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**EXTRATERRITORIALITY OF
THE SHERMAN ACT AND DETERRENCE
OF PRIVATE INTERNATIONAL CARTELS**

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Staff Paper 04-08

July 2004

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Abstract*

This paper presents two major economic arguments relevant to a decision facing the U.S. Supreme Court in early 2004. In *Empagran v. F. Hoffmann-LaRoche* the Court must decide whether companies like Empagran, an Ecuadorian animal-feed manufacturer, ought to be permitted to sue for treble damages under the 1890 Sherman Act, even though Empagran bought vitamins from a convicted global cartel wholly outside U.S. territory. Because of ineffective antitrust enforcement in its home country, Empagran and similarly situated buyers favor having this right, whereas Roche and 19 other members of the vitamins cartel oppose it.

The first argument in favor of extraterritorial expansion concerns the effects on U.S. consumers and the competitiveness of U.S. markets. I argue that in the context of international price-fixing conspiracies, conduct relating to “wholly foreign” purchases *necessarily* affects domestic commerce. This is because international cartels must prevent international geographic arbitrage in order to succeed in controlling prices in any targeted national market.

Second, this paper assembles empirical evidence that, should non-U.S. transactions be excluded from U.S. antitrust protection, the global aspirations of contemporary cartels offer an insuperable challenge to a core aim of the antitrust laws: Deterrence. The broad geographic harm generated by the scores of modern global price-fixing conspiracies has overwhelmed the ability of current laws about corporate antitrust sanctions to provide enough financial disincentives to discourage the formation of similar cartels in the future. Permitting foreign buyers who purchased the products of international cartels abroad to pursue civil antitrust damages actions in U.S. courts is necessary to yield the level of legal punishment needed to protect the U.S. economy and its consumers from future cartel injuries. Territorial expansion will also increase the probability of discovery of clandestine cartels by multiplying the number of jurisdictions in which private parties have an incentive to investigate collusive behavior.

* An expanded version of an *Amicus Curiae* Brief submitted on March 15, 2004 to the United States Supreme Court in *Empagran v F. Hoffmann-LaRoche*. See Bush *et al.* in the References.

DETERRENCE OF PRIVATE INTERNATIONAL CARTELS

by
John M. Connor

Background

The past decade has witnessed nothing less than an explosion in the discovery of private international cartels with global price-fixing ambitions¹. Cartels with international membership are not new, having been observed operating in large numbers both at the turn of the 19th century and in the period between the two world wars. What is new in the current wave of international price fixing is their global reach². While detection and prosecution of cartels with international membership offer special difficulties, the United States and the European Union have implemented a number of policies and techniques that have been moderately successful in dealing with foreign companies and evidence. However, under the current regime of legal sanctions, the global aspirations of the new cartelists offer an insuperable challenge to a core aim of the antitrust laws -- deterrence. The broad geographic harm generated by the scores of global price-fixing conspiracies discovered since the mid 1990s has overwhelmed the ability of the world's antitrust authorities and private damage actions to provide enough financial disincentives to discourage the formation of similar cartels in the future.

Anticartel enforcement today is at a crossroads reminiscent of the legal situation in the United States in the 1880s. The American economy was undergoing a fundamental transformation from a one in which markets were geographically localized to one in which limited liability corporations were creating trusts that operated across the Nation. At that time several states had passed antitrust laws designed to correct abuses of market power of large scale companies with strong market positions in several states. As state attorneys general soon found out, victories in state courts against railroads, meatpackers, and similar companies engaged in multistate collusion were hollow because effective remedies could not be imposed on guilty firms that had the majority of their assets located outside the state's jurisdiction. Passage of the Sherman Act was motivated in part to cure this flaw. Today, many industries are led by a few multinational companies with sales spread across the Northern Hemisphere; each of them is in conscious rivalry for strong market positions in the "Triad" (North America, Western Europe, and East Asia). When the conditions in these industries are right, overt but clandestine collusive conduct may occur that coordinates prices in the Triad and beyond. The industrial structure of many contemporary markets has enervated the power of the Sherman Act in the face of such global conspiracies.

In early 2004, the U.S. Supreme Court agreed to hear arguments in a case named *Empagran et al. v. F. Hoffmann LaRoche et al.* (Henning 2004). The respondents (plaintiffs) in this case are a group of foreign feed manufacturers and wholesalers that bought bulk vitamins in the 1990s (Empagran is an Ecuadorian company). Their purchases occurred wholly outside the United States in countries that have no laws that permit private antitrust suits to recover damages

¹ During 2000-2003 the world's antitrust authorities have had to cope with 23 newly discovered international cartels per year; in the first half of the 1990s, fewer than four were discovered each year on average (Connor 2003b:15).

² Only one or two international cartels formed before the 1970s aimed at controlling prices in the whole industrialized world; even in these cases their intention to include Australia or Japan in their orbit is questionable.

from price-fixing conduct³. The respondents (defendants) are companies that have been convicted of international price fixing of bulk vitamins by the United States' Department of Justice (DOJ) and several other antitrust authorities outside the United States. Moreover, the defendants have agreed to pay record amounts of compensation to thousands of U.S. buyers of vitamins stemming from private treble-damage actions under the 1890 Sherman Act. Empagran wants to have the same right to sue as U.S. buyers, even though its purchases are "wholly foreign".

On January 17, 2003 by a 2-1 vote a panel of the U.S. Court of Appeals for the District of the District of Columbia found for the plaintiffs; this decision "...in effect opened the doors of the courthouse to the world" (Henning 2003:1). On September 11, 2003 the full Court of Appeals voted 4-3 to sustain the panel's January decision:

"The same conduct injures both foreign plaintiffs and domestic plaintiffs, and is clearly the conduct that Congress aims to reach with our antitrust laws" (*ibid.*).

The Appeals Court was referring to a feature of the Sherman Act called extraterritoriality. This feature arises from the language of the Sherman Act, which declares illegal all explicitly collusive pricing conduct that "affects trade and commerce of the United States." That is, price-fixing agreements that are carried out inside or outside United States' territory are illegal because they affect sales in the United States. Without such a provision U.S. price fixers could escape prosecution simply by chartering a boat and meeting 20 miles offshore. Moreover, legal cartels such as U.S. Webb-Pomerene export associations might be tempted to control domestic prices through their export activities. Similarly, collusion on exports to the United States would go unpunished were it not for the extraterritorial reach of the Sherman Act. However, until this suit was initiated, it was generally assumed that transactions wholly outside the U.S. market would not qualify for treble damages in private suits. Thus, this principle of "partial" extraterritoriality is widely accepted as an essential feature for the effectiveness of U.S. (and other nations') antitrust laws, but how extensive this feature should be is the nub of the issue.

As a legal matter there are two separable issues to be considered, one of subject-matter jurisdiction and one of standing in private antitrust suits (Hausfeld *et al.* 2004, Shapiro *et al.* 2004). The subject-matter issue in *Empagran* is whether a 1982 amendment to the Sherman Act called the Foreign Trade Improvements Act (FTAIA) applies to "wholly foreign" direct purchases from a global cartel. This amendment was intended to clarify what type of commerce is actionable under the antitrust laws. The FTAIA authorizes the application of Section 1 of the Sherman Act when the defendant's conduct affects both domestic (U.S.) and foreign commerce *if* such conduct has "...a direct, substantial, and reasonably foreseeable effect..." on U.S. consumers, producers, or exporters (Davis 2003: 31)⁴. The plaintiffs believe that the FTAIA does not apply to international cartels, only to export sales (Hausfeld 2004: 3-4). Even if the law

³ Proctor & Gamble Co. and six of its foreign affiliates were originally among the plaintiffs, but their claims are being held in abeyance (Hausfeld 2004:2). There is also an Australian respondent; Australia does permit single-damages private suits.

