

International Price-Fixing Cartels and Developing Countries:
A Discussion of Effects and Policy Remedies

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Abstract

The U.S. Department of Justice, the European Commission, and the Organization for Economic Cooperation and Development have all recently voiced concern about international price-fixing cartels. The U.S. and European Union have increased prosecution of international cartels in the past decade, but very few developing countries have made similar enforcement efforts. If these cartels have significant effects on developing country consumers and producers, the lack of antitrust prosecutions by developing countries against these cartels is an important problem. Geographically limited prosecutions may not provide sufficient disincentives to deter collusion that has worldwide benefits for colluding firms. Ongoing prosecutions of international cartels by industrialized countries may open up markets for entry by developing country producers, but these efforts may be undermined if cartels create durable barriers to entry. Western governments are also susceptible to manipulation by domestic producers using tariff barriers and anti-dumping duties to protect the home market, both during and after the price-fixing conspiracy. Thus, developing countries may need to develop their own antitrust laws and enforcement capabilities to help deter international cartel activity. A recent ruling of the Second Circuit Court of Appeals also opens up the possibility that developing country consumers may be able to exact remedies in U.S. courts.

In this paper we examine the possible effects of private international cartels on developing countries by looking in detail at three recent cartel cases, as well as at a broader cross-section of thirty-seven recently prosecuted international cartels. We discuss the indirect effects on developing country producers, either as competitors or co-conspirators, as well the direct effects of cartels on developing country consumers. By combining trade data with a sample of US and European prosecutions of international cartels in the 1990s, we are able to make a first attempt at quantifying the order of magnitude of the consequences of these cartels on developing countries as consumers. In 1997, the latest year for which we have trade data, developing countries imported \$36.4 billion of goods from a sub-sample of ten industries that had seen a price-fixing conspiracy during the 1990s. These imports represented 2.9% of total imports and 0.7% of GDP in developing countries.

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An earlier version of this paper "Private International Cartels and Their Effect on Developing Countries" was written as a background paper for the World Bank's *World Development Report 2001*. We are grateful for comments received by Simon J. Evenett. Our thanks to Arjun Jayadev, Jessica Nowicki, Natalia Lukito, and Sukmi Sukmiwaty for excellent research assistance. Special thanks also go to Charlie Perkins of Pipe Logix for providing data. The ideas expressed in this paper do not represent the opinions or policies of the World Bank.

I. Introduction

The U.S. Department of Justice, the European Commission, and the Organization for Economic Cooperation and Development have all recently voiced concern about, and in the former two cases, increased their prosecution of, international cartels. These recent prosecutions of international cartels in a wide range of industries demonstrate that cartels have pernicious effects on consumers despite the obstacles created by legal prohibitions on collusion and individual firm's incentives to compete rather than collude.

As with private international cartels through history, most of the cartels recently caught in the antitrust net of the U.S. or EU competition authorities are made up of producers in industrialized, OECD countries. Therefore, it is not surprising that virtually all previous examination of the impact of these cartels focused on the better-documented effects on wealthy, industrialized countries.¹ This appears to be true of both business and public policy players, as there has been little activity on the part of developing country governments or developing country consumers to respond to these cartels even after they have been shown to exist. This contrasts with the actions of the Canadian government, which has consistently pursued anti-competition cases against firms who have been investigated first by either the U.S. Department of Justice or the European Commission. One exception to this generalization is Mexico, which took action against the lysine cartel, and is investigating the vitamins cartel.² The lack of action in response to these cartels also appears to hold true of private parties in developing countries, which have, with only a few exceptions, apparently not actively sought civil remedies against cartel participants to the extent that consumers in western, industrialized countries have. There are a variety of reasons – legal, political, and economic -- why this may be the case. But, as this paper demonstrates, a lack of impact on developing countries is probably not one.

¹ See "Hard Core Cartels" Organisation for Economic Co-operation and Development (Paris, France 2000), p. 6. See also speech by Mr. Mario Monti, Member of the European Commission in charge of Competition, "Fighting Cartels: Why and How? Why should we be concerned with cartels and collusive behavior?" presented at the Third Nordic Competition Policy Conference, Stockholm, September 11, 2000 and the U.S. Department of Justice International Competition Policy Advisory Committee "Final Report" (U.S. GPO Washington, DC 2000).

² Brazil is also contemplating action against the lysine cartel. "European Commission Sets ADM Fine," Scott Kilman, *Wall Street Journal* June 8, 2000.

This, in turn, suggests that a more comprehensive approach to promoting competition may be necessary. Current regulatory institutions are neither international enough nor sufficiently focused on promoting competition rather than simply prohibiting particular anti-competitive techniques to assure that global markets will be competitive and open to new producers. There is currently no competition authority that considers it within their purview to assure that developing country producers have access to markets uninhibited by restraints from private agreements by established producers.

The extant research on the impact of cartels on developing countries focuses on commodity price stabilization schemes among developing country producers of primary products. In these studies, the analysis focuses on developing countries as producers and industrialized countries as consumers. In contrast, the cartels in our sample produce sophisticated manufactured goods or services; their members are largely international corporations based in industrialized countries. We examine two aspects of the impact of these cartels on developing countries. First, we look at developing countries as producers, either competitors to or collaborators with, these international cartels. In three case studies, we examine the creation of barriers to entry by cartels and their impact on developing country producers or potential producers. We also examine the methods that may be used to induce cooperation with the cartel by developing country producers. Second, we take a cross-section sample of all international cartels prosecuted by the U.S. and EU in the 1990s and ask how price-fixing conspiracies may have affected developing country consumers. This two-pronged approach gives a more complete picture of the varied direct and indirect effects of international cartels on developing countries.

Section II begins with a brief overview of basic cartel theory and outlines the possible effects of international cartel activity on developing country producers and consumers. Section III describes three recent cartels and their effects: the citric acid, graphite electrodes, and seamless steel tubes cartels. Section IV presents a cross-section sample of thirty-seven private international cartels from the 1990s and estimates the effect of these cartels on developing country trade. Section V discusses the legal issues posed by foreign plaintiffs seeking antitrust remedies in U.S. courts for the anticompetitive conduct of international cartels. Section VI presents conclusions and policy implications.

II. Cartels and Their Effects

A. Cartel Basics

There are a wide variety of organizations that may reasonably be described as international cartels. The focus of this paper is explicit price-fixing or market division agreements, known in policy circles as “hard core” cartels, among private producers from multiple countries. These agreements are illegal in the U.S. and the European Union. They have been the focus of increased prosecution by U.S. and European Union competition policy authorities over the last decade. (They are illegal in many other countries as well, although laws and enforcement vary.) There are other types of cartels, such as purely domestic cartels, private export cartels, and state-run cartels. Our analysis is limited to private hard-core international cartels.

Producers form a cartel with the goal of limiting competition. By restricting output and increasing price, ideally to the price a monopolist would set (if the cartel controls the entire market), profits will be jointly maximized. Assume for the moment that the firms in an industry have overcome the coordination problems necessary to establish a cartel. Upon its creation a cartel immediately faces the problem of how to escape from the Prisoner’s Dilemma: by raising price above marginal cost, the cartel creates an incentive for each producer to cheat.³ Each firm has an incentive to shave its price, increase its output and market share, and thereby increase its profits. But if each firm did so, collusion would immediately dissolve into competition. Repeated interaction (over time or across markets) can, by providing the incentive of future collusive profits, deter firms from cheating in the present and allow them to escape this Prisoner’s Dilemma. This tradeoff can be expressed very generally as requiring that the discounted expected stream of profits from future collusion must exceed the profits earned by cheating today:

³ The classic presentation of firms’ incentive to cheat on collusive agreements is George J. Stigler “A Theory of Oligopoly” *Journal of Political Economy* 72:1 (1964) pp. 44-61. For further discussion of cartel economics and a survey of empirical research on cartel stability, see Levenstein and Suslow, “What Determines Cartel Success?” forthcoming in *How Cartels Endure and How They Fail* edited by Peter Grossman (Edward Elgar, 2002).

$$E[\Pi_{\text{cheating today}}] + E[\Sigma (\Pi_{\text{following an incident of cheating}})^{\delta}] < E[\Sigma (\Pi_{\text{colluding forever}})^{\delta}]$$

This means that the likelihood that an industry will bother to exert the effort to establish a cartel will depend on several very basic factors that determine the expected profits associated with colluding. These include the benefits of colluding, the benefits of cheating, the extent of repeated interaction, and the discount rate.

Consider first the benefits of colluding. The incentive to create a cartel depends fundamentally on the cartel members' assessment of the potential for an increase in price to lead to an increase in profits. This depends, in turn, on such factors as the price elasticity of demand (as demand is more elastic, the potential for increasing profits decreases and the incentive to create a cartel decreases); the rate at which future profits are discounted (as cartel members become more impatient, collusion is harder to sustain); and variance in demand (at a minimum, demand fluctuations create coordination and complexity problems, as the optimal price changes whenever demand shifts).

Next, consider the benefits of cheating. If the benefits to cheating are sufficiently low relative to the gains from colluding, the industry will find that it lies within the bounds in which collusion is *possible*. In order to *successfully* collude, it will also be necessary for cartel members to devise punishment mechanisms that provide necessary further deterrence to cheating. That is, the second term on the left side of the inequality above (profits earned following an incident of cheating), must be very low or even negative. The extent of multi-market contact -- the number of times and places that two firms interact -- is one determinant of the number of opportunities to punish cheating; as it increases, so does likelihood that collusion will succeed. Another important factor is industry structure on the buyer's side of the market. If consumption is concentrated in just a few customers, it is more likely that a cartel member would succeed in increasing its market share substantially with a small cut in price and therefore be more tempted to cheat.⁴

⁴ On the other hand, our sample of recent prosecutions of international cartels suggests that successful collusion is possible in industries with large customers. The vitamins cartel, for example, lasted many years and sold to very large customers.

The ability of the cartel to punish cheaters also affects the benefits of cheating. Anti-trust enforcement can make it difficult for a cartel to punish its members, particularly via a price war, as such punishment would make its existence more obvious to the anti-trust enforcement authorities. Anti-trust enforcement also limits the use of fines as punishments; in permissive anti-trust environments, cartels have frequently used mechanisms in which a firm that has sold over its quota or in some other way violated the agreement (e.g., sold below the agreed upon price or outside its assigned territory) simply compensates the other parties.

Beginning with Stigler (1964) and developed further by Green and Porter (1984), economists have focused on the importance of the *observability* of cheating to collusive stability. When cheating cannot be observed, it is harder to give firms an incentive not to cheat. It is more likely that collusion will be disrupted either by cheating or by events that are empirically indistinguishable from cheating. For this reason, firms in the cartel may find it useful to invest in information collection in order to support the collusive equilibrium.⁵ In addition, cartel members often find that there is no substitute for frequent face-to-face meetings, in order to compare market information and discuss alleged occurrences of cheating.

Finally, having established sufficient incentives for existing industry participants to collude, the ultimate critical element to sustainable cartel profitability is the existence of barriers to entry. When firms do manage to coordinate their conduct on incentive-compatible collusive strategies, they create an incentive for outsiders to enter the industry. Coping with and preventing entry can undermine the best-laid collusive plans. In some industries it may be that firms resist the temptation to collude because they know that it would only lead to entry (which might, given any cost of exit, make the incumbent firms worse off).

The next section outlines the possible effects that an international cartel could have on either developing country consumers or producers. The price effects are clear enough. Therefore, we focus on the hidden entry barriers that may be created as a necessary part of the cartel.

⁵ Genesove and Mullin (1999) and Levenstein (1996) examine the information collection procedures of two cartels in the sugar and bromine industries, respectively. Industry associations often engage in the collection and dissemination of information, which may facilitate collusion. The government may encourage this information dissemination, as the federal government during the open price policies under the National Industrial Recovery Act (Alexander 1994) or as state governments did even more directly in the salt industry (Levenstein 1995).

B. Potential Effects of Cartel Activity on Developing Countries

For consumers the direct cost of a cartel is plain: price will increase if the cartel is successful. There may other costs as well, such as decreased product choice (if the cartelized product is differentiated and if geographic markets are allocated among producers) or a slower rate of technological change.

