special concrete foundation eng., NL
NO	US	1			Spun yarn, open end, US ^m
GLOBAL	GLOBAL		1	1	Stamp Auctions (Episode 1)
GLOBAL	GLOBAL	1			Stamp Auctions (Episode 2)
WE	IT			1	Steel bars, concrete reinforcing , IT
WE	EU			1	Steel beams
WE	EU			1	Steel pipes, insulated heating
WE	EU			1	Steel tubes ("oil country tubes")
WE	EU			1	Steel, flat stainless
NO	US	1			Sulfuric acid, US ^m
WE	EU	1			Switchgear, gas insulated ^m
GLOBAL	GLOBAL			1	TACA (Europe/No.Atlantic Shipping)
NO	US			1	Tactile tile, US
NO	US			1	Tampico Fiber, US
GLOBAL	GLOBAL				Tar Pitch ^m
AS	KO			1	Telephone services, Korea
GLOBAL	GLOBAL		1	1	Three Tenors CD
AS	JP	1			Tire manufacturing, JP ^m
NO	US			1	Tobacco Leaf, US
WE	EU			1	Tobacco processing, Spain
WE	UK			1	Toys and games, UK
WE	FR	1			Toys, France ^m
OC	AU			1	Transformers, power and distn, E. AU
WE	EU	1			Transport, English Channel ^m
AS	IL			1	Transportation, diamonds, intl., Israel
NO	US			1	Transportation, marine, US ⁿ
NO	US			1	Tubes, laminated, US
GLOBAL	GLOBAL	1			Urethane Plastics ^m
AS	JP			1	Vinyl food wrap, Japan
GLOBAL	GLOBAL			1	Vitamin A
GLOBAL	GLOBAL			1	Vitamin B1
GLOBAL	GLOBAL			1	Vitamin B12
GLOBAL	GLOBAL			1	Vitamin B2
GLOBAL	GLOBAL			1	Vitamin B3 (Niacin)
WE	EU			1	Vitamin B4 (Choline Chloride) Europe
NO	NO AM			1	Vitamin B4, North America
GLOBAL	GLOBAL			1	Vitamin B5 (Calpan)
GLOBAL	GLOBAL			1	Vitamin B6
GLOBAL	GLOBAL			1	Vitamin C

Table 8 (Continued)

Continent	Geog location	Probe active over	Consent decree	Final	Market
AS	CN	1			Vitamin C, US imports from China ^m
GLOBAL	GLOBAL			1	Vitamin D
GLOBAL	GLOBAL			1	Vitamin E
GLOBAL	GLOBAL			1	Vitamin premixes
GLOBAL	GLOBAL			1	Vitamins, total [subtotal]
WE	DE	1			Waste collection, Germany ^m
NO	NO AM	1			Window coverings, PVC, US+ CA ^m
GLOBAL	GLOBAL	1?	1	1	Wine Alcohol,EU Auctions ^m
OC	NZ	1			Wood preservatives, NZ ^m
WE	EU			1	Zinc phosphate

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