⁴ Davis (2003) surveys six appellate decisions in 2002-2003 in which the courts have attempted to clarify the FTAIA.

applies to the plaintiffs' purchases, the effects on U.S. commerce were direct, substantial and foreseeable.

The second issue in *Empagran* is whether the FTAIA extends the protection of U.S. courts to antitrust violations when the "foreign effect" is a cartelized price paid by a defendant on a transaction outside the United States. This latter situation might be called "full extraterritoriality." The plaintiffs argue that full extraterritoriality will serve the purposes of the Sherman Act because they are direct buyers clearly injured by the cartel's illegal conduct, their claims will deter conduct that adversely affects U.S. commerce, and their claims can be easily managed simultaneously with those of domestic direct buyers (*ibid.* 4).

The Supreme Court agreed to hear this case because decisions in two other Circuits are split on the issue. In the 2001 *Kruman* decision in the 2nd Circuit in New York permitted wholly foreign buyers to share in the roughly \$500 million in damages paid by Sotheby's and Christie's after the two auction houses were convicted of price fixing (*ibid.*). However, in *Den Norske Stats Oljeselskap* the same year by the 5th Circuit in New Orleans concerning a global conspiracy in the market for heavy lift marine barges turned down a similar suit by a Norwegian oil company on the grounds that it did not have jurisdiction.

The Supreme Court received 19 *amicus* briefs in the *Empagran* appeal. Four of these briefs, from seven foreign nations, made the case that extending standing to foreign purchases would encourage forum shopping, undermine these countries' leniency programs, and be adverse to international comity. The United States Government also argued that its highly successful corporate leniency program would be imperiled by the increased private antitrust liability that would be faced by leniency applicants should the plaintiffs prevail (Taft and Graubert 2004). However, each of these governments' positions was opposed by three *amicus* briefs submitted by academic legal scholars⁵. Three briefs in support of the defendants were sponsored by business organizations, which argued that a decision in favor of the plaintiffs would unnecessarily intrude into the free functioning of markets and would make life difficult for multinational corporations. This paper does not address these arguments except in passing.

Objectives

This paper presents two major economic arguments that support a decision favorable for the Appellants. First, I find that conduct relating to wholly foreign purchases is an integral component for affecting domestic commerce in the context of international price-fixing conspiracies. Specifically, international cartelists must prevent international geographic arbitrage in order to carry out a successful international cartel⁶. The essentiality of arbitrage is what makes the effects on U.S. commerce direct.

⁵ It is notable that all five of the briefs submitted by academic *amici* were in support of the plaintiffs. See Bernheim *et al.* (2004), Bush *et al.* (2004), Michaels *et al.* (2004), First and Fox (2004), and Stiglitz and Orszag (2004).

⁶ The relationship of geographic arbitrage to the effectiveness of global cartel effectiveness seems to have been first mentioned in Connor (2001: 208-209). Both of the other briefs written by economists (Bernheim *et al.* 2004 and Stiglitz and Orszag 2004) agree on this point. In a personal telephonic communication to the author, Orszag said that the importance of arbitrage had been overlooked in the economic literature before 2001.

Second, I present empirical evidence that under the current regime of legal sanctions, the global aspirations of the new cartelists offer an insuperable challenge to a core aim of the antitrust laws -- deterrence. The broad geographic harm generated by the scores of modern global price-fixing conspiracies has overwhelmed the ability of corporate antitrust sanctions to provide enough financial disincentives to discourage the formation of similar cartels in the future. These sanctions are inadequate to deter cartel formation because, in spite of notable improvements in recent years, the probability of being caught by one or more of the world's antitrust authorities remains well below 100% and because the *expected* illegal monopoly profits made worldwide are more than sufficient to compensate would-be conspirators for their *expected* liabilities in jurisdictions with effective antitrust laws and enforcement⁷. Permitting foreign buyers who purchased the products of international cartels abroad to pursue civil antitrust damages actions in U.S. courts will make deterrence more likely and thereby protect U.S. consumers and the U.S. economy from future cartel injuries. Deterrence will improve because the civil damages collected by direct purchasers have the potential to increase by 200% to 700% above the levels observed in the 1990s and because the probability of discovery of clandestine collusive behavior is much higher as buyers in scores of new jurisdictions will have incentives to investigate and expose the conspiracy.

This paper attempts to validate these conclusions by drawing upon research on private international cartels that has appeared in the past eight years⁸. To do so, this paper will describe the salient economic features of the global vitamins cartel, calculations of the amount of injury caused for buyers in the United States and elsewhere, corporate financial sanctions imposed, the ways in which these cartels were similar to others prosecuted in the past decade, evidence of recidivism in international price fixing, and how deterrence will be significantly enhanced should wholly foreign direct buyers have standing to sue under the Sherman Act.

This research demonstrates that the international vitamin cartel generated the largest total of antitrust fines and penalties in history, which are calculated to be between \$4.4 and \$5.6 billion. But the cartel's monopoly profits in all areas of the world were \$9 to \$13 billion. Thus, the criminal and civil justice systems of the globe produced fines and damages that amounted to at most only half of this cartel's illegal profits. These sanctions are much less than the amount needed to discourage future cartel formation. One of the best ways to discourage cartels is to increase the expected costs in the event the participants are caught, in order that the expected penalties exceed the expected benefits. As a practical matter, this deterrence benefit to the United States' consumers and its economy -- something surely intended by Congress -- is likely to be achieved only if federal law is construed to give injured foreign customers like Respondents the power to sue in the courts of the United States under American antitrust laws.

⁷ The OECD (2002) presents survey data from a large number of member countries showing that the great majority of national antitrust fines imposed on international cartels in the 1990s failed to recover single damages (Annex A). These are not typical cases, but rather exceptionally successful government prosecutions. Supplemented by five estimates from Connor (2003b), the mean recovery of national damages was 81% and the median was 63%. Connor (2003), Bernheim *et al.* (2004), Stiglitz and Orszag (2004), and Evenett *et al.* (2001:1244) also conclude that deterrence of contemporary cartels by national antitrust authorities is insufficient.

⁸ Some of that research appears in *Global Price Fixing* (Connor 2001a), academic publications incorporated in it (Connor 1998), subsequent papers (Connor 2001b, 2003a, 2003b, 2004), a working paper in process (Connor and Lande 2004), Evenett *et al.* (2001), and First (2001).

The Vitamins Cartel, 1990-1999

Decisions about raising the prices of vitamins A and E began in discussions in Switzerland and Germany among Hoffmann-LaRoche (hereafter “Roche”), BASF, and Rhône-Poulenc (now Aventis) in late 1989⁹. Soon afterward the Japanese chemical manufacturer Eisai agreed to raise the price of vitamin E effective January 1990. It was logical for the conspirators to begin with vitamins A and E because they had the largest sales of the 16 products that would eventually be cartelized, were among the most concentrated industries, were dominated by the four manufacturers (at least 87% of global supply), and were well protected from entry by new sellers because of the difficulty of the synthetic chemistry involved¹⁰. The number of cartelized products grew to eight by January 1991, and by the end of 1991 at least 20 parent-company manufacturers would be involved in one or more of the eight to 12 interlocking product agreements¹¹. The end result was a smoothly functioning machine not unlike a classic Swiss watch. There were wheels within wheels.

In a couple of cases price fixing was effective for only four years, but most were durable conspiracies. The first of the cartels to collapse was that for vitamin H in April 1994 after 30 months of operation, and the large vitamin C cartels dissolved shortly thereafter because of a flood of Chinese exports triggered by the cartel-induced high prices. However, many of the individual cartels were still effectively raising prices above non-collusive levels in February 1999 when definitive evidence of the conspiracy came into the hands of the DOJ from a company seeking amnesty. One cartel was active for nearly 11 years, and several of the cartels lasted nearly ten years.