For producers, there are both potential costs and benefits. Developing country producers may benefit from an industry price umbrella set by a U.S. or EU cartel, allowing non-cartel producers to sell at that price, or slightly below, without having to adhere to a cartel production quota. There are, however, potential negative effects as well. In order to ensure cartel survival, international cartels may engage in activity that blocks or slows entry by developing country producers. For example, cartel members may use tariff barriers and antidumping duties to prevent entry by developing country participants. International cartels may also use government-authorized, non-tariff barriers to prevent entry (e.g., quotas or regulation) or punish outsiders (e.g., using trade reporting and import surveillance by government agencies to track where other firms are selling).

In addition to those barriers intentionally or inadvertently provided by national governments, cartels can also use private barriers to prevent entry. Historically, cartels have used a variety of different techniques to block entry. These include the threat of retaliatory or predatory price wars, use of a common sales or distribution agency (i.e., vertical foreclosure), and patent pooling. For the most part the public record on recent price-fixing cartels does not discuss whether the cartel engaged in activities to block entry because such evidence is not necessary for a criminal conviction, at least in the United States where price fixing is *per se* illegal. In part, because of the secrecy surrounding cartel operations, we must rely largely on anecdotal evidence from which only tentative conclusions can be drawn. However, we have found descriptions of activities by contemporary international cartels that may have been attempts to deter or block entry by developing country producers.

One example is provided by the price-fixing conspiracy in the EU steel beam market between 1988 and 1994. Steel makers who were colluding to fix the price of steel beams “restrict[ed] the

flow of information . . . in order to freeze out any new competitors," according to Karl Van Miert, the EU competition commissioner.⁶ It is not clear from the published record what type of information steel producers were trying to restrict in the steel beam case, but we do know that in many industries information about technology and more formally, patent pools, have been used by cartels in the past to create barriers to entry.⁷

Or, consider the actions of graphite electrode producers from the U.S., EU, and Japan between 1992 and 1997 (discussed more fully below). The U.S. Department of Justice alleged that graphite electrode producers engaged in activity to disadvantage outsiders to their cartel, claiming that they "agreed to restrict non-conspirator companies' access to certain graphite electrode manufacturing technology."⁸ Again, while this charge appears in every individual indictment, indicating it was agreed upon by all cartel members, the details of the firms' actions are not given.

These kinds of activities may be particularly effective in limiting entry from developing country producers who are new to international trading. Such activities may encourage developing country entrants to participate in some sort of joint venture with an established producer who has the information, patents, or distribution network that developing country entrants lack. Such joint ventures could then function as a way for colluding firms to accommodate developing country entry into a cartel under their own terms or to engage in an implicit cooperative pricing arrangement. These arrangements give developing country producers access to the world market, but may do so at some cost to the degree of competition that would otherwise obtain in the industry. In addition, in several recent international cartel cases, joint ventures have been established in the years following the forced break-up of the cartel. This may reflect an attempt to consolidate and restructure the industry in a more direct way, in light of the break-up of the cartel.

⁶ "European Commission Fines Steel Makers \$116.7 Million" *Wall Street Journal Europe* February 17, 1994.

⁷ See, for example, Steven W. Usselman, "Organizing a Market for Technological Innovation: Patent Pools and Patent Politics of American Railroads, 1860-1900" *Business and Economic History* 19 (1990): 203-22 and Leonard S. Reich, "Lighting the Path to Profit: GE's Control of the Electric Light Industry, 1892-1941" *Business History Review* 66:2 (Summer 1992): 305-34.

⁸ "Japanese Subsidiary Charged with International Conspiracy to Fix Prices for Graphite Electrodes in the U.S." U.S. DOJ Press Release, February 23, 1998.

Of course, both developing country entrants and established producers could also have other, welfare-enhancing motives for establishing such joint ventures, such as sharing technology, local market expertise, or capital. It is important to note that these explanations for joint ventures are not mutually exclusive; a joint venture might well accomplish both welfare-enhancing and competition-reducing goals of the participating firms. Joint ventures (and mergers) in industries known to have a history of international price-fixing should be scrutinized by regulatory authorities and structured so as to support the welfare-enhancing gains from cooperation while allowing consumers in both developing and industrialized countries the benefits of enhanced competition.

Given this overview of basic cartel operations and how cartel activity might affect developing countries, we now turn to three contemporary international cartel cases to find specific illustrations of these activities. In each case, we provide a brief overview of the industry and then discuss the price-fixing conspiracy its possible effects.

III. Three Illustrative Cartel Cases

As we will discuss in Section IV, there have been approximately forty international cartels indicted and prosecuted in the 1990s by the U.S. Department of Justice and the European Union's European Commission. Of this sample, we have selected three cases to show the potential effects of international cartels on developing countries: citric acid, graphite electrodes, and seamless steel tubes. In these cases the effects of the cartel were felt worldwide and the cartel exported a significant percentage of the product to developing countries. Also, although the quality of the data varies, there is at least some price data obtainable in each case. There are other contemporary cartel cases where the cartel, although international in its membership, covered only a limited geographic scope (e.g., Western Europe). These cartels may have had significant effects for a period of time, but are not ideal for our focus on developing countries. In addition, there are other recent cartels in the sample that probably did have worldwide effects, but were either services or customized products, so adequate price and trade data are not available (e.g., cable-stayed bridges). In contrast, the three cases selected satisfy our criteria of having both broadly felt effects and publicly obtainable price data.

A. Citric Acid Cartel

1. Industry Background

Citric acid is used primarily as a flavor enhancer and preservative, falling into a general category of chemicals called acidulants. Acidulants are naturally occurring acids that inhibit the growth of bacteria and can offset product sweetness with their tart flavor. In general, the main uses for citric acid are in soft drinks (its largest end use), processed food, detergents, and pharmaceuticals and cosmetics. The acidulant class also includes lactic, fumaric, malic and tartaric acids. Fumaric acid, for example, competes against citric acid as a preservative. It is generally cheaper, but has certain chemical characteristics (e.g., a stronger acid taste than citric acid), that make it an inferior substitute for many processed foods.⁹ Citric acid is the most widely used acidulant, accounting for about two-thirds of the total acidulant market.

Buyers can be large or small, but the large customers account for the bulk of citric acid sales. Given that the greater part of citric acid production goes to beverage companies, such as Coca Cola and Pepsi, the buyers are very large indeed. Procter & Gamble is also one of the largest U.S. consumers of citric acid. In fact, in the United States, approximately 70 percent of citric acid and sodium citrate sales go to 10 to 15 end users.¹⁰

There are two primary production processes – shallow pan and deep tank fermentation. The deep tank process is preferred in most industrialized countries due to lower labor requirements and better quality control. This process does, however, require large amounts of energy as an input.¹¹ Connor (1998) estimates the marginal cost of production at \$0.60 per pound during the conspiracy period.¹² The shallow pan process is more labor intensive and less capital intensive, and therefore operates on a smaller scale.

⁹ “Fumaric Acid” *Chemical Marketing Reporter*, July 24, 2000.

¹⁰ Petition for the Imposition of Antidumping Duties: Citric Acid and Sodium Citrate from the People’s Republic of China, filed by Akin, Gump, Strauss, Hauer, & Feld, L.L.P. with the U.S. International Trade Commission, December 15, 1999, p. 17. . (Public version of document obtained from ITC website: <http://dockets.usitc.gov>.) Hereinafter referred to as “ITC Petition”.

¹¹ ITC Petition, p. 15.

¹² Connor (1998), p. 11.

Production is concentrated in the U.S., Europe, and China, although there are citric acid producers scattered throughout the world. In the late 1990s Western Europe, the U.S., and China together had an 88% market share of world capacity, estimated at approximately 1.2 billion pounds in 1994. Table 1 provides a summary of the key firms in the industry, their capacity, and market shares. The U.S. industry in 1990, just prior to the start of the conspiracy, had three players: ADM, Cargill, and Bayer AG (a German firm whose U.S. marketing was handled by Haarmann & Reimer, its U.S. subsidiary). Cargill entered the industry in 1990, as the first producer vertically integrated forward from corn refining into citric acid production. All producers are now vertically integrated. In Europe in the early 1990s there were five producers in the citric acid market, with the three largest being Bayer, Hoffmann-La Roche (a division of Switzerland's Roche Holding), and Jungbunzlauer International AG (Switzerland). These European companies, as well as smaller Chinese importing companies, satisfied most of the U.S. import demand during the mid-1990s.

Chinese producers have presented the most vigorous competition to U.S. and European manufacturers. Up to one hundred small firms entered the industry in the mid-1990s with the help of the Chinese government. Although the exact price differential has varied, in general Chinese citric acid sells in the U.S. for 10 to 20 cents less per pound than domestic supplies and European imports. Some consumers consider China's product to be lower quality and do not consider buying it, despite the price difference. For others, particularly industrial users, price is the major decision variable. Chinese exports peaked around 1994 and then dropped off as the Chinese government withdrew its subsidies and raw materials prices increased. Exports from China rebounded after the cartel was broken apart. The Chinese producers as a group currently hold about 15% of the U.S. market share.

2. Price-Fixing Conspiracy and Its Effects

According to U.S. Department of Justice documents, firms in this industry fixed prices from approximately July 1991 to June 1995.¹³ Although the citric acid cartel did not control world

¹³ "Justice Department's Ongoing Probe Into the Food and Feed Additives Yields Second Largest Fine Ever," DOJ Press Release, January 29, 1997. The reported cartel dates vary somewhat, depending on the particular firm charged and the antitrust authority or private plaintiff bringing the suit. Connor (1998), for example, notes that DOJ

production, it did account for 75-85% of sales in North America and Western Europe.¹⁴ Citric acid firms have been convicted for these activities in the United States, Canada, and the European Union. The fines are detailed in Table 2.

There have been several follow-on suits by customers claiming damages. One civil suit filed by bottlers and food processors was settled in 1996 for a total of \$94 million (ADM, H&R, HLR, and Jungbunzlauer were defendants). Cargill was named in this civil suit, but exonerated. In the court opinion of September 1, 1999 the judge wrote: “It is true that between 1990 and 1997 ADM, H&R, and Cargill always changed list prices within a month of one another and generally did so in the same month...Although there appears to have been little competition in citric acid list prices, Cargill did price aggressively in actual contracts.” This difference between list and transactions prices is important to keep in mind when we look later at the price trends in the industry in the past decade. In particular, large customers generally pay less than list price.

The members of the citric acid cartel fixed prices and allocated sales in the worldwide market, issued coordinated price announcements, and monitored one another’s prices and sales volumes.¹⁵ In addition, the cartel members recognized the importance of policing and enforcing the agreement. They shared monthly sales figures and took stock at the end of the year of each company’s total sales. A company selling more than its quota was required the next year to purchase citric acid from a cartel member that was under quota.¹⁶

The structure put in place by the citric acid cartel members was quite elaborate. The senior executives responsible for determining the broad outline of the cartel agreement were nicknamed “the masters.” At first, when the cartel began in 1991, meetings were held only by the masters. Later, in 1993, “the sherpas” (lower-level executives) began to hold meetings as well in order to handle the day-to-day workings of the cartel and work out grievances between members.¹⁷

indictments filed against the European participants in the conspiracy list July 1991 to December 1996 as the cartel dates. Connor (1998), p. 11

¹⁴ Connor (1998), p.13.

¹⁵ US Department of Justice press release (January 29, 1997).

¹⁶ Kurt Eichenwald “U.S. Wins A Round Against Cartel,” *New York Times*, January 30, 1997.

¹⁷ European Commission document DN: IP/01/1743. (05/12/2001)

The U.S. price trend from 1990 through 1999 is shown Figure 1. Two price series from two different sources are plotted: *Chemical Marketing Reporter (CMR)* and *Purchasing Magazine (PM)*.¹⁸ One can see from the graph that the *CMR* data is more representative of a list price, while the *PM* data reflects, at least to some degree, true transactions prices. Prior to the conspiracy, during the time when the industry was adjusting to Cargill's entry and Pfizer's exit, there was a price war. Prices in early 1991 were driven down to the high-50 cent range.¹⁹ The price war ended in early 1991. List prices rose steadily after that, stabilizing at 85 cents per pound in the U.S. between 1993 and 1996 (this is reflected in the *CMR* line). According to Connor (1998), actual transactions prices, as reflected by the *PM* line in Figure 1, stayed from 1 cent to 5 cents lower than list prices. For example, in 1991 *CMR* reported that "despite the 68-cent list price, agreements are currently settled at about 63 cents."²⁰

Although the transaction price increase is slightly less dramatic, both price series in Figure 1 show a steady increase in price and then a decline after the conspiracy ended. EU Competition Commission Mario Monti reported that citric acid prices rose by 50 percent during the conspiracy.²¹ One has to be careful, of course, about drawing strong conclusions from such statements or from the price charts included in this paper, since they do not control for other factors affecting price. For example, there are seasonal effects in pricing due to increased demand from the beverage market in late spring and early summer.

More generally, charges of increased cartel prices must be interpreted with care because some portion of the increase may reflect other factors such as rising raw materials costs or increases in demand. The price charts are purely descriptive, and do not purport to control for other relevant factors that may have affected prices during the conspiracy period. In addition, we do not estimate what the price would have been in the "but-for" world. That is, although it is clear that there was a conspiracy and that firms have admitted their guilt, we have not attempted to

¹⁸ Most of these data (1987-97) are taken from Connor's Appendix Table 1, which presents price data compiled from various issues of *CMR* and *PM*. We have updated the data series from the same two sources through 1999.

¹⁹ Melissa Shon *Chemical Marketing Reporter*, "Cargill, Jungbunzlauer Slate Citric Acid Additions," March 30, 1992.

²⁰ David Axinn "Citric Acid Marks Rise as Market Settles Down," *Chemical Marketing Reporter*, July 22, 1991.

²¹ "Competition: Monti Calls for Higher Fines on Cartels," *European Report*, September 13, 2000. Unfortunately, Monti does not specify whether he is referring to US or European price increases (or whether they were the same).

estimate the competitive price or the price that would have prevailed absent the cartel. Any conclusions, therefore, about the *effects* of cartel activity must be drawn with great care.

In order to provide an estimate of the order of magnitude of the effect of this cartel on developing country consumers, we start with Connor's (1998) estimate that buyers in the U.S. paid an extra 21-24% during the conspiracy, using marginal cost as the "but-for" or counterfactual price.²² If we simply round down and assume that prices increased 20% on an approximately 300,000 million pound per year market in the "Rest of the World" (i.e. markets outside the United States, Canada, and Europe), so that the prices charged were ten cents per pound above the competitive level (which is substantially less than the observed price increase), this would amount to a cost of \$30 million per year to consumers. The cost to these consumers is also the benefit to cartel members. The monopoly profits earned in these markets provide an incentive to collude for firms to collude; no corresponding punishment or fine has lessened this incentive.

It is possible that developing country producers may have received an increased price during the conspiracy period by riding on the coattails of the major producers. Conversely, developing country producers may have been damaged if the cartel was able to somehow prevent imports into its territory. The existing literature has reached no consensus on the net impact of these effects on cartel outsiders. In one case, U.S. producers of ferrosilicon formed a cartel in 1989 and proceeded to use antidumping laws in the U.S. and Europe to bar entry to non-cartel members.²³ However, the claim that firms were systematically filing anti-dumping claims and then withdrawing them following a, presumably threat-induced, agreement with importers has not stood up to rigorous empirical tests.²⁴

²² Connor, p. 10. Lawrence J. White disputes Connor's use of marginal cost as the "but for" price for the lysine conspiracy. White argues that the true "but-for" price was higher, based on the fact that the market was a four-firm oligopoly that probably would not have converged on an equilibrium of price at marginal cost. Lawrence also argues for a shorter cartel period than Connor. (See Lawrence J. White "Lysine and Price Fixing: How Long? How Severe?" forthcoming in *Review of Industrial Organization*.) Of course, from a policy perspective, the relevant question is what is necessary to achieve a competitive price that assures an efficient allocation of producers' resources and individual consumption decisions. Thus, for our purposes, the marginal cost price is the relevant comparison.

²³ Pierce (2000).

²⁴ Using data from 1990 to 1997, Taylor (2001) finds that most withdrawn anti-dumping cases either have no effect on market price and quantity, or are followed by a decrease in price and increase in quantity.

We have some evidence of attempts to limit entry from two citric acid anti-dumping cases that were filed during the conspiracy period. The first, from India, appears not to relate directly to the cartel, but could be an indirect consequence. India imposed anti-dumping duties on citric acid imports from China in November 1998. Before the duties were imposed, China had captured close to 40% of the Indian market for citric acid. If China was being kept from the U.S. and European markets, either through anti-dumping cases or private restraints, they may have turned to India as an outlet for their product. It is even possible that the multi-national firms that participated in the cartel were able to influence Indian policy toward Chinese imports.²⁵

U.S. producers have twice tried to use the government to help protect the domestic industry from Chinese imports. First, in 1995, *while the cartel was still intact*, producers lobbied the Office of the U.S. Trade Representative to include citric acid on the list of various Chinese imports to be hit with a high tariff. A last-minute agreement prevented the sanctions from being imposed.²⁶ The second anti-dumping allegation was brought at the end of 1999 by ADM, Cargill, and Tate & Lyle, who reacted to the rise in imports of citric acid from China by filing a petition with the Department of Commerce and the International Trade Commission seeking anti-dumping duties of 350% on Chinese imports. While U.S. prices in early 2000 averaged around 63-66 cents per pound, citric acid from China was selling for about 53 cents per pound.²⁷ According to claims made in the case, the filing was prompted in part because two of the largest consumers of citric acid, Proctor & Gamble and Ashland Chemical Inc. (a distributor) switched to Chinese citric acid for their raw material needs. Contradictory testimony was given regarding whether the quality of citric acid from China met U.S. standards. One Chinese supplier tried to qualify to supply Quaker Oats, for example, and was turned down (although this same supplier does sell to smaller U.S. food manufacturers). The ITC dismissed the case in February of 2000, after deciding that

²⁵ There are other examples of attempts by international cartels to use anti-dumping laws to sustain collusion. The ferrosilicon price-fixing conspiracy lasted from 1989-1991 and involved producers from the U.S. and Norway. Five of the six major US manufacturers pleaded guilty and were fined. These same firms asked for, and received, anti-dumping duties that were placed on Brazil, China, and other countries. When the International Trade Commission found out about the U.S. firms' involvement in a cartel, it reversed the tariffs.

²⁶ Cheryl Cullinan Lewis, "Citric Acid" *Purchasing*, May 4, 1995.

²⁷ Feliza Mirasol, "DOC Investigates Possible Dumping of Citric Acid," *Chemical Marketing Reporter*, January 17, 2000.

there was no material injury.²⁸ At the hearings, it certainly weighed against the producers that these same producers had just been convicted and fined for cartel behavior. U.S. and European governments must be extremely wary of such attempts by firms to use the state as a tool for creating barriers to entry. Chinese exports to the United States increased dramatically after the demise of the cartel, lending credence to the idea that the cartel was able to limit such exports during its existence.

There has been rapid consolidation in the industry since the price-fixing conspiracy was revealed. Internationally, Hoffmann-La Roche completed its sixth joint-venture facility in China in 1997. Its partner, Wuxi Zhongya, is one of China's three largest producers.²⁹ Cargill and Tate & Lyle are both investing in Brazil, where a high quality and low cost sugar supply is attracting citric acid manufacturers.³⁰ There are two ways to interpret these events. One is that, following the demise of the cartel, western producers are accepting entry from developing country producers. The alternative is that former cartel members are attempting to re-establish market dominance, absent the cartel, through these joint ventures.

Prices have fallen, both in the U.S. and in Europe since the demise of the cartel. Figure 1 shows the general downward trend in U.S. prices since late 1995. *CMR* and *PM* both report that prices are down and stable, despite the fact that demand is strong. European prices, which tend to be lower than U.S. prices, have followed a similar pattern: the average price per kilogram ranged from \$1.68 - \$1.82 in 1995, \$1.04 - \$1.39 in 1997, and \$1.06 - \$1.17 in 1999 (still well above Connor's estimate of marginal cost).³¹

B. Graphite Electrodes Cartel

1. Industry Background

Graphite electrodes (GE) are large carbon columns used by electric arc furnaces (EAF) or "mini-mills" in the making of steel. These mini-mills use graphite electrodes to generate the enormous

²⁸ Clay Boswell, "Pucker Up: A Taste for Tartness Drives Acidulants," *Chemical Marketing Reporter*, May 29, 2000

²⁹ "Keeping the Faith," *Pharmaceutical Executive*, January 1, 1998.

³⁰ Kiernan Gartlan, "Tate & Lyle To Exp and Brazilian Citric Acid Operations," *Dow Jones Commodities Services*, October 19, 2000.

heat necessary to melt scrap metal and convert it back into a marketable steel product. GEs are made from synthetic graphite, for which the primary raw materials are petroleum coke, coal tar and petroleum pitch. The petroleum coke is crushed and mixed with the pitch into a paste, which is then extruded through a press. The electrodes are baked and undergo a series of refinements. The electrodes are then machined to meet the customer's specifications.

GEs are the only material that can generate sufficient heat to melt scrap steel. There is no competitive substitute, other than the more traditional methods of making steel (i.e., open hearth and basic oxygen). GEs make up about 6-7 percent of the cost of converting scrap to steel. Almost fifty percent of GE costs are raw materials costs, the bulk of which is petroleum coke (also called needle coke for electrodes applications). Labor costs represent about twenty percent of total costs.³² The production process is highly electricity intensive, and therefore the electricity portion of the cost varies by location within a country and across countries.

A new plant takes 3-4 years to build. A civil complaint filed by numerous steel producers against the GE manufacturers highlights the significant barriers to entry that exist even without a cartel: "The production of GEs is a mature, capital-intensive business that requires detailed product and process know-how. It takes approximately four years to build a new plant with a 20,000-ton capacity. No significant new player has entered the industry since 1950."³³ Thus entry is limited not only by high capital requirements but also by the importance of implicit technical and market knowledge.

There was a shakeout and consolidation in the industry in the late 1980s and early 1990s, just prior to the price-fixing conspiracy. The consolidation was precipitated by slumping steel production. In fact, GE industry capacity has shrunk by one-third since the mid-1980s.³⁴ The number of producers has since stabilized. Table 3 provides a summary of the major firms in the industry, their market share, and locations. In this highly concentrated market, UCAR

³¹ "Citric Acid," *European Chemical News*, March 6-12, 2000.

³² Barbara Martinez, "Robert Krass Chairman CEO and President of UCAR International" *Dow Jones Investor Network*, October 6, 1995.

³³ *Ferromin International Trade Corporation, et. al. Vs. UCAR, et. al.* In the United States District Court for the Eastern District of Pennsylvania, Second amended complaint, filed May 1, 1999, at paragraph 47. Hereinafter referred to as the "Ferromin" case.

International of the United States and SGL Carbon Corporation of Germany dominate, with a combined world market share of roughly two-thirds. Both firms manufacture electrodes in many countries (including such developing and transition economies as Brazil, Mexico, South Africa, Russia, and Poland) and sell throughout the world. There are also a number of other firms who are not global producers, but who do sell their product globally. The C/G Group, for example, has plants only in the United States, but sells throughout the world. Supporting this world market are fairly low transportation costs, generally less than 5% of the cost of the electrodes.³⁵

The share of EAF production as a percentage of total world steel production has grown rapidly over the past two decades. Mini-mills now comprise about one-third of total steel production. The table below shows how EAF production was distributed around the globe in 2000.³⁶

Region	Production (million metric tons)	Oxygen %	Electric %	Open Hearth %
EU	163.2	60.3	39.7	0
Other Europe	46.5	56.8	41.7	1.6
Former USSR	98.6	54.6	12.5	32.9
NAFTA	133.8	51.5	48.5	
Central & South America	40.3	65.0	35.0	
Africa	13.4	49.3	50.1	
Middle East	10.6	20.8	79.2	
Asia	330.3	62.1	28.5	1.7
<i>WORLD</i>	<i>845.8</i>	<i>58.6</i>	<i>33.8</i>	<i>4.6</i>

2. Price-Fixing Conspiracy and Its Effects

Price-fixing by graphite electrode producers began in 1992 and continued through at least 1997.³⁷ According to reports in the press, investigation of alleged price-fixing began after a

³⁴ "New Issues -- UCAR International IPO," *Standard & Poor's Emerging and Special Situation*, November 14, 1994.