Whether tracked in euros, U.S. dollars, or Swiss francs, market prices in the United States, Canada, and Western Europe began to rise almost immediately after higher list prices were announced by the vitamins manufacturers (EC 2003:86-89; Connor 2001a:319-331). In some cases prices peaked just before the cartel was exposed and in other cases a couple of years before the cartel dissolved. But in all cases, selling prices rose to levels greater than those observed prior to the collusive agreements and well above those observed after they broke apart. The price increases cannot be fully justified by either changes in production cost or by unexpected surges in demand. The pattern of price changes in North America and Europe are remarkably parallel. Prices in all other parts of the world were similarly affected, though the average overcharges may have varied slightly from those observed in North America or Western Europe. A statement describing an investigation of the Korean Fair Trade Commission confirms

⁹ Information about these cartels is drawn from six chapters of Connor (2001a: 277-337, 368-379, 405-407, 463-476), which were written in late 2000, supplemented by scores of publicly available press accounts. A particularly rich source of information is the European Commission’s decision of November 21, 2001 (EC 2003).

¹⁰ The products are vitamins A, B1, B2, B3 (niacin), B4 (choline chloride), B5, B6, B9 (folic acid), B12, C, D3, and H (biotin); three carotinoids; and vitamin premixes. The U.S. Department of Justice (DOJ), Canadian Competition Bureau (CBC), and European Commission fined the defendants for different combinations of these 16 products. For example, only the DOJ fined firms for premixes, only the CBC for B12, and only the EC for D3; however all three entities prosecuted the makers of vitamins A, E, C, and many others.

¹¹ In terms of their market effects, each of the 16 product conspiracies may be analyzed separately. Moreover, as a behavioral phenomenon, some of the “sub cartels” managed two or three products simultaneously (e.g., vitamins A and E, three carotinoids). Eight to 12 such sub cartels can be identified. However, as a matter of law, the sub cartels comprise one overarching agreement or conspiracy.

that the price effects in South Korea, which imports all its vitamin supplies, confirms the similarity in price effects (KFTC 2003).

Besides setting list prices and rigging bids on tenders from larger customers, the vitamin makers engaged in many other conducts that supported their control over price (Connor 2001a: 305-317). They agreed on global and regional sales quotas, generally based on historical levels. They shared production and sales information to monitor their adherence to prices and market allocations. They developed plans to thwart entry by producers outside the collusive groups. They set many common terms of sale, such as discounts, delivery, and restrictions on customers' resales. The cartels were managed through three levels of managers; the lowest level had face-to-face meetings quarterly to adjust prices in several currencies.

The reason for the frequency of these meetings is instructive. Although each of the cartels had impressive coordination of total industry supply and market prices, the cartels had a limited ability to affect changes in demand and no power over currency exchange rates. With few exceptions, the markets into which the vitamins cartels sold product had floating currency exchange rates that moved daily in response to changes in macroeconomic conditions. Moreover, it is important to note that bulk vitamins were high priced, storable commodities that were usually shipped in large quantities great distances¹². International shipping costs for vitamins in the 1990s were well under 5% of the manufacturers' price¹³. Under such conditions, if changes in currency exchange rates were sharp enough, buyers would find it profitable to sell stored vitamins from countries with depreciated currencies to countries with appreciated currencies; prices in the latter areas would then fall below the cartels' preferred levels. This is called *geographic arbitrage*.

Arbitrage undermines the ability of international cartels to set prices at the most profitable level in each currency zone and could even destroy collusive arrangements. For example, during 1990-1998 the value of the U.S. dollar relative to the Deutschmark varied by as much as 41%, and during 1991 the rates changed by more than 25%. Consider what might happen if the vitamins cartel set the national prices of its vitamins only once each year. If the vitamins cartel set the price of vitamin E in Deutschmarks when this currency was weak against the dollar, a U.S. chemical wholesaler could make a quick and handsome profit by exporting the vitamin to Germany when the Deutschmark later strengthened.¹⁴ The cartel would sell a greater

¹² The majority of the cartels' members had most of their vitamin factories located in Europe, from which they exported the majority of the output to other continents. The majority of U.S. consumption was satisfied by imports. During the affected periods, vitamin A sold for \$100-\$200/lb., vitamin E for \$60-\$90/lb., vitamin C \$30-\$40/lb., and most of the other vitamins in between.

¹³ Europe-U.S. and Europe-Asia transportation costs for these products were less than \$1/lb. These low oceanic transport rates can be inferred from data published by UNCTAD (1998:71), which shows that for all commodities the ratio of transport costs to import value was 5% in 1990 and 1995; most internationally traded goods are much lower in price than organic chemicals. Other evidence was supplied in exhibits submitted in the lysine trial *United States v. Andreas* (Connor 2001:217-219). ADM spent only \$0.10 to \$0.13 per pound in transporting, storing, and merchandising lysine everywhere in the world. In terms of its ability to enter international trade, lysine is very much like most bulk vitamins, a powder that must be protected from humidity.

¹⁴ In 1991 the Deutschmark was worth as little as \$0.55 and appreciated to \$0.69 (www.onanda.com). Even if transportation costs were a generous 5% of export costs, by timing its purchase and resale correctly our hypothetical U.S. wholesaler could sell at a net increase in price of 20% and make a much higher mark-up on the export

amount of vitamins at a relatively low price in the United States but would lose the high priced sales in Germany to this entrepreneurial exporter. If sales diversions of this type became large enough, the total monopoly profits could decline to a level inadequate to compensate the cartel members for their legal risk. Many cartels attempt to forbid the practice of reselling by their customers. But the only way cartelists can effectively prevent geographic arbitrage is to make it unprofitable by frequently resetting domestic cartel prices in all regions of the world using current exchange rates to ensure that prices remain close together.

We know from direct evidence that comparable cartels were conscious of the problem presented by geographic arbitrage. In its three years of operation, the well documented lysine cartels had at least 23 face-to-face meetings in order to adjust prices in various currencies whenever exchange movements got the cartel's prices out of line (Connor 2001b:203). During the cartel's first few months of operation, the price was set in U.S. dollars only. By the end of the cartel, prices in at least nine currencies were agreed upon (p. 238). A memorandum of a meeting of the cartel in Paris in 1993 written by an executive of the Ajinomoto Co. specifically refers to the need to combat geographic arbitrage by non-cooperative wholesalers:

"With the [Deutschmark] strong against the \$, presently it is 22% higher than in the U.S. If the difference between Europe and the U.S. becomes bigger, ill-reputed dealers will start working and goods will enter Europe from the U.S. and decrease the price."¹⁵

Affected Sales of The Vitamins Cartel

Although the vitamins cartels are not different in kind from other international cartels of the 20th century, they were of exceptionally large scale. The most conventional measure of a cartel's size is *affected commerce*, i.e., the sales revenues generated by the cartelized product during the price-fixing period¹⁶. The dates of effective price control by the vitamins cartels are well known. Sales in the U.S., Canadian, and EU markets are also known with a fair degree of precision¹⁷. Sales in other parts of the world can be estimated as a residual amount after ascertaining the world totals. More information is available about the major vitamins (A, E, C, etc.) than for the minor products.

The total affected sales in the United States has been estimated to be as low as about \$5 billion and as high as more than \$7 billion, according to public statements by DOJ officials and plaintiffs' memoranda submitted in support of settlements (Table 1). This figure appears to

transaction than it would make in the U.S. market. If the dollar strengthened against the Mark, the incentive for a reverse diversion would occur.

¹⁵ This is quoted from Trial Exhibit 10-T of *United States v. Michael D. Andreas*. It is translated from Japanese.