³⁵ Ferromin case, paragraph 50.

³⁶ International Iron and Steel Institute website: http://www.worldsteel.org/trends_prod/prod06.

³⁷ "Commission Fines Eight Companies in Graphite Electrode Cartel," European Union press release July 18, 2001.

As is the case in most such cases, the exact dates of the conspiracy are not known. The alleged dates of conspiracies vary depending on the claimant and the accused firm.

complaint from a steel manufacturer.³⁸ Lawsuits and criminal charges have been brought in the U.S., Canada, and the European Union.³⁹ Convictions are detailed in Table 4. In the U.S., for example, there were seven firms indicted for price-fixing, UCAR, SGL, C/G, Showa Denko, Tokai, SEC, and Nippon, and six firms fined (C/G was granted leniency by the Department of Justice). An eighth firm, VAW Aluminum, was fined by the European Commission, but not by either the U.S. or Canada. Fines (not including civil damages) against these eight firms now total almost \$500 million.

After the GE firms pled guilty to the U.S. charges, dozens of civil suits followed. Almost forty U.S. steel producers sued for damages, and many of these suits have settled. In general, although manufacturers in developing countries must have been damaged by many recent worldwide cartels, such as the vitamin, citric acid, lysine, and steel tube conspiracies, they have apparently not sued in U.S. courts. The graphite electrodes case is one exception, where a civil lawsuit has been brought by a group of non-U.S. steel producers. The “Ferromin” antitrust suit was filed in February 1999 by 27 international EAF steel producers, many of them from developing countries.⁴⁰ The plaintiffs’ firms reside in Turkey, Thailand, Australia, China, Australia, and Sweden. The defendants named are UCAR, SGL, Tokai, C/G, Nippon and SEC. The plaintiffs claim that their purchases of GEs in the U.S., Europe, Australia and Asia totaled \$180 million over 1992-97 and that they were overcharged an average of 45 percent during this period. In June 2001 a U.S. District Court dismissed those claims where GEs were purchased in foreign markets, but has allowed the claims to remain of those plaintiffs who state they can show that the GEs they purchased were invoiced in the United States.⁴¹ We will discuss the legal issues arising from this case and a similar Christie’s art auction case in more detail in Section V.

The information that we have on the cartel structure and organization comes almost exclusively from the U.S. Department of Justice’s investigation. Cartel members agreed to: 1) increase and

³⁸ Adam Jones, "Blowing the Whistle - American-Style," *The Times*, February 24, 2000.

³⁹ The Japanese Fair Trade Commission issued a warning to Japanese GE firms in March of 1998. There was no conviction or fine, apparently due to a lack of evidence.

⁴⁰ One of the plaintiffs is the Ferromin International Trade Corporation, which is a U.S. company that purchased graphite electrodes on behalf of its Turkish affiliates.

⁴¹ *Ferromin v. UCAR International et al.*, 153 F.Supp.2d 700 (2001).

maintain prices, 2) eliminate price discounts,⁴² 3) allocate volume among conspirators, 4) divide the world market among themselves and designate the price leader in each region, 5) reduce or eliminate exports to members' home markets, 6) restrict capacity, 7) restrict non-conspirator companies' access to certain graphite electrode manufacturing technology, 8) exchange sales and customer information in order to monitor and enforce the cartel agreement, and 9) issue price announcements and price quotations in accordance with the agreement.

Each of the provisions listed above would be considered "normal" (necessary, but not sufficient) for the successful operation of a cartel. One of the most interesting aspects of the conspiracy is the agreement to restrict access to technology, although the Justice Department has, so far, provided no details of these allegations. One of the most noteworthy absences, though, is a provision of penalties for cheating on the agreement. This may have been implicit and discussed in the meetings, but never formalized. Since they did collect and share information on sales for the purposes of enforcing the agreement, there presumably would have been a discussion (or implicit threats) of what would happen if someone cheated.

The alleged price increases by the cartel were significant. In the United States, graphite electrode prices increased over 50% from May 1992 through February 1997. The Ferromin antitrust claimants allege that the price increases they suffered averaged over 45%. In Canada prices rose by more than 90% over 1992-97.⁴³ The Canadian market was much more concentrated at the time, consisting only of UCAR and SGL, whose combined market share during the conspiracy years was over 90 percent.

The U.S. price trend from 1980 through 1999 is shown Figure 2. The chart captures the fall in prices during the steel slump of the late 1980s, a clear increasing trend in the nominal price of GEs during the cartel period, and a decline after the firms were convicted by the DOJ. (The dotted line indicates missing data for the mid-1980s.) *Purchasing Magazine* reports that the last

⁴² More specific information on this point is given in "Government's Sentencing Memorandum and Government's Motion for a Guidelines Downward Departure (U.S.S.G. §5K1.1)" U.S. Department of Justice, Filed October 19, 1999. It says that all forms of discounts were to be eliminated, including rebates and consumption guarantees

⁴³ "Foreign Corporation Fined \$12.5 million for Price Fixing," Industry Canada, Competition Bureau, News Release, July 20, 2000.

price trough was \$2,100 per metric ton in early 1992.⁴⁴ In May 1992 the U.S. price was \$3,123, and by February 1997 it had risen to \$3,439.

There are a few details worth noting about the prices used for Figure 2. From 1992-97 they reflect prices in the United States, as laid out in the DOJ Sentencing Memorandum of October 19, 1999. Outside of that time period, prices are taken from a variety of sources, including *Forbes*, *Oil and Gas Journal*, *Dow Jones Commodity Service*, UCAR earnings reports, and C/G SEC filings. It is unclear whether the price quotes given before 1992 and after 1997 reflect world prices or U.S. prices. For example, news sources say “high-performance graphite electrodes are approaching \$2,100 per metric ton” or “Carbide/Graphite’s electrodes now sell for...” without specifically stating whether these prices hold only for the U.S. or more broadly. There is anecdotal evidence that some EAF producers in developing countries were able to buy below the cartel price. In India, for example, GEs in mid-1997 were selling at roughly Rs 71,000 per ton compared with GEs from Japan selling at Rs 99,000 per ton.⁴⁵ This price quote is given after the cartel was broken up in the United States. Thus, the fact that price differences across countries are sporadically mentioned in the press implies that there is some ambiguity in the data and therefore also in the interpretation of the price chart.

Developing country producers may have been able to increase their prices under the rising cartel price umbrella. That does not mean that developing country producers would have set exactly the same price; there may be quality differences or other differences in transportation costs, supply assurance, contract terms, and so on. Although this is a reasonable conjecture, given profit-maximizing behavior on the part of developing country producers, we have no data to corroborate this hypothesis,

Alternatively, developing country GE producers may have been damaged if the cartel was able to prevent imports into its territory. Indian graphite electrode producers have made exactly this claim. The chairman of HEG, one of India’s major GE producers, said that “the growth of Indian exports is not being liked by the American/European and Japanese producers. In order to

⁴⁴ *Purchasing*, October 19, 1995.

⁴⁵ “Rajesh Shirsat and Samata Dhawade, “Graphite Electrode Sector: Huge Export Potential Waiting to be Tapped,” *Business Standard*, June 3, 1997.

counter India's growth in exports, they are resorting to large scale dumping in India, and have cornered more than 30 per cent of the domestic market. While Indian exporters are selling their products at over \$2,800, international producers are dumping the same product in India at less than \$2,200."⁴⁶ In response to complaints from HEG and other GE producers in India, the government imposed anti-dumping duties in 1997 on imports from the U.S., several European countries, and China. Since the anti-dumping claims were filed in 1996, while the conspiracy was still operating, it is possible that the conspiring GE producers were trying to force the exit of, or at least discipline, Indian producers.

There has been a clear downward price trend since the conspiracy ended, as shown in Figure 2. This certainly reflects in part the Asian financial crisis that hit the steel industry and therefore the graphite electrode industry in late 1998. There is some evidence, albeit anecdotal, that points to readjustment to a new equilibrium in the industry since the cartel ended. One recent article mentions a "market share-driven price war" that has cut prices by five percent.⁴⁷ In addition, individual companies have restructured in the face of mounting fines. Joint ventures are also taking place. In 1999, for example, UCAR entered into a production and marketing joint venture with Jilin Carbon, the largest Chinese producer of graphite electrodes.⁴⁸ Whether such a joint venture facilitates or controls Chinese entry is not yet clear, but it does suggest that monitoring of industries by competition authorities after the breakup of a price-fixing conspiracy may be warranted.

C. Seamless Steel Tubes (Oil Country Tubular Goods) Cartel

1. Industry Background

Seamless steel tubes, pipes, and casings are used in the construction of wells in the oil and gas industry. They are often referred to in the trade literature as Oil Country Tubular Goods (OCTG). Steel line pipes are used in the transmission of oil and gas from wells. Stainless steel tubes, made by established steel producers, represent new competition for the traditional OCTG product, and are the only substitute.

⁴⁶ *Ibid.*

⁴⁷ "Purchasing Hotline," *Purchasing*, June 1, 2000.

Demand is extremely variable over time. It is closely correlated with the amount of drilling currently being undertaken by oil and gas firms, which in turn depends on the price of oil and gas. This means that there is excess capacity in the steel tubes industry during periods of low oil prices. During periods of increasing oil prices, oil producers seem to accept price increases in OCTG, but OCTG prices also seem to come quickly down when the price of oil does, as steel producers try to make use of existing fixed capacity.

Natural gas creates greater demand for OCTG than does oil drilling, because natural gas wells are deeper. Thus, consumer substitution of natural gas for oil increases demand for OCTG (and the reverse). OCTG costs are not a large enough portion of the cost of production to lead to a shift between natural gas and oil in response to fluctuations in the price of OCTG.

Entry in to the industry is, in principle, fairly easy, and there are a large number of firms. The industry structure is, however, both more complicated and much more concentrated than a simple count of the number of firms would suggest (see Table 5). In the U.S., there are a small number of firms that produce a full line of steel tubes, casings, and line pipes, and sell that line to the industry. These firms are often vertically integrated steel producers. There are a large number of smaller firms that produce less than a full line of OCTG products. These firms are usually not vertically integrated and instead purchase semi-finished steel inputs. They often also purchase some OCTG or line pipe products from other manufacturers in order to offer a full line to their customers. These firms often customize (with specialized coatings, etc.) products for their customers. The U.S. firms sell primarily or exclusively to the North American market, which includes the Gulf of Mexico. Otherwise, U.S. firms do not seem active in the export of OCTG.

Other leading producers are located in Japan, Germany, France, Italy, Argentina, Mexico, Brazil, and Sweden. These producers sell to both U.S. and worldwide markets. Three large alliances, including all of the members of the former cartel, dominate world trade. These alliances include third-world steel producers; the largest alliance is controlled by an Italian-Argentine firm (Techint). These various relationships among steel tube producers, either as suppliers and

⁴⁸ John E. Sacco, "Ucar Enters Joint Venture with Jilin Carbon," *American Metal Market*, October 17, 2000.

customers, or as owners or partners in a joint venture, provide many opportunities for cooperation and may substantially lessen competition in the industry from what one would expect it to be if these various industry participants were all independent competitors.

Internationally, the creation of alliances among major producers has also meant the consolidation of their sales forces. In fact, in the case of the alliance among Nippon, Kawasaki, and Sumitomo Metal it appears that the alliance is essentially the creation of a joint sales agency to distribute their goods worldwide.⁴⁹ The opportunity to combine its sales force with the existing international sales network of Techint (DST) was apparently central to NKK's decision to spin off its OCTG unit to NKK Tubes, which is now jointly owned by NKK and DST.⁵⁰ While the use of a single, consolidated sales network may provide efficiencies in distribution or convenience for customers, it also make communication and coordination of prices and market shares much easier, and effectively prevents cheating by firms who have delegated sales to the joint distributor.

Smaller, independent oil and gas producers may rely on brokers while larger firms have in recent years been more likely to establish direct, long term relationships with OCTG producers. For example, Pemex, the Mexican state-owned oil producer, entered into a long term arrangement with Techint, which controls OCTG producers in Mexico, Argentina, Italy, and Canada. The Techint (DST) group provides just-in-time supplies of OCTG allowing Pemex to reduce its inventories to near zero.

This kind of relationship, which has grown more prominent since the demise of the cartel in 1995, has changed the structure of distribution in the industry. In doing so, it has increased the competitive advantages associated with vertical integration and horizontal size, because being large and diversified is necessary to being able to guarantee supplies to customers in an industry with such high variance in demand. It also has increased barriers to entry as customers are tied to long-term relationships.

⁴⁹ Audrey McAvoy, "Japan Steel Companies Discussing Seamless Steel Pipe Tie-Up" *Dow Jones International News* August 18, 1999.

⁵⁰ "NKK Merges Seamless Pipe Operations into JV with Grupo Technit" *Dow Jones International News*, November 2, 1999.

2. Price-Fixing Conspiracy and Its Effects

It is unlikely that the cartel agreement had a direct impact on the U.S. market where prices are above world levels because of anti-dumping tariffs currently in effect. There has been no case to date in the United States. In December 1999, the European Commission fined four European and four Japanese steel manufacturers over \$100 million, charging them with fixing bids on seamless steel tubes and line pipes between 1990 and 1995. The European manufacturers included the inventor of steel tubes, Mannesmann; British Steel, now Corus, which exited the industry in 1994; Dalmine, indirectly owned at the time by the Italian government but privatized in 1996; Vallourec, a French steel producer who specializes in tubular products. The Japanese conspirators were NKK, Kawasaki, Nippon, and Sumitomo Metal. These eight independent firms created a cartel organization called the “Europe Japan Club.” Under the auspices of the Europe Japan club they agreed “that the domestic markets of the different producers ... should be respected” so that producers refrained from selling in the home countries’ of the other members of the Club.⁵¹ In shared markets, the Club met regularly and designated which company was to win a particular job by bidding an agreed upon price, with the others to submit higher bids.

The European Commission decision covered restrictions on sales and pricing agreements in Europe. The cartel agreement also apparently restricted competition in “certain third markets” as well. The fines issued by the EC did not reflect these non-European markets because, the Commission concluded, there was no evidence that they had a restrictive effect on the European Union. Further details on this agreement have not been made public by the European Commission pending appeals by some of the accused. Because the EC has not included these other “third markets” in its decision, it is likely that details regarding this aspect of the agreement will never be made public. This points to an important weakness in international competition policy. The competition authorities in Europe may well have information regarding restrictions on competition in developing countries (or developed countries), but under current law and agreements there is often not permission, let alone responsibility, to share that information with the affected parties.

We have detailed data for OCTG prices in the United States over the period in question.⁵² However, because of the substantial tariffs in place during this period, these may not be a good proxy for worldwide prices. Average prices of OCTG are presented in Figures 3 and 4. The OCTG price falls during most of the period of the conspiracy. However, this was also a period of low and declining oil and gas prices. Thus the observed prices, even in the U.S. where the cartels effect was presumably only indirect, may have been higher than they would have been under competitive conditions. Further analysis, controlling for the price of oil and gas, is necessary to obtain a quantitative estimate of the effect of the cartel on prices.

Price trends in the industry continue to mirror oil and gas prices. U.S. prices fell during the early 1990s, reaching a trough in mid-1995. They then increased for three years until declines in oil prices in 1998 led to a 41% drop in U.S. OCTG demand and declining prices of OCTG. By the middle of 1999, OCTG prices were again increasing, as they continued to do for most of 2000.

The share of worldwide seamless tube exports coming from Germany, France, England, and Japan stayed roughly the same during the period of the cartel (Figure 5), actually increasing slightly toward the end of the period. As the cartel included the major producers from each of these countries, this measure is a reasonable estimate of cartel exports. To the extent that there were alliances between the cartel participants and producers in other countries, this measure actually understates the market share of the cartel. The fact that their market share does not decline suggests that entry (or expansion by non-participants) was not a viable source of increased competition during this period.

No evidence was found indicating that steel producers blocked entry or potential entry into the OCTG market from developing country steel producers. Several of the participants have production facilities in developing countries, including Brazil, Mexico, and Argentina. Several of the cartel participants have, since the breakup of the cartel by the European Commission, entered into joint ventures with firms based in developing countries, so that the largest steel tube producing alliance is now led by an Italian-Argentinean family and its steel producers in

⁵¹ “Commission fines cartel of seamless steel tube producers for market sharing” European Commission press release, 8 December 1999.

⁵² We are extremely grateful to Charlie Perkins of Pipe Logix for providing us with this data.

Argentina and Italy. Several of the producers in the cartel also have production facilities in the transition economies of Eastern Europe. It appears that any participation in this market that will be done by producers from that region will be done through cooperation with one of these alliances.

Since the demise of the cartel, the industry has undergone a fairly substantial reorganization, in which all parties to the cartel have joined in one of three international alliances. The largest of these, with a 25% market share of world consumption of OCTG is led by the Techint, an Italian–Argentinean firm controlled by the Rocca family. Techint controls Dalmine, the Italian member of the cartel, Tamsa, a Mexican tube producer, and Siderca, an Argentine steel producer. They are known jointly as the DST group. The Rocca family has been in the steel tube business since before World War II. Tamsa is currently under investigation by the Mexican Federal Competition Commission for taking advantage of its position as the sole seamless tube producer in Mexico. There is no indication in published reports that this investigation is linked to the European Commission charges.⁵³ NKK, also a member of the Europe-Japan club, has now formed an alliance with DST, as has a Canadian producer.

The other three Japanese producers who were members of the cartel have formed an alliance in which they use a single sales agency to represent all three. Mannesmann and Vallourec, the other two firms in the Europe-Japan Club have formed a joint venture to which they have transferred all their OCTG production. They are also engaged in steel tube joint ventures with Corus, another member of the Club that has exited the OCTG market.

China's exports of seamless steel tubes have increased significantly, but the current focus of its steel tube producers is improving manufacturing technology and product quality rather than expansion of capacity for export.⁵⁴ This suggests that, at least in the short run, China will not significantly increase competition for established producers.

Tariffs continue to play a significant role in this industry and may well limit the entry of developing country firms not aligned with one of the three groups that dominate the industry.

⁵³ "Mexico: Investigation into Tamsa" *Metal Bulletin* August 21, 2000.

⁵⁴ "Chinese Steel Industry Will Mainly Develop Flat Products" *Asia Pulse* September 20, 2000.

The European Union imposed anti-dumping duties on Ukraine and Croatia in February 2000. It has had anti-dumping tariffs in force against six other East European countries since 1997. Tariffs have been maintained in U.S. since 1995 against Mexico (whose only producer is part of DST) and since 1994 against Japan.⁵⁵ The recently enacted steel tariffs specifically exclude OCTG from increased tariffs.⁵⁶ Imports of pipe into the United States have increased in part because tariffs on steel sheets have encouraged foreign producers to export finished products into the U.S.

D. Summary

There are a number of lessons to draw from these three cases. First, consider the potential for consumer welfare effects. International cartels can clearly have worldwide effects, but until now, no one has studied the issue. In certain cases these cartels significantly raise the price for several years. These price increases are on sophisticated intermediate goods, which then have spillover costs to both consumers and downstream producers. Without prosecution by government authorities, consumers lack the information, resources, and, in some cases, legal structure to protect their own interests.

Second, the cases give us several insights into firm behavior and follow-on policy implications. One of the lessons is that access to technology and markets is actively limited by the cartels (or at least such attempts are made), using both governmental (tariff) barriers and private barriers. Governments must therefore be watchful of how they might inadvertently help to support cartel practices. In addition, significant industry restructuring often follows the break-up of cartels, and yet no antitrust authority seems to be watching to see if competition is being preserved during the restructuring.

Also, we observe that these cartels came together during periods of increasing price competition, often following entry or market integration. Market integration alone, without vigorous anti-cartel enforcement, may give rise to increasing cartel activity rather than competition. Increasing

⁵⁵ "Sumitomo Anticipates OCTG Rebound," *American Metal Market*, April, 5, 2001.

⁵⁶ *Journal of Commerce*, October 14, 1999 and "Steel Products Proclamation: To Facilitate Positive Adjustment to Competition From Imports of Certain Steel Products" President of the United States of America, 5 March 2002, <http://www.whitehouse.gov/news/releases/2002/03/20020305-7.html> .

liberalization of international trade may have inadvertently, by increasing competition in formerly protected national markets, increased the incentives for firms to participate in cartels. Such a response undermines the process of international integration, and decreases the benefits of economic integration to consumers around the world. It may also undermine political support for international liberalization if citizens believe that private barriers to trade will simply replace government-created ones.⁵⁷

Finally, there is a regrettable lesson for empirical research. The effects of private (as opposed to state run) international cartels on developing countries are quite difficult to determine, even on a case-study basis. There is anecdotal evidence about prices and barriers to entry, but few definitive conclusions can be drawn. There are enormous difficulties in estimating the quantitative impact of cartels on developing country incomes because of the secrecy under which cartels operate, the lack of anti-trust prosecutions in developing countries themselves (leading to a lack of information on the activities of cartels in developing country markets), and the general lack of data on individual transactions that might have been influenced by the existence of a cartel. For this reason, we turn to the trade data as a way to quantify, however roughly, the effects of contemporary international cartel activity on developing countries.

IV. Estimate of Developing Country Trade Affected By Recent International Cartels

It is impossible to gauge the true number of international cartels in existence in the 1990s. However, we do know that the U.S. Department of Justice and the European Commission have recently investigated and prosecuted, or are currently investigating, at least forty different international price-fixing conspiracies that were in force at some point in the past decade. The surge in U.S. prosecutions of international cartels stems primarily from the revision and expansion of the Antitrust Division's corporate amnesty program in 1993. The number of corporations coming forward and seeking amnesty rose from roughly one corporation per year to one per month.⁵⁸ On the heels of this increased enforcement by the U.S., both the European

⁵⁷ We should note that some of the cartels in our cross-section sample, discussed in the next section, clearly pre-date recent moves toward international liberalization.

⁵⁸ Bingaman, Anne K., Assistant Attorney General, Antitrust Division. "Opening Markets and Protecting Competition for America's Businesses and Consumers: Goals and Achievements of the Antitrust Division, U.S. Department of Justice, Fiscal Year 1993 through March 1996," March 27, 1996, at p.8. See also Adler, Howard Jr.

Union as well as some non-European countries have strengthened their anti-cartel laws and stepped up enforcement.⁵⁹

From these recent international price-fixing cases, we have created a sample of thirty-seven international cartels on which the cross-section analysis in this paper is based (Table 6). We believe that this is close to the universe of international cartels that have been prosecuted by the United States or the European Commission for fixing prices during the 1990s. Table 6 summarizes the dates of cartel operation, the legal entity (i.e., the U.S. or the EC) that prosecuted the case, the country of origin of the indicted firms, whether firms from developing countries are known to be participants in the price-fixing arrangement, and, finally, which country or countries are known to be affected (as consumers) by the cartel. In order to appear in this table, a cartel must satisfy the following five conditions: 1) it must involve more than one producer (otherwise, we consider it an extension of monopoly power case); 2) it must include firms from more than one country; 3) it must have attempted to set prices or allocate markets; 4) it must have existed during part or all of the 1990s (so, for example, there are cartels in our sample that began in the 1980s and ended in the 1990s); and, 5) it must have been prosecuted by the U.S. or EU (or both). This sample, like its intellectual antecedents, may be biased as a result of its dependency on prosecution as a sample selection criterion.⁶⁰

Table 7 shows concentration and cartel price increase information for selected cartels. The typical international cartel has operated in a highly concentrated market (in those cases where we can find the information). Estimates of the increase in price resulting from these cartels vary widely by industry. At the low end, for example, we have a price increase of ten percent for the thermal fax paper cartel, which was formed as the industry was declining and lasted for less than

and Laing, David J., "The Explosion of International Criminal Antitrust Enforcement," *Business Crimes Bulletin: Compliance & Litigation*, March 1997. Adler and Laing state, for example, that "In 1991, only 1 percent of corporate defendants were foreign and no foreign individuals were charged that year. From July 1996 to January 1997, 20 percent of all corporations and 27 percent of all individuals charged were foreigners." (p. 1)

⁵⁹ See, for example, Reynolds, Michael, "EU Briefings," *International Financial Law Review*, London, January 1, 1999, vol. 18, no. 1, p 48+. The article announces the decision within the European Commission to create a new unit to fight cartel activity.