¹⁶ Affected sales are normally dated from the time at which the first agreement was made until the date of the cartel's last meeting. Another approach is to begin counting sales on the first date on which an agreed change in list or transaction prices were changed or became effective. I will follow the more conservative second approach. Both approaches undercount sales in the months following the formal dissolution of a cartel during which prices remain elevated above the but-for price because of institutional lags in price cuts.

¹⁷ Sales of vitamin premixes are difficult to obtain, and it is not always clear that total sales of all vitamins include premixes. Vitamin premixes are mixtures of bulk vitamins that are tailored for the nutritional needs of various types of farm animals. The United States is the only jurisdiction in which the vitamins manufacturers were sanctioned for price fixing the market for premixes.

include only a few of the largest vitamins, whereas subsequent prosecutions make it clear that the cartel involved a wider array of vitamins and vitamin premixes. A reasonable estimate of U.S. affected sales of the full array of 16 vitamin products is approximately \$7.4 billion.

Sales of the vitamins cartel in the European Economic Area¹⁸ were released by the European Commission in its published decision regarding the fines imposed on the conspiring manufacturers (EC 2003). I have estimated the affected sales of bulk vitamins (not including premixes) in the EEA to have been US\$8.3 billion. Affected sales in Canada were given in statements of the Canadian Bureau of Competition in 1999-2000 to be C\$700 to C\$750 million (US\$530 to US\$570). Finally, based upon reports of global sales it is possible to estimate sales in the rest of the world (primarily Asia, Africa, and Latin America). During the price-fixing period, sales of bulk vitamins were approximately \$18.2 billion. Therefore, global affected commerce of bulk vitamins and premixes (the latter in the United States only), reached \$34.3 billion¹⁹.

The significance of this sales calculation lies in the geographic location of vitamins sales during the cartel's active period. The three jurisdictions with the most effective anticartel enforcement – the USA, Canada, and the EU – accounted for less than half of worldwide sales²⁰. It follows that, if the rate of monopoly profits made by the cartelists was roughly the same across the three regions of the world, then the *majority* of those profits were made in jurisdictions where anticartel enforcement is weak or nonexistent. The ability of international cartelists to garner monopoly profits in weak antitrust jurisdictions adversely affects deterrence.

Economic Injuries Caused By The Vitamins Cartel

Numerous economic analyses have been conducted by economists and parties to private suits in which calculations of the economic injuries of vitamins' price fixing were central issues in U.S. litigation. Less formal calculations were performed by government prosecutors in the course of their preparation for negotiations with or hearings with the defendants concerning fine levels. There appears to be a substantial consensus among these individuals on the size of the vitamins cartel's price-fixing overcharges.

On May 20, 1999, the day the guilty pleas of the three largest members of the vitamins cartel was announced in Washington, DC, the Assistant Attorney General for Antitrust, Joel Klein, stated:

¹⁸ The EEA includes the EU and a few other countries that are members of the European Free Trade Area but that have not joined the EU; Norway is an example. These countries have agreed to allow the EC to enforce its competition laws in their national jurisdictions (Harding and Joshua 2003).

¹⁹ Connor (2003b) has compiled the largest set of data on modern (i.e., post 1980) cartels. Only the European cement cartel, which was fined by the EU in January 1992, might be slightly larger; affected sales in nominal currency were about \$32 billion, but when corrected for inflation the cement cartel will surpass the vitamins cartels. The cement cartel, however, was not a global cartel in the sense being used in this paper.

²⁰ The USA, Canada, and the EU accounted for 21%, 2%, and 25% of affected world vitamin sales, respectively (Connor 2003b: Appendix Table A.1).

“The vitamin cartel is the most pervasive and harmful criminal antitrust conspiracy ever uncovered...The enormous effort that went into maintaining the conspiracy reflects the magnitude of the illegal revenues it generated...”

Several subsequent speeches by DOJ officials would echo Klein’s assertion that the vitamins cartel was the most injurious to the U.S. economy of any international price-fixing conspiracy prosecuted by the United States²¹. Prosecutors for the Canadian Ministry of Justice that handled the vitamins case were quoted in the press stating that vitamins prices were 30% higher than competitive levels (Connor 2001a:405). Similarly, the vitamins decision of the European Commission clearly concludes that the cartels caused a significant increase in EU prices of bulk vitamins (EC 2003: 69). The EC opinion reproduces several charts showing the transactions prices of vitamins in euros and Swiss francs that display the classic humped pattern of prices before, during, and after the conspiracy. That fact that the three governments imposed fines on the vitamins conspirators that were the highest in the history of antitrust speaks for itself.

Unlike the terse press releases and sentencing memoranda of the U.S. DOJ, the EC decision is exemplary in providing numerous details about the operations, size, and European price effects of the vitamins cartels. From graphical evidence provided on the prices of seven vitamins, it is clear that the prices in euros rose significantly compared to the years before price fixing began (EC 2003:86-89). Moreover, whenever prices are shown for a couple of years or more after collusion ended, the post-cartel prices are lower than the pre-cartel prices, a trend that demonstrates that costs of production during the relevant period probably fell. Therefore, applying a simple before-and-after technique to calculate price effects will in all likelihood provide reliable but slightly understated estimates (Connor 2004).

The simple mean price-fixing overcharge in the EU was 29% when measured with the pre-cartel prices as the competitive benchmark and 38% when applying post-cartel prices as the benchmark (i.e., the so-called but-for price)²². The price effects were highest for the vitamin E cartel, the largest in terms of sales, and lowest for the vitamin C cartel, one that was subject to stiff import competition from Chinese manufacturers after a relatively short life (Connor 2001a). If one weights the overcharges by the sales sizes of the individual cartels, the mean overcharge was 31% to 42%.

Plaintiffs’ counsel and experts have cited estimates of overcharges that were prepared for class-action treble-damages suits in U.S. courts²³. Lead counsel for the federal class in the so-called all-vitamins suit, which proceeded against the six largest vitamin manufacturers that produced a broad array of vitamins, stated that the proposed settlement was about equal to the

²¹ The only other U.S. case that is a contender for the most harmful cartel is the heavy electric power equipment conspiracy that was prosecuted in 1960-61, but this was a solely domestic cartel and its price effects were relatively mild.

²² These were highly concentrated markets before and during the collusive conduct. It is likely that tacit collusion marked the behavior of these industries prior to the formation of the cartels. Thus, the benchmark prices used here probably are above perfectly competitive levels. The median overcharges were 25%.

²³ Like the cartels themselves, related civil litigation was quite complex. Direct purchasers were also plaintiffs in at least three other federal class actions: the “Merck Group” for vitamin C, the “Biotin-Niacin Group” with six smaller (parent) manufacturers, and the “Choline Chloride Group” with six different manufacturers as defendants.

overcharges. By inference, the overcharge was at least 20% of affected sales²⁴. Other class-action plaintiffs' counsel, some representing opt-outs from the federal class, said that the average U.S. overcharge was between 24% and 40% of affected sales²⁵. Counsels for parties to private suits are normally regarded as unreliable sources of information on price effects.

One civil trial involving choline chloride, one of the smaller vitamins, yielded a jury judgment on the size of the injuries. Mitsui, DuCoa, Chinook, and affiliated companies were the defendants in a treble-damages case that ended in 2003. The jury found the defendants guilty of price fixing and identified the injury to be \$49.5 million. This overcharge conservatively represents 38% of affected sales (Hausfeld 2003).