⁶⁰ See Posner, Richard A. "A Statistical Study of Antitrust Enforcement." *Journal of Law and Economics* 13, 2 (1970): 365-419; Hay, George A., and Daniel Kelley. "An Empirical Survey of Price Fixing Conspiracies." *Journal of Law and Economics* 17(1974): 13-38 Asch, Peter, and Joseph J. Seneca. "Characteristics of Collusive Firms." *Journal of Industrial Economics* 23, 3 (1975): 223-37.

a year. At the high end there is the price increase estimate of 100 percent for the stainless steel cartel, and 50-60 percent in the U.S. and 90 percent in Canada for the graphite electrodes cartel.

In order to determine whether developing countries were consumers of one of the cartelized products in the sample, we matched the products in Table 6 with import-export data for the sample period. The trade data come from Robert Feenstra's, *World Data Flows, 1980-1997, With Production And Tariff Data* (Center for International Data, Institute of Governmental Affairs, University of California – Davis, 1999). The bilateral trade flows for all countries are classified according to the Standard International Trade Classification (SITC), Revision 2.

Tables 8, 9, and 10 summarize import data for ten of the cartelized products in Table 6 for 1997, the most recent year for which trade data are available.⁶¹ The sample size falls to ten products in Tables 8 – 10 from the thirty-seven in Table 6 for two reasons. First, the data on trade flows excludes services, so cartels that fixed prices on services were ruled out for further analysis. Second, goods were dropped from the sample where the data appeared to be misclassified or aggregated to such a level that no reasonable match to the cartel product could be made. The SITC codes are, unfortunately, often broader than the products in question. We indicate discrepancies between the cartelized products and the SITC categories in the notes to Tables 8 – 10 and give further details in the Appendix.

In Tables 8 – 10 we report the value of imports for those products for which we were able to obtain reasonable trade data. In Table 8, we report 1997 imports of “cartel-affected” products as a percent of total imports to developing countries, with countries aggregated by income categories. Table 9 presents 1997 import data for these same products, showing them as a percent of total GDP. Table 10 gives the total value of cartel-affected imports. We also report in each of these tables, just for comparison, the analogous import values for high-income countries. Examining these ten products – which were cartelized at some point during the 1990s and for which we were able to obtain reasonably reliable trade data – the total value of such “cartel-affected” imports to developing countries was \$36.4 billion (Table 10). This figure made up 2.9% of all imports to developing countries in 1997 and equaled 0.7% of their combined GDP.

⁶¹ These are the products for which we have been able to find minimally reliable data in international trade statistics. These data problems are discussed further below.

The impact appears to be largest on the most developed countries of the developing world. Cartel-affected imports made up 3.3% of imports and 0.8% of GDP for the “upper middle income” countries who have the income and industries that demand and rely on imports of sophisticated intermediate manufactured goods. While the total value of cartel-affected imports is higher for high-income countries (\$73.7 billion compared to \$36.4 billion), these imports represent a smaller proportion of imports and GDP (1.7% and 0.3% respectively). Of course, in countries where producers belonged to the cartel, domestic production as well as imports is affected by cartel behavior.

These numbers clearly do not represent the value of imports to developing countries by all international cartels. The estimates are, on the one hand, biased downward because we include only ten of the thirty-seven known price-fixing conspiracies. At the same time, we overestimate trade in many of these ten products when the trade categories are broader than the products whose prices were fixed by the cartel. In general, when interpreting the trade data it must be kept in mind that some of the cartel product-SITC matches are poor. These estimates are intended to give a sense of the order of magnitude of affected trade, not an exact measure.

We can illustrate the typical problems with the data by using the citric acid, graphite electrodes, and seamless steel tubes cartels again as illustrative cases. For example, we have not been able to obtain accurate international trade data for citric acid. Therefore, citric acid simply does not appear in Tables 8 – 10. As with other narrowly specified chemicals, we suspect that there is misclassification in the trade data, but whatever the source of the problem, volume of trade in citric acid is simply not available. Even if we did have import measures they would understate the full impact of the cartel on developing country consumers who pay higher prices not only for raw citric acid, but also for a wide range of citric-acid containing goods.

For graphite electrodes the situation is slightly better. Tables 8 – 10 suggest that graphite electrodes constitute a significant fraction of developing country imports (at least within the cartelized products in the sample). Graphite electrodes are important to developing countries that manufacture steel using the EAF process, but the data that we present here undoubtedly vastly *overstates* their value, as this import category includes not only graphite electrodes, but all “otherwise unclassified electrical equipment.” On the other hand, if we did have a good match to

graphite electrodes, that measure would *understate* the impact of the cartel on trade because the product is an intermediate good that is also imported into the developing country in a more processed state. To the extent that the graphite electrode cartel increased the price of steel imports to developing countries, focusing on graphite electrode imports understates the impact of the cartel. Therefore, the data must be read with a degree of skepticism.

The OCTG cartel-trade data match is also problematic. This category is much broader than the oil and gas goods that were included in this particular conspiracy. However, there have been recent European Commission decisions convicting an overlapping set of steel producers for fixing the price of steel heating pipes during the 1980s, steel beams during the 1980s, and stainless steel during the mid-1990s.⁶² Thus, it is possible that the prices of the other steel pipe products included in these import data have been affected by these various activities. Some imports included in these figures were certainly produced by firms who were not a party to these agreements. However, given the substantial market shares of the firms in the cartel, it is likely that their behavior changed the prices charged by firms who were not a party to and not even aware of the price fixing of their larger competitors. Without more information about the secret activities of cartels, it is impossible to determine the quantitative effect of these cartels on developing country incomes.

Even with these qualifications, it is clear from the magnitude of these figures that cartels have adversely affected a not insignificant portion of the trade, and therefore the trade balance, and consumption of developing countries. (Following the industrial organization literature, we focus on trade and consumption, though the impact on the trade balance is not an unimportant issue in a period in which some developing countries experiences severe currency crises.) Given the actual and potential effects on trade that reach into the tens of billions of dollars, a natural question to ask is why these many affected countries are not seeking damages from cartel member firms in their home countries. In particular, given that the United States has the strongest laws and enforcement record against price-fixing, a legal mechanism for civil suits

⁶²Charles Goldsmith and Martin DuBois, "European Commission Fines Steelmakers \$116.7 million" *Wall Street Journal Europe* February 17, 1994, Emma Tucker, "European Commission Ten Companies Penalised for Fixing Prices of Insulated Steel Heating Pipes" *Financial Times* October 22, 1998, and Philip Burgert, "EC Issues Fines for Stainless Price Fixing" *American Metal Market* January 26, 1998.

(which, the European Union, for example, does not have for antitrust violations), and some of the richest companies, why is it that there are relatively few lawsuits brought by foreign companies seeking damages? Not surprisingly, given the many recent international cartel prosecutions, there are a number of parties interested in this issue. The question of whether U.S. antitrust law can be applied to foreign transactions has recently become a lively legal issue, and it is one that we turn to now.

V. Foreign Plaintiffs' Access to U.S. Courts in International Cartel Cases

Consumers in developing countries harmed by the activities of international cartels may be unable to pursue legal remedies in their own countries, either because antitrust laws prohibiting such behavior do not exist, do not provide adequate remedies, or are not enforced by the relevant authorities. In many such instances, those consumers may look to U.S. law instead for remedies for the antitrust injuries they have suffered. The ability of such plaintiffs to sue in U.S. courts is constricted, however, by the fact that U.S. antitrust laws do not reach *all* anticompetitive conduct. Rather, U.S. antitrust laws apply to “anticompetitive conduct directed at foreign markets that directly affects the competitiveness of domestic markets,” but not to “anticompetitive conduct directed at foreign markets that only affects the competitiveness of foreign markets.”⁶³ In determining whether U.S. antitrust laws will apply to specific acts, the courts look to the *effect* of the anticompetitive conduct, not the *situs* of that conduct.⁶⁴ This “effects” test can thus subject defendants whose anticompetitive conduct occurred solely outside the U.S. to suit in U.S. courts, where the effects of that conduct are felt in the United States.

Historically, U.S. courts have not been particularly sympathetic to the claims of foreign antitrust plaintiffs whose claims arise from anticompetitive conduct directed at foreign markets. However, a March, 2002 decision of the U.S. Court of Appeals for the Second Circuit, *Kruman v. Christie's International PLC*,⁶⁵ has suggested a broader mechanism by which foreign plaintiffs can pursue legal remedies in the U.S. courts for the anticompetitive behavior of international cartels.

⁶³ *Id.* at *17.

⁶⁴ *United States v. Aluminum Co. of America*, 148 F.2d 416, 433-44 (2d Cir. 1945).

⁶⁵ 2002 U.S. App. Lexis 3895 (2d Cir. Mar. 13, 2002).

The access of foreign antitrust plaintiffs to U.S. courts is largely governed by the Foreign Trade Antitrust Improvements Act (FTAIA) of 1982,⁶⁶ which Congress enacted in an effort to clarify application of U.S. antitrust laws to foreign conduct and to limit application of U.S. antitrust laws when non-import foreign trade is involved. In particular, Section 6a of the FTAIA provides, in relevant part, that the Sherman Act “shall not apply to conduct involving trade or commerce . . . with foreign nations unless . . . such conduct has a direct, substantial, and reasonably foreseeable effect . . . on trade or commerce which is not trade or commerce with foreign nations and such effect gives rise to a claim under” the Sherman Act.⁶⁷

Until the Second Circuit’s recent decision in *Kruman*, all of the federal courts which addressed this issue agreed that the FTAIA requires foreign plaintiffs suing under U.S. antitrust law to show: (1) that the alleged anticompetitive behavior had a “direct, substantial and reasonably foreseeable effect” on the U.S. marketplace *and* (2) that an anticompetitive effect on the U.S. marketplace gave rise to the plaintiff’s claimed injuries.⁶⁸ The coupling of these two requirements effectively bars many foreign plaintiffs from suing in U.S. courts for international cartel activities. To proceed, plaintiffs must be able to show that their injuries were caused specifically by the anticompetitive effect of the defendant’s conduct on the U.S. marketplace and not by anticompetitive conduct that affects a worldwide market, even if that market includes the United States.

In *Ferromin International Trade Corp. v. UCAR International, Inc.*,⁶⁹ for example, 27 plaintiffs had alleged that they suffered injury as a result of price fixing and market allocation in the worldwide market for graphite electrodes between 1992 and 1997. The U.S. district court dismissed the claims of 16 of the plaintiffs, stating that although the plaintiffs had alleged a number of anticompetitive effects upon the U.S. marketplace resulting from the defendants’ conduct, the plaintiffs had not alleged that their injuries stemmed from the effect of the higher prices for graphite electrodes in the U.S. market (as opposed to higher prices in other, foreign

⁶⁶ Pub. L. No. 97-290, 96 Stat. 1246 (codified at 15 U.S.C. § 6a).

⁶⁷ 15 U.S.C. §6a.

⁶⁸ *See, e.g.*, *Den Norske Stats Oljeselskap As v. HeereMac Vof.*, 241 F.3d 420 (5th Cir. 2001); *Ferromin Int’l Trade Corp. v. UCAR Int’l, Inc.*, 153 F. Supp.2d 700 (E.D. Pa. 2001); *In re Copper Antitrust Litigation*, 117 F. Supp. 2d 875, 876 (W.D. Wis. 2000); *de Atudcha v. Commodity Exch., Inc.*, 608 F. Supp. 510 (S.D.N.Y. 1985).