Finally, there have been a number of empirical studies of the price effects of the vitamins cartels by academic economists and economic historians. Connor (2001a: 336) estimated the U.S. overcharges for 12 vitamins using the before-and-after technique on a combination of list and transaction prices. These estimates are on average somewhat lower than the EU price effects: allowing for some uncertainty, the weighted average is 25% to 28% of affected commerce. As in Europe, vitamin E had the highest U.S. overcharge rate and vitamin C one of the lowest. He applied the U.S. overcharge rates to global sales to estimate the world overcharge which totaled \$7 to \$8 billion. Economic historians Suslow and Levenstein cited overcharge figures of 20% and 30% in a survey of modern cartels (Connor and Lande 2004: Appendix Table 2). A sophisticated econometric model of world trade in bulk vitamins also yielded conclusions about collusive price effects (Clarke and Evenett 2002: Table 7). What is of special interest about this study is that the authors are able to calculate overcharges for the 19 countries outside the EU and North America with the strictest antitrust laws separately from those countries with weak antitrust enforcement; the former had overcharges averaging 13% while the latter incurred a 33% overcharge. Therefore, it seems likely that monopoly profit rates from collusion higher in the rest of the world are higher than in the United States, Canada and the EU. Finally, from a cutting-edge dynamic simulation model fitted to parameters drawn from the vitamin C industry, de Roos (2001:20, 28) predicted the U.S. price during fully collusive and non-collusive regimes. His results are that vitamin C prices were 22% to 26% higher during the cartel period, which is quite remarkable given that this cartel was one of the weakest and most fragile of the vitamins cartels.

To summarize, the average price effects of the vitamins cartels appear to be lowest for buyers in the United States, averaging somewhere in the 20% to 35% range. Canada and Europe were higher, roughly in the 30% to 40% range. The rest of the world came closer to European levels than to U.S. levels. Applying these price effects to the affected sale mentioned in the previous section suggests that global injuries were between \$9 and \$13 billion, of which 15% accrued in the United States, 1% in Canada, 26% in the EU, and 58% in the rest of the world.

²⁴ Robert Silver, co-lead counsel for the federal class in the "all-vitamins" group, made this statement. It is unusual for plaintiffs' counsel to minimize the overcharge/sales ratio, but at the time Silver was interested in avoiding mass defection from the federal class.

²⁵ Private communication from a plaintiffs' counsel. Defendants' counsel are as a rule silent on the degree of injury caused by their clients.

Corporate Cartel Sanctions

The vitamins cartel has been the most harshly sanctioned conspiracy in antitrust history (Connor 2003b:47-49, 52-53, 56-57,106-111). This section focuses on corporate monetary antitrust penalties, recognizing that corporate persons may be deterred in less measurable ways and that individuals were also punished. Personal financial penalties, though small by comparison to corporate ones, and more serious personal criminal sanctions, though rarely employed, may add to or interact with corporate sanctions in discouraging the formation or enlargement of cartels, but they are difficult to incorporate into a unified calculus of collusive deterrence.

Under one sentencing statute the courts may approve monetary fines of up to double the harm caused by a given cartel, but because of the perceived difficulties of proving overcharges a simpler method of assessing liability is almost always used²⁶. As an alternative, the U.S. Sentencing Guidelines call for a fine range that takes 20% of affected sales and multiplies that base fine by a culpability factor as low as 0.5 or as high as 4.0 (USSG 2003)²⁷. Thus, the maximum criminal fine could in principal reach 80% of affected U.S. sales, which could be more or less than double the harm²⁸. In several recent international cartel cases prosecuted by the DOJ, the maximum fines calculated under the 20%-of-sales rule have been significantly lower than double the harm (Connor 2001a:360 and 366).

In discussing the economic effects of anticartel sanctions, it is essential to distinguish theoretically available legal sanctions from those actually applied as a matter of custom and policy.

Although the Sentencing Guidelines do not specify U.S. affected sales to establish the base fine, it has become the DOJ's practice to employ only domestic commerce. The DOJ has asserted that it has the authority to calculate the base fine using defendants' global affected sales instead of domestic affected sales (Spratling 1999). Using *global* sales could increase the maximum liability of typical international price fixers by a multiple of three to six, i.e., up to six to ten times the U.S. harm. However, on the two occasions in which the DOJ has considered the global sales affected, this factor caused an adjustment in the culpability multiplier rather than the base fine (Kovacic 2002:10). Changing the multiplier has a much smaller effect on the recommended fine range than changing the base fine. Thus, it appears to be U.S. government enforcement practice to refrain from applying an affected sales concept that would result in potentially deterring fines.

²⁶ The 1974 statute (18 USC §3571(a) and (b)) specifies the larger of "double the harm" (the monopoly overcharge and possibly the dead-weight loss) or "double the gain" (monopoly profits), but in cartel cases the former figure is always larger. Whenever the overcharge is larger than about 15% of affected sales, double the harm leads to a greater fine than the maximum fine calculated with the 20% rule (Connor 2001a: 62-63). The median overcharge of modern international cartels is about 28% (Connor 2003b: 29). Thus, application of the

²⁷ The multipliers always result in a range in which the minimum recommended fine is half or less of the maximum fine, e.g., 2.0 and 4.0 or 0.5 and 2.5.

²⁸ See footnote 21 above.

The DOJ habitually recommends substantial discounts from the levels specified by the Guidelines²⁹. Members of modern international cartels have been granted very large downward departures for minimal cooperation almost as a matter of course, driving actual fines down well below single U.S. damages in almost all cases (Connor 2001a). In the vitamins case, the second through fifth firms to plead guilty were granted average downward departures of about 80% from the Guidelines' maximum fines (Connor 2001a: 375)³⁰. As a result of U.S. sentencing practices, its criminal fines amounted to less than 11% of the vitamins cartel's global monopoly profits.

The EU has quite different standard for imposing its administrative fines, which are calculated on the basis of the seriousness and duration of the violation³¹. The European Commission (EC) is limited by a maximum fine of 10% of a firm's global sales in the year prior to the Commission's action. For a single-product firm with sales only in the EU, the maximum EU fine could be a large share of the profits accruing from a fairly harmful cartel. However, most members of global cartels are highly diversified firms, and the cartelized product is a small share of the company's portfolio. For example, for the leading member of the vitamins cartel, Hoffmann-LaRoche, which made roughly 40% of the world's supply, vitamins accounted for merely 8% of its total sales in fiscal year 2002³². For such firms, a durable cartel can easily generate monopoly profits well above what an EU fine could possibly disgorge³³. Moreover, as in the United States, generous reductions in fines are routinely granted for cooperation with the EC. Actual fines imposed by the EC for the same global cartels have on average been about 20% lower than those imposed in the United States (Connor 2003a).

The Sherman Act is unique among the world's antitrust statutes in permitting treble damages for direct purchases from effective cartels (ICPAC 2000; Harding and Joshua 2003). In the case of the vitamins cartel, if buyers actually recovered treble damages, this alone would have amounted to about 45% of the monopoly profits made by these cartels. Should the Appellants in this case be allowed standing to sue for treble damages, private recovery could amount to 300% of damages instead of 45%. Clearly the question of standing can mightily affect the ability of antitrust actions to deter international price fixing.

Private plaintiffs have rarely if ever attained treble damages. Historically, what has been observed for domestic price-fixing cases is that plaintiffs have recouped less than single damages (Lande 1993). The recovery rate for contemporary international cartels is also below single damages; only three examples could be found of settlements above single damages, and none as

²⁹ I am aware of only one instance in which a defendant in a global cartel was required to pay a fine close to the maximum amount specified in the Guidelines, Mitsubishi (graphite electrodes) after an adverse jury decision.

³⁰ Rhône-Poulenc as the first to plea was granted full amnesty (Spratling 2000). Roche and BASF applied next for leniency at almost the same time; they were granted downward departures from the maximum fines specified by the U.S. Sentencing Guidelines of 81% and 72%, respectively (*ibid.*). Connor (2003a:375) estimated that Daiichi (third to plea) and Eisai (fourth) received discounts from the maximum fine of 86% and 88%, respectively. As a proportion of the *minimum* fines, the mean downward departure for the four companies was 62%.

³¹ Cartels are in the most serious of three categories, but the base fines employed by the EU are related to neither affected sales nor cartel-generated profits. Only duration is loosely related to EU or global harm.

³² In the 1940s vitamin sales accounted for the majority of Roche's sales, but by 2002 pharmaceuticals and diagnostic devices comprised about four-fifths of the company's sales.

³³ Ignoring inflation, a five-year cartel with a typical 25% overcharge will create injuries greater than the maximum possible EU fine for any company for which the cartelized product constitutes more than 8% of global company sales.

high as double damages (Connor 2003b: 59)³⁴. However, if wholly foreign direct buyers were to be permitted to bring treble-damage suits in U.S. courts, recoveries at historical rates would push total private recoveries to about 75% of global overcharges³⁵. Combined with fines, these expanded private damages could approach optimal deterrence.

In sum, the maximum financial antitrust liability that would face global cartels in the absence of full extraterritoriality would be, *de jure*, the sum of (1) five to six times the harm generated in the United States, (2) approximately single U.S. damages in the European Union, and (3) negligible fines or penalties elsewhere. As noted above, the injuries caused by global cartels spread beyond North America and Western Europe. Therefore, as a proportion of the monopoly profits garnered worldwide, the theoretical upper limit of lawful antitrust liability would be limited to approximately double global damages. *De facto* the application of fines and private suits to global cartels has resulted in total monetary sanctions that have been less than double actual global damages in all cases and less than single damages on average. In the end, then, even international cartels that are uncovered and prosecuted tend to be profitable. As explained below, such sanctions offer woefully suboptimal deterrence, but under the reading of the Sherman Act adopted below, deterrence might approach optimal levels.

The Vitamins Cartel's Sanctions

The first source of monetary sanctions were government fines, first imposed on the vitamins defendants by U.S. courts in a series of guilty pleas beginning in 1999 (Table 2). These pleas appear to be complete now with a total of \$911 million collected in criminal fines. Canada was next with criminal fines of \$100 million paid. The EU imposed administrative fines of \$759 million in 2001³⁶. Australia ordered a fine of \$14 million and South Korea \$3 million. Japan and Switzerland issued warnings to the cartelists, but no fines. While Brazil and other jurisdictions are investigating the vitamins cartels, no further major fines are expected to be imposed in this case.

The second major source of sanctions is private actions by direct buyers, principally in the United States. Several federal cases have been resolved for “all vitamins,” biotin-niacin, choline chloride, and vitamin C. These total \$596 million in recovery and legal fees and costs³⁷. The biggest gap in our knowledge is the size of the settlements for the all-vitamins opt-outs. About 225 companies of the 4000 original class-action plaintiffs opted to litigate on their own. As these opt-outs represented more than 75% of class purchases, their settlements are likely to be substantial. Assuming that they will settle for a somewhat larger percentage of affected sales than those buyers that remained in the class, I estimate the total payout to be in the range of \$2000 to \$3000 million. Similar civil actions are being litigated in Australia and Canada but are unlikely to result in large recoveries. In the EU and the rest of the world civil liability is

³⁴ The median ratio of settlement payouts to overcharges is 76%.

³⁵ Recovery by indirect purchasers is difficult to document because so many private suits are settled confidentially, but is believed to be well under single damages in all cases and typically a negligible percentage of damages. The major exception to this statement is suits prosecuted by coalitions of members of the National Association of Attorneys General.

³⁶ These fines are under appeal and could be reduced, as they often are, by the European Court of First Instance. Non-U.S. vitamins actions are found in press releases mounted on the antitrust agencies' web sites.

³⁷ Two fairly small producers of niacin have yet to settle.

negligible for-price fixing violations (Harding and Joshua 2003:236-239). While single damages are permitted in theory in a few European national courts, various practical impediments exist.

In the specific case of the vitamins cartel, the total antitrust fines and penalties are reckoned to be between \$4.8 and \$5.8 billion. But, as was shown previously, the best estimates of the cartels' monopoly profits in all areas of the world are \$9 to \$13 billion. The criminal and civil justice systems of the globe failed to recover more than half of the cartel's illegal profits.

To summarize, if U.S. government enforcement continues to calculate base fines solely from domestic affected sales, then the maximum fine on international cartels by the United States, Canadian, and EU authorities will typically amount to less than double the cartel's U.S. damages. Civil liability is confined almost entirely to the U.S. court system and is unlikely to exceed double U.S. damages. If an international cartel confined its sales solely to the U.S. market, its members might face the prospect of treble or quadruple damages, but few international cartels are configured this way³⁸. Rather, sales and profits made in the U.S. market are typically less than one-third or one-fourth of the total. In such cases, fines and penalties in all jurisdictions will be less than global monopoly profits.

The Vitamins Cartel Is Not Atypical

Most of the other international cartels of 1990s resemble those in vitamins³⁹. These two groups are similar in their operation, effectiveness, and sanctions:

- Vitamins are organic chemicals; 49 of the 167 cartels manipulated organic chemicals markets.
- The vitamins conspirators were almost all manufacturers; the great majority of global cartelists are manufacturers.
- One-fourth of all international cartels sold to dispersed customers in the food and agricultural industries; half of the bulk vitamins ended up in animal feeds.
- The typical international cartel made less than half of its revenues in North America and the EU; so did the vitamins cartel.
- The median number of companies forming international cartels was five; the median number in each vitamin sub cartel was three.
- More than 80% of international price fixers are headquartered in the EU or Japan; in vitamins it was 80%.
- No international cartel sold a differentiated consumer product; vitamins are unique chemicals sold to other manufacturers.

³⁸ Connor (2003b:Appendix Table 3) found only 18 cases out of 167 modern international cartels.

³⁹ These facts are drawn from Connor (2003b).

- In common with all other cartels, Vitamins Inc. needed to combat the effects of international arbitrage on prices in high-prices regions.
- The mean duration of the vitamins sub cartels was 69 months; for all global cartels, 60 months; for all international cartels uncovered in 1996-1999, 75 months.
- Mean affected sales of all international cartels was \$4.4 billion; for vitamins \$3.3 to \$4.1⁴⁰.
- The global financial antitrust penalties imposed on the vitamins conspirators was 31% to 58% of economic harm caused; for 29 international cartels the mean was 55%.
- The total financial antitrust penalties imposed on the vitamins conspirators was 12% to 16% of affected sales; the mean ratio for 65 international cartels was 12%.

International Cartel Recidivism

Several of the vitamins manufacturers have been fined previously for price-fixing violations under U.S. or EU competition law (Connor 2001a: 499-500). F. Hoffmann-LaRoche or its holding company Roche AG, engaged in 12 overlapping vitamin-products agreements. Roche, one of the two companies identified as the ringleaders of the vitamins cartels, was fined \$14 million by the United States in 1997 for its leading role in the citric acid cartel of 1991-1995 (Connor 2001a: 395). Roche executives were obligated to provide full cooperation in antitrust matters by virtue of Roche's guilty plea in the citric acid case, yet they continued to conspire on vitamins prices for two more years. Moreover, there was testimony given at trial in 1998 in *U.S. v. Michael D. Andreas et al.* that Hoffman-LaRoche had been a member of a clandestine international cartel in the citric acid market in the late 1980s (Connor 2001a:136). This earlier citric acid cartel, although a U.S. pharmaceutical company was a member of the cartel, was never uncovered by any antitrust authorities⁴¹. Thus, there is credible evidence that Roche is a true recidivist in the narrowest sense of the term⁴².