⁶⁹ 153 F. Supp.2d 700, discussed *supra* notes ____ and accompanying text.

markets). Indeed, the court found that the higher prices paid by those foreign plaintiffs were caused by anticompetitive effects in foreign countries, not in the U.S. The court allowed the claims of the remaining 11 plaintiffs to go forward, however, because some of the electrodes purchased by these plaintiffs were invoiced in the U.S., thus satisfying the “causal requirement” that these plaintiffs were injured as a result of higher prices in the U.S. marketplace.⁷⁰

In its recent decision in *Kruman*, however, the Second Circuit deviated from prevailing precedent on the meaning of Section 6a of the FTAIA, opening the door to more suits by foreign plaintiffs. In a sense, the *Kruman* decision was a narrow one, as it was based specifically upon existing Second Circuit precedent, and thus its impact on the law of other circuits is uncertain. In another sense, however, the *Kruman* decision was of wide-ranging impact, both because of the prominence of the Second Circuit and because the decision created a circuit split on an issue of significant importance – the availability of U.S. antitrust remedies to foreign plaintiffs who were harmed by anticompetitive conduct directed at least in part to a foreign marketplace. The legal and policy implications of the *Kruman* decision are substantial and deserve careful exploration, as the issue may well end up before the U.S. Supreme Court for ultimate resolution.⁷¹

The *Kruman* court rejected the two-step test articulated by all other federal courts addressing this issue. Specifically, the court determined that the FTAIA had not altered prior law in the Second Circuit with respect to the nature of the effect that anticompetitive conduct directed at foreign markets must have on the domestic marketplace in order to be actionable under U.S. antitrust laws. Under the Second Circuit’s *National Bank of Canada* rule,⁷² “anticompetitive conduct directed at foreign markets is only regulated by the Sherman Act if it has the ‘effect’ of causing injury to domestic commerce by (1) reducing the competitiveness of a domestic market; or (2) making possible anticompetitive conduct directed at domestic commerce.”⁷³ The first prong of this test encompasses anticompetitive conduct that is directed toward both foreign and domestic markets and that actually reduces the competitiveness of the domestic market. The second prong encompasses anticompetitive conduct that is “directed only at a foreign market, but has the effect

⁷⁰ *Id.* at 706.

⁷¹ A detailed analysis of the *Kruman* decision is outside the scope of this paper, but we plan on taking on this issue in future research.

⁷² See *National Bank of Canada v. Interbank Card Assoc.*, 666 F.2d 6, 8 (2d Cir. 1981).

⁷³ *Kruman*, 2002 U.S. App. Lexis 3895, at *5-*6.

of allowing a separate course of conduct that directly affects the competitiveness of . . . domestic markets.”⁷⁴

The effect of the Second Circuit’s rule is to allow antitrust suits to proceed in instances in which other federal courts would find the FTAIA prohibited such suits. The plaintiffs in *Kruman* were buyers and sellers at foreign auctions who alleged that they were overcharged for auction services in auctions held outside the U.S. as a result of a price-fixing conspiracy by the defendants. (A separate suit was brought by plaintiffs who alleged they had been overcharged for auction services in auctions held in the U.S. as a result of domestic price-fixing conspiracy by the same defendants.) Because the plaintiffs had alleged only that they had paid inflated prices at foreign auctions, the district court dismissed their claims, stating that they had not satisfied the FTAIA’s requirements. While the imposition of high prices overseas may have had an effect ultimately on the U.S. marketplace, the plaintiffs had not alleged that this domestic effect gave rise to their injuries.⁷⁵

The Second Circuit reversed, noting that the plaintiffs had alleged that the domestic price-fixing scheme could not have succeeded in the absence of the foreign price-fixing scheme. If this was true, the foreign conduct clearly had an anticompetitive effect upon the domestic market. The “conduct” at issue could be described as an agreement to fix prices in both foreign and domestic markets, which conduct clearly has an effect upon domestic markets because it includes conduct directed at a domestic market. Alternatively, the “conduct” could be “described as an agreement to fix prices in the foreign auction market that made possible an agreement to fix prices in the domestic auction market.”⁷⁶ In either event, one of the prongs of the *National Bank of Canada* rule is met, and the FTAIA would not bar the plaintiffs from bringing suit in a U.S. court.

The Second Circuit discussed the applicability of its ruling to international cartels in dicta. In identifying the type of conduct that would satisfy the first prong of its *National Bank of Canada* test (i.e., conduct that would have the effect of injuring domestic commerce by reducing the competitiveness of a domestic market), the court provided the example of an international cartel

⁷⁴ *Id.* at *22.

⁷⁵ *Kruman v. Christie’s Int’l PLC*, 129 F. Supp.2d 620 (S.D. N.Y. 2001).

⁷⁶ 2002 U.S. App. LEXIS 3895 at *40.

whose anticompetitive behavior was directed at both domestic and foreign markets, and stated that “the FTAIA was clearly intended to regulate such conduct.”⁷⁷

The *Kruman* court did limit the scope of the conduct that could be regulated by U.S. antitrust laws. The defendants had argued that given the nature of the modern global economy, with its global marketplaces, any anticompetitive conduct that affects foreign markets could conceivably affect the U.S. economy and so lead to a suit under U.S. antitrust laws. The *Kruman* court rejected this line of reasoning, however, noting that under its test, such conduct would be actionable only if it caused injury to domestic commerce through an anticompetitive effect or by making possible anticompetitive acts directed at domestic commerce. In addition, the court noted that the FTAIA itself also limited the reach of the antitrust laws by requiring that the “effect” of the conduct be “direct, substantial, and reasonably foreseeable,”⁷⁸ stating that this standard would prevent conduct with a merely “ancillary effect” upon U.S. markets from being actionable under U.S. antitrust laws.

At this point, we have many questions and few answers regarding the Second Circuit’s ruling. There are significant jurisprudential and policy issues raised by this decision. On the legal side, for example, the *Kruman* ruling leaves open issues of proof (will they be insurmountable for the foreign plaintiffs?) and how to measure the remedies. On the policy side, questions about the costs and benefits of this decision, if it stands, are numerous. For instance, what does the U.S. have to gain by allowing such lawsuits to proceed? Is it primarily an additional instrument of deterrence against anticompetitive behavior? How can we gauge whether the benefits to the degree of market competition in the U.S. as a result of this rule will outweigh the costs to the U.S. legal system? These questions highlight an important avenue for future research.

⁷⁷ *Id.* at *39 n.9.

⁷⁸ 15 U.S.C. §6as (quoted *id.* at *42).

VI. Conclusion

In this investigation of the effects of international cartels on developing countries we have addressed both developing countries as consumers, as well as developing countries as competitors or co-conspirators. The cases discussed show the potential for an international cartel made up of producers from industrialized countries to have simultaneously harmful effects on developing country consumers and harmful or beneficial effects on developing country producers.

The multi-dimensional role that U.S. and EU governments play in responding to these cartels has varied affects on developing countries. The vigorous prosecution of international cartels by the U.S. and EC may well open up entry possibilities to developing country producers. On the other hand, these governments are also susceptible to manipulation by domestic producers using tariff barriers and anti-dumping duties to protect the home market, either during or after the conspiracy. As raised in the previous section, impending legal decisions on whether to take a narrow or broad view of the application of U.S. antitrust law will have a direct effect on damages suffered by developing countries from international cartels.

Finally, there is the role of the antitrust authorities in holding confidential certain information that could clarify the effect of cartels on developing country consumers and producers. In general, although U.S. and EC decisions often mention that a cartel had effects “in the U.S. and elsewhere” or in “certain third markets,” those effects are never included in the decisions. Details regarding the effects of the cartels outside of U.S. and EU markets will, in general, never be made public. This points to an important weakness in international competition policy as it affects developing countries. The competition authorities may well have information regarding restrictions on competition in developing countries, but under current law and agreements there is often not permission, let alone responsibility, to share that information with the affected parties. These and other issues will need to be addressed as international anticompetitive conduct collides with national competition policies.

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TABLE 1

CITRIC ACID: CAPACITY AND MARKET SHARES OF MAJOR FIRMS

Firm Name	Capacity - 1990 (million pounds/year) a	Capacity 1995 (million pounds/year) a	U.S. Capacity- 1999^b (million pounds/year)	Global Cartel Market Share 1991^c	Global Cartel Market Share 1995^c
Pfizer/ADM ^d	140	180			
ADM			200	12%	8%
Bayer/Haarmann & Reimer	140	150		24%	14%
Cargill	55	160	165		
A.E. Staley (a division of Tate & Lyle)			135		
Jungbunzlauer	132	463		11%	21%
Bayer	90	160			
Hoffmann-La Roche	77 ^e	154		13%	7%
Biocor (Italy)	53	88			
Palcitric (Italy)	0	77			
Citurgia Biochemicals					
China (various companies)	186	535			
Aktiva	0	66			
Godot Israel	20 ^e	40 ^e			
World Capacity, except for former USSR	877	2,230			
World consumption ^e	850	1,560			

Europe consumption ^e	339	555			
U.S. consumption estimates ^e	300	475			
U.S. exports ^e	17	52			
U.S. imports	65	125			
TOTAL CARTEL MARKET SHARE				60%	50%

Notes for Table 1:

^a The numbers in the first two capacity columns are from Connor (1998), Table 1. There are always differences in estimates of capacity. For example, a 1994 *Chemical Marketing Reporter* article "Citric Acid Market Grows with 'New Age' Drink Sales" contains different estimates for U.S. production capacity: ADM is reported at 180 million pounds instead of Connor's 140, Haarmann & Reimer at 150 (same as Connor), and Cargill at 130 instead of Connor's 160.

^b *Purchasing Magazine* September 7, 2000.

^c Global market share based on capacity: Connor (1998), Table 4.

^d ADM acquired Pfizer's North Carolina plant in December 1990, and Pfizer continued to supply citric acid from its Groton plant until mid-1993 when the plant was closed: Connor (1998), p. 22.

^e Estimate by Connor (1998), p. 23.

TABLE 2**CITRIC ACID: CARTEL MEMBERS AND GOVERNMENT FINES**

Firm Name and Region	Fine
ADM (U.S.)	\$30m (DOJ) \$2m (Canada) €6.7m (EU)
Bayer/Haarmann & Reimer (Germany/U.S.)	\$50m (DOJ) \$4.7m (Canada) €14.22m (EU)
Jungbunzlauer Intl. AG (Switzerland)	\$11m (DOJ) \$1.9m (Canada) €7.64m (EU)
Hoffmann-La Roche (Switzerland)	\$14m (DOJ) €3.5m (EU)
Cerestar Bioproducts BV (Dutch subsidiary of the French agricultural products firm Eridania Beghin-Say SA)	\$400,000 (DOJ) €0.17m (EU)

TABLE 3**GRAPHITE ELECTRODES: CAPACITY AND MARKET SHARES OF MAJOR FIRMS**

Firm Name	U.S. Market Share (at time of conspiracy, as reported by DOJ)	World Market Share (1999, as stated in Ferromin complaint)	Location(s)
UCAR	34%	31%	Worldwide
SGL	23%	27%	Worldwide
Carbide/Graphite Group	18%	6%	US
Showa Denko	18%	6%	Japan and US
Tokai Carbon	1%	11%	Japan
SEC Corp		5%	Japan
Nippon Carbon		4%	Japan

TABLE 4**GRAPHITE ELECTRODES: CARTEL MEMBERS AND GOVERNMENT FINES**

Firm Name	Fine
UCAR	\$110m (DOJ) \$11m (Canada) €0.4m (EU)
SGL	\$135m (DOJ) \$12.5m (Canada) €80.2m (EU)
Carbide/Graphite Group	Granted leniency (DOJ) €10.3m (EU)
Showa Denko	\$32.5m (DOJ) €17.4m (EU)
Tokai Carbon	\$6m (DOJ) €4.5m (EU)
SEC Corp	\$4.8m (DOJ) €2.2m (EU)
Nippon Carbon	\$2.5m (DOJ) €2.2m (EU)
VAW Aluminum	€1.6m (EU)