Roche is not the only convicted member of the vitamins cartel to be fined for international price fixing in another line of business. The large French chemical manufacturer Rhône-Poulenc, which in 1999 merged with the leading German chemical firm Hoechst to form Aventis, was subsequently given amnesty in 1999 by the European Commission for its role in the global conspiracy in the amino acid methionine (Connor 2003b: Table A.1). Hoechst itself, which conspired in the vitamin B12 cartel, was convicted and fined \$36 million by the United States in 1998 for its role in the global sorbates cartel; in 2003 the EU imposed a fine of \$116

⁴⁰ Recall that there is some uncertainty about the precise number of quasi-independent vitamins cartels; the EC counted ten conspiracies for 12 products (EC 2003).

⁴¹ Unrebutted testimony in the same trial also revealed that two of the Japanese members of the global lysine cartel had thrice previously formed both international and domestic U.S. cartels in the lysine market (Connor 2001b). Thus, two of the five lysine defendants convicted by the United States in 1996 had by that time fixed prices of lysine on *four separate occasions*.

⁴² Roche has recently sold its vitamins and fine chemicals division. It is no longer in a position to fix prices of bulk vitamins or citric acid.

million on Höchst (then named Aventis) for the sorbates violation (*ibid.*). Thus, three of the co-conspirators in the vitamins cartels are known to have fixed prices in previous or concurrent international cartels that operated in the 1990s; doubtless there are other instances of repeated violations of the antitrust laws by other members of the vast vitamins cartels that have not been discovered or publicly reported.

These three examples drawn for the vitamins case are neither isolated nor merely anecdotal. Connor (2003b) examines the phenomenon of repeated violations of the antitrust laws of the United States and the European Union. This research collects information on 167 international cartels that were uncovered by one or more of the world's antitrust authorities between January 1990 and July 2003. These data are believed to be reasonably complete. Out of the hundreds of companies identified as participants in these cartels, more than 50 companies participated in two or more of these contemporary cartels (Connor 2003b: Appendix Table 5)⁴³. Five companies are known to have participated in ten or more such cartels, and 13 companies in five or more. There are a few instances of true recidivism, but most of the cases just mentioned are matters of companies colluding in overlapping cartels in multiple product lines. For example, the Dutch chemical maker Akzo Nobel engaged in international price-fixing agreements ten product lines: choline chloride (vitamin B4), sodium gluconate, MCAA, soda ash, explosives, auto paints, organic peroxides, PVC additives, rubber processing chemicals, and MBS. Perhaps it is best to call such behavior serial price fixing.

Deterring International Cartels

The fact that so many companies engage in repeated violations of U.S. and EU competition laws is symptomatic of deeply rooted business behavior. The roots of price-fixing conduct lie in the structures of markets (Connor 2001a:522-527 and 2003b: 8-11). Common to all discovered cartels is "small numbers" (a high degree of industrial concentration of ownership among the sellers) coupled with a high degree of control of the market by members of the cartel. Similarly, cartels are more effective when buyers are many and none purchase large shares of the cartelized product. A third nearly universal feature of markets also with cartel activity is that the products are standardized commodities with few or no substitutes even when a cartel raises its price to a level well above normal. Storable products that are cheaply transported long distances make better candidates for internationally collusive schemes than perishable items⁴⁴.

The vitamins cartel illustrates the importance of these market characteristics. Global market concentration was high (the top four or five firms accounted for more than 75% of production), the cartel members comprised the top tier of manufacturers, more than ten thousand companies purchased bulk vitamins directly from the cartel, the biological functions of vitamins insured their uniqueness in demand, and their high prices permitted long-distance trade.

⁴³ Some of these companies were also convicted or fined as members of purely domestic cartels or of international cartels that were active in periods prior to 1990. Thus, these data on repeated participation are undercounts.

⁴⁴ An interesting footnote to the lysine cartel was convicted for its price agreements in the dry lysine market. Liquid lysine, which sold for less than \$0.50 per pound and could not be transported economically by tanker vehicles more than a few hundred miles from the plants in which it was made, was not subject to direct price manipulation by the cartel.

Beyond these three characteristics are a number of market features that generally facilitate overt collusion but that may not be necessary conditions. Cartelized markets tend to be mature; growth tends to be steady and predictable; rapid changes in product design or in methods of manufacture tend to be things in the past⁴⁵. Transactions are typically made through private bilateral negotiations that are not directly observable to third parties, and most sales are made by means of long term supply contracts. Terms of sale (delivery services, quantity discounts, rebates, recognized grades, quality premiums, etc.) have long been standardized throughout the industry. Leading companies may have had years of strategic interaction with one another. Barriers to entry are formidable, thus severely limiting the number of potential entrants should prices rise significantly. Again, the markets for bulk vitamins by and large display these facilitating factors.

Such a mix market characteristics is found in only a minority of the world's industries. The structures and practices in the manufacturing and mining industries foster cartelization, whereas the organization of retail sales of manufactures does not. Manufacturing of organic chemicals embodies them, while production of inorganic chemicals does not.

The import of these remarks is that collusion is rational in some industries but foolhardy in others. By calling collusion "rational" economists intend to characterize cooperative business choices that are expected to generate greater profits than alternative strategies (Polinsky and Shavell 2000, Posner 2001, Shavell 2003). The field of legal economics that studies crime and punishment is founded on the idea that persons choose crime because the *anticipated benefits exceed the expected losses*. When the benefits (monopoly profits) exceed the losses (antitrust fines and penalties), deterrence will not be achieved⁴⁶.

There are two major reasons why it is rational for firms contemplating global price fixing to proceed. First, *actual* cartel profits have historically exceeded the financial penalties meted out by the world's courts and commissions. It is reasonable to suppose that *future expectations* about the benefit/cost ratio of international price fixing will be tempered by historical experience.

We have shown above that the total collusive overcharges imposed by the vitamins cartel greatly exceeded the global fines and penalties extracted from the cartelists. This result follows from the leniency policies of the most active anticartel authorities, from the difficulties of plaintiffs in U.S. civil suits in achieving double or even single damages, from the absence of civil suits abroad, and from the near absence of any kind of enforcement outside North America and the EU⁴⁷. The facts regarding anticartel sanctions presented above support these observations in the case of global cartels uncovered since 1990.

⁴⁵ Cartel formation is frequently, possibly usually preceded by an actual or impending "crisis" (as perceived by the cartelists): markedly slowing growth, falling prices, rising inventories, low rates of capacity utilization or similar conditions that have caused or are about to cause profits to decline to what are by the standards of the industry historically low rates.

⁴⁶ When they are equal, deterrence is said to be optimal. Optimal deterrence theory usually assumes that the government has no residual uncertainty and that would-be corporate criminals are risk-neutral. If a corporation is instead risk-avoiding, the optimal punishment level for the same level of anticipated benefits will be lower.

⁴⁷ Of course some cartels are uncovered and sued only by private parties, but the reverse is by far the most common pattern. Once one antitrust authority is alerted to the existence of a cartel, these days the others will soon know.

Second, global cartelists have reason to expect that their secret price fixing will probably remain hidden. The probability of being apprehended by one or more of the world's antitrust authorities is not known with certainty, but it is certainly less than 100%. The most reliable sources suggest that the probability of any kind of private cartel being caught before the agreement is dissolved for other reasons is in the range of 10% to 33% (Connor 2003b: 63)⁴⁸. It is true that most of these estimates date from periods before the full force of today's U.S. criminal sanctions and leniency inducements were felt. Nevertheless, there is little reason to believe that the true probability of detection is outside the range⁴⁹.

Therefore, even if corporate antitrust fines and penalties were to be applied in Europe and North America at their maximum levels, the low probability of detection alone will generally result in sub optimal deterrence. When one also considers the application of leniency policies in the negotiation of fines, the absence of criminal enforcement outside of two continents, and the inability of injured parties to seek civil restitution outside of North America, the profitability of global price fixing is assured.

Principal Conclusions

During 1990-2003 international cartels with global reach presented a knotty challenge to antitrust enforcement.

Cartels that sell internationally tradable commodities and that aim to fix prices in two or more regions with different national currencies cannot control currency exchange rates. As a consequence, private international cartels must prevent geographic arbitrage through frequent realignment of national prices if their control over price is to succeed. The vitamins cartels and scores of the largest cartels uncovered by antitrust authorities since 1990 embody these characteristics, and direct evidence exists that cartel managers in fact were aware that unchecked arbitrage would undermine their scheme. Therefore, the purchases of wholly foreign buyers play an integral role in creating the antitrust injury incurred by wholly domestic direct purchasers.

Even under ideal prosecutorial outcomes, in the absence of full extraterritoriality, the global reach of modern cartels insures that the monetary payouts of guilty international cartelists cannot succeed in disgorging all the illegal cartel profits. That is, the imposition of maximum government fines combined with fully successful civil suits in North America will inevitably result in amounts less than single global damages. It would therefore be utterly rational for would-be cartelists to form or join an international price-fixing conspiracy. Only if treble damages are available to wholly foreign buyers might tip the balance: if plaintiffs like Respondents are successful in American courts, the monetary penalties imposed on prosecuted members of cartels could, at least in theory, in most cases exceed the monopoly profits. Cartel formation was discouraged.

⁴⁸ The legal-economic literature on this point is scanty. Seven sources are cited on the page cited above. Also note that even after detection, successful prosecution of objectively guilty international conspiracies by the DOJ is also less than 100%.

⁴⁹ Polinsky and Shavell note that arrest rates for the most common felonious property crimes are between 13% and 17%.

Even taking account of prosecutorial conditions resembling recent historical patterns of punishment, full extraterritoriality greatly improve international cartel deterrence and will lead it to approach optimal deterrence. The precise degree of deterrence will depend on the perceived probability that international cartels will be detected, investigated, and convicted. It is widely believed that the probability of detecting clandestine cartels is less than one-third. The degree of deterrence will also depend on the proportion of the price-fixing overcharges awarded to plaintiffs in civil suits, which on average has been less than 100%, and in individual cases never exceeds double damages. If these estimates are correct and conditions remain unchanged, permitting wholly foreign buyers to seek redress for antitrust injury in U.S. courts, will mean that typical would-be cartelists will face, if not an optimal level of deterrence, the likelihood of a much smaller degree of under deterrence than exists today.

Table 1. Affected Sales of the Vitamin Cartels, 1990-1999.

Region	Minimum	Maximum	Consensus Estimate
<i>million U.S. dollars</i>			
United States: ^a			
Vitamins	5,000	5,500	5,100
Premixes	2,000	2,500	2,300
Canada: ^b			
Vitamins	530	570	550
Premixes	0	0	0
European Economic Area: ^c			
Vitamins	8,300	8,300	8,300
Premixes	0	0	0
Rest of the World: ^d			
Vitamins	18,000	18,700	18,200
Premixes	0	0	0
World: Vitamins	31,800	33,100	32,100
Premixes	2,000	2,500	2,300

a) Statements of U.S. DOJ and plaintiffs' memoranda in support of settlements.

b) Statements by CBC place sales at C\$700 to 750 million, translated at c\$100 = U.S. \$ 0.76.

c) From EC (2003, based on sales in euros in 1994 and 1998, the rate of growth between those years, and interpolation and extrapolation to the full conspiracy period. Excludes vitamin B4, presently under investigation. Includes vitamins B1, B6, B9, and H.

d) Global sales in 1995 of \$3.6 billion are derived from Marz (1996) and are related to U.S., Canadian, and E.U. sales in the same year; affected sales in the rest of the world comprise 56% of the global total in 1995, a ration projected to the entire affected period.

Table 2. Corporate Fines and Settlements, Vitamin Cartels, 1999-2003.

Type of Sanction	Known	Estimated	Total
<i>million U.S. dollars^a</i>			
Government Fines:			
United States	911.0	--	911
European Union	759.0 ^d	--	759
Canada	99.7	--	100
Australia	13.7 ^e	--	14
Korea	3.1	--	3
Other Countries ^b	--	--	--
Direct Buyers:			
U.S., major vitamins ^c	370.0	2,000 -3,000	2,000-3,000
U.S., E. Merck group	50.0	--	50
U.S., Niacin and biotin group	105.9	--	106
U.S., Choline chloride group	53 ^f	--	53
Canada	--	10 - 20	15
Australia	--	5 - 10	7
U.S., UCB Chemicals Corporation	9.0	--	9
U.S., Akzo Nobel	7.5	--	8
Indirect Buyers:			
National Association of Attorney Generals	335.0	--	335
California	96.0	--	96
Massachusetts	19.6	--	20
Other	--	300 - 400	350
Total			4,836-5,836

Sources: Press releases of antitrust authorities, press reports, law firms' web sites.

a) Fines and settlements outside the United States are translated into U.S. dollars on the date of the announcement. Includes legal fees where known.

b) Investigations are reportedly still underway in early 2004 by Brazil.

c) Follows from a November 1999 agreement between about 4000 plaintiffs in a federal class action and the seven largest defendants. In March 2000, about 200 of the plaintiffs, representing 77% of the value of U.S. purchases from the cartel, opted out of the agreement. Their settlements are secret and are estimated. Settlement rate reported to be 22.88% of sales for opt-ins. Shapiro *et al.* say that defendants have paid more than \$2 billion.

d) Does not include ongoing vitamin B4 investigation.

e) Does not include ongoing vitamin C action.

f) Mitsui only.

g) Fines and settlements outside the United States are translated into U.S. dollars on the date of the announcement. Includes legal fees where known.

g) Investigations are reportedly still underway in early 2004 by Brazil.

h) Follows from a November 1999 agreement between about 4000 plaintiffs in a federal class action and the seven largest defendants. In March 2000, about 200 of the plaintiffs, representing 77% of the value of U.S. purchases from the cartel, opted out of the agreement. Their settlements are secret and are estimated. Settlement rate reported to be 22.88% of sales for opt-ins.

i) Does not include ongoing vitamin B4 investigation.

j) Does not include ongoing vitamin C action.

k) Mitsui only.

Table 3. *De Jure and De Facto* Corporate Antitrust Fines and Settlements, International Price Fixing, Historical Means in the 1990s.

Source of Sanctions	De Jure Maximum, Local Affected Sales	De Jure Maximum, Global Sales	De Facto, Current Leniency Policies
	<i>Percent of global harm^a</i>		
Government Fines:			
United States	5-17 ^c	200 ^f	3-16
European Union	5-20 ^d	150-200 ^d	3-13
Canada	0-1	20	0-1
Other Countries	Nil	Nil	Nil
Direct Buyers in:			
United States	50-83 ^e	330 ^e	10-30
Canada	1-2	1-2	0-1
Australia	1-2	1-2	0-1
Europe	Nil	Nil	Nil
Other jurisdictions	Nil	Nil	Nil
Indirect Buyers:			
United States ^b	25-42	165 ^e	2-10
Other	Nil	Nil	Nil
Total	87-166	867-919	18-72

Sources: Connor (2003b:Table 26).

a) Historical geographic location of harms is 15-25% (US), 20-30% (EU), 1-2% (Canada and Australia each), and 45-65% (rest of the world).

b) Permitted in roughly half of the States and averaging at most double damages.

c) Fines follow U.S. Sentencing Guidelines: base fine is 20% of U.S. affected sales and typical culpability multipliers for all participants are 1.5 to 3.5.

d) EU fines average 75% to 80% of U.S. levels for same cartels.

e) Plaintiffs receive treble U.S. damages and legal fees are an additional 10%.

f) Fines are based on the alternative sentencing provision of double the harm and global affected sales.

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