TABLE 5

OCTG: MAJOR WORLDWIDE PRODUCERS

Corporate Name	Location(s) (of OCTG production)	Cartel Participant	Industry Structure Comments
<i>Grupo DST (Techint)</i>			
NKK (allied with DST)	Japan	Yes	
Dalmine (part of DST group) Formerly owned by Ilva SpA	Italy	Yes	
Siderca (part of DST group)	Argentina	No	
Tamsa (part of DST group)	Mexico	No	
NKKTubes (joint venture of NKK and Siderca)			
Algoma Seamless Tubulars	Canada	No	
<i>Vallourec-Mannesmann Alliance</i>			
Mannesmann AG			
Mannesmann Rohren-Werke	Germany	Yes	
Mannesmann Handel	Germany	Investigated, but not fined	Now owned by Thyssen
Mannesmann SA Brazil	Brazil		
Vallourec	France	Yes	

Corporate Name	Location(s) (of OCTG production)	Cartel Participant	Industry Structure Comments
Vallourec & Mannesmann Tubes (V&M Tubes or V&M do Brasil, joint venture of Mannesmann and Vallourec)	Brazil	No	
Europipe	Germany and France (US)	Investigated, but not fined	Welded gas line producer, jointly owned by Mannesmann, Usinor, and Corus to whom they transferred their large diameter welded tube producing business
Thyssen Stahlunion	Germany	Investigated, but not fined	Owns small share of Mannesmann Ruhrenwerke
<i>“Japanese” Alliance</i>			
Kawasaki	Japan	Yes	
Nippon Steel	Japan	Yes	
Sumitomo Metal (Sumitomo Deutschland)	Japan	Yes	
<i>Other Producers</i>			
Sandvik Steel	Sweden (US, UK, Canada, Czech, France, Germany)	No	Sells stainless steel seamless tubes, which it has marketed to the oil industry since 1990
Corus (formerly British Steel)	UK	Yes	

TABLE 6
RECENT INTERNATIONAL CARTELS INVESTIGATED BY
THE U.S. DEPARTMENT OF JUSTICE AND THE EUROPEAN COMMISSION

Industry	Start¹	End	Conviction	Country of Origin of Indicted Firms	Developing Country Participants	Country(ies) Known To Be Affected²
Aluminum Phosphide	Jan-90	Nov-90	DOJ	Brazil, Germany, India, US	Brazil, India	US
Bromine Products	Jul-95	Apr-98	DOJ; <i>Under Investigation by EC</i>	Israel, US	No	US
Cable-Stayed Bridges	Sep-96	Dec-97	DOJ	France, US	No	US
Carton-board	1986	1991	EC ³	Austria, Canada, Finland, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, UK, US (via European subsidiaries)	No	Europe
Cement	1983	Aug-94	EC	33 European firms, 8 national cement trade associations, and the European Cement Association	No	Europe
Citric Acid	1991	1995	DOJ, EC	Austria, Germany, Netherlands, France, Switzerland, US	No	International
Diamonds (Industrial)	1992	1994	DOJ (went to trial, government lost)	South Africa, US	South Africa	International
Explosives (Commercial)	1987	1992	DOJ	Norway, UK	No	US
Ferrosilicon	late 1989	mid-1991	DOJ	Norway, US	No	International
Ferry Operators (Adriatic Sea)	1987	1994	EC	Greece, Italy	No	Greece, Italy
Ferry Operators (Cross-Channel Freight)	Aug-92	Dec-92	EC	France, Netherlands, Sweden, UK	No	Europe
Graphite Electrodes	Jun-92	Jul-97	DOJ	Germany, Japan, US	No	International

Industry	Start¹	End	Conviction	Country of Origin of Indicted Firms	Developing Country Participants	Country(ies) Known To Be Affected²
Isostatic Graphite	Jul-93	Feb-98	DOJ	US and unnamed firms	na	International
Laminated Plastic Tubes	1987	1996	DOJ	Switzerland, US	No	US
Lysine	Jun-92	Jun-95	DOJ, EC	Germany, Japan, South Korea, US	S. Korea	International
Maltol & Sodium Erythrobate	Maltol: 1989 SE: 1992	Maltol: 1995 SE: 1994	DOJ	US + unnamed firms	No	International
Methionine	1985	1996	EC	France, Germany, Japan, South Korea, US	China	US
Paper, Carbonless	1992	1995	EC	France, Germany, South Africa, Spain, UK	South Africa	Europe
Pigments	1984	1992	Private class-action lawsuit ongoing in Canada	Canadian division of UK firm, Canadian subsidiary of German firm, US	No	na
Plastic Dinnerware	Nov-91	Apr-92	DOJ	Canada, US	No	US
Ship Construction Services (Heavy-Lift)	1993	May-97	DOJ	Belgium, Netherlands, US	No	International
Ship Transportation Services (Heavy-Lift)	1990	May-95	DOJ	Japan, South Korea, US	South Korea	International
Shipping (Central West African)	1972	1992	EC (conviction, but fine overturned)	Zaire, Angola, Northern part of continental Europe, excluding UK	Zaire, Angola	International
Shipping (North Atlantic)	1994	1996	EC	29 countries	e.g., Malaysia	International
Shipping (Far Eastern)	1990	1994	EC	Denmark, France, Germany, Ireland, Japan, Korea, Malaysia, Singapore, Taiwan, UK	Malaysia, S. Korea	International
Shipping (West African)	1975	1992	EC	12 countries	e.g., Senegal, Cameroon	
Sodium Gluconate	1987	June-95	DOJ, EC	US, France, Japan, Netherlands	No	International
Sorbates	1979	1996	DOJ	Germany, Japan, US	No	International
Stainless Steel	Jan-94	Mar-95	EC	Belgium, France, Germany, Italy, Spain, Sweden, UK	No	Europe

Industry	Start¹	End	Conviction	Country of Origin of Indicted Firms	Developing Country Participants	Country(ies) Known To Be Affected²
Steel Beam	1988	1994	EC	Belgium, France, Germany, Luxembourg, Spain, UK	No	W. Europe
Steel Heating Pipe (pre-insulated)	Late 1990	1995	EC	Austria, Denmark, Finland, Germany, Italy, Switzerland	No	Europe
Steel Tube, Seamless	1990	1995	EC	France, Germany, Italy, Japan, UK	No	Europe and "certain third markets"
Sugar	Jun-86	Jul-90	EC	Denmark, Ireland, UK	No	UK
Tampico Fiber	Jan-90	Apr-95	DOJ	Mexico, Netherlands, US	Mexico	US
Thermal Fax Paper	1991	1992	DOJ: 5 Japanese firms pleaded guilty; 1 Japanese firm went to trial and won	Japan, US	No	US
Vitamins	Sep-89	Feb-99	DOJ, EC	Canada, Germany, Japan, Switzerland, US	No	International
Zinc Phosphate	1994	1998	EC	Germany, Norway, UK	No	Europe

Notes to Table 6:

1. Cartel dates are approximate. In particular, indictments of different firms may list different conspiracy dates.
2. Information on "Country(ies) Known To Be Affected" reported in this table comes from DOJ and EC press releases, indictments, and rulings, as well as articles in the press. These documents, of course, focus on the effects in either the United States or Europe. In most cases there is no information from these sources on who purchased from the cartel.
3. Companies appealed, but Court of First Instance confirmed the basic decision, although annulling minor parts of the decision.

TABLE 7
RECENT INTERNATIONAL CARTELS
MARKET CONCENTRATION AND PRICE INCREASE ESTIMATES

<i>Industry</i>	<i>Measure of Market Concentration^a</i>	<i>Measure of Price Increase^b</i>
Aluminum Phosphide	U.S.: C4 = 90	48%
Bromine Products	World: C3 = 76	N/A
Cartonboard	Europe: Cartel share = 80	20-26%
Cement	Europe: C6 = 50 Britain: C3 = 90 France: C4 = 90	N/A
Citric Acid	U.S.: C4 = 100 Europe: C5 = 100	1) 21-24% markup over marginal cost 2) 50% price increase
Ferrosilicon Products	U.S.: Six major producers	N/A
Ferry Operators (Cross-Channel Freight)	C2 = 72 for cross-channel passenger market; same two firms were indicted in the cross-channel freight cartel	10%
Fine Arts	C2 = 95	0 – 20%
Graphite Electrodes	World: C2 = 67 U.S.: C5 = 94 Canada: C2 = 90	U.S.: 50% - 60% Canada: 90%

<i>Industry</i>	<i>Measure of Market Concentration^a</i>	<i>Measure of Price Increase^b</i>
Isostatic Graphite	World: 6 major firms	N/A
Laminated Plastic Tubes	U.S.: C3 = 95	N/A
Lysine	World: C3 = 95% in late 1980's (ADM began production in 1991 and by 1996 had 47% world market share) Mexico: C2 = 90	World: 41% U.S.: 67%: Estimated "overcharges" vary from \$45 million up to \$134 million Canada: 50%
Maltol	World: C2 = 80-90	N/A
Plastic Dinnerware	U.S.: C2 > 90	N/A
Shipping (Central West African)	Shipping conference held more than 90% market share	N/A
Shipping (Far Eastern)	Shipping conference held 80% share between northern Europe and the Far East	N/A
Shipping (France-Central & West African)	C4 = 90	34-39%
Shipping (North Atlantic)	1994: Cartel members had joint market share over 60% 1995: Shipping conference held between 70-80% of the trans North-Atlantic container market	Damages Estimate, 1995: Announced price increases in 1995 "would have meant an additional cost to shippers of US\$65 to \$75 million, when compared with 1994 prices" Damages Estimate, 1994-98: Trans-Atlantic Conference Agreement (TACA) cost European industry \$1.8 billion in extra shipping costs between 1994 and 1998
Sodium Erythorbate	C2 = 90	N/A

<i>Industry</i>	<i>Measure of Market Concentration^a</i>	<i>Measure of Price Increase^b</i>
Sodium Gluconate	Cartel members were world's major producers	N/A
Sorbates	N/A	14%
Stainless Steel	World: C4 = 52	100%
Steel Beam	Europe: C10 = 66	N/A
Steel Heating Pipes	Western Europe: C6 = 91	10-20%
Steel Tube, Seamless	EC cartel share = 19%	N/A
Sugar	Great Britain: C2 = 90	N/A
Tampico Fiber	Cartel members had "overwhelming" share of the U.S. market	N/A
Thermal Fax Paper	U.S.: C3 = 40-45	10%
Vitamins	World: C3 = 75 for bulk vitamins	U.S.: 20% Canada: 30%

Notes to Table 7:

^a All concentration figures are approximate. Wherever possible concentration measures date to the period of the cartel. In other instances the figures date to the period immediately prior to or after the cartel. Detailed references are available from the authors.

^b All price increase measures are approximate. Information is extremely sparse. The price increase information usually refers to a selected period within the cartel years; it is not normally an indicator of the average price increase over the entire life of the cartel. Detailed references are available from the authors.

TABLE 8
IMPORTANCE OF CARTELIZED PRODUCTS
IN DEVELOPING COUNTRY IMPORTS, 1997¹

	<i>Low Income Countries</i>	<i>Lower Middle Income Countries</i>	<i>Upper Middle Income Countries</i>	<i>All Developing Countries</i>	<i>High Income Countries</i>
Product	Percent of total imports	Percent of total imports	Percent of total imports	Percent of total imports	Percent of total imports
Aluminum Phosphide ²	0.05%	0.02%	0.03%	0.03%	0.03%
Carton-board ³	0.13%	0.13%	0.22%	0.18%	0.13%
Ferrosilicon ⁴	0.08%	0.03%	0.10%	0.07%	0.12%
Graphite Electrodes ⁵	0.45%	0.85%	1.12%	0.95%	0.73%
Paper, Carbonless	0.10%	0.28%	0.15%	0.19%	0.13%
Ship construction ⁶	1.44%	0.35%	1.47%	1.07%	0.40%
Sodium Gluconate	0.46%	0.06%	0.07%	0.11%	0.06%
Steel Tubes ⁷	0.03%	0.02%	0.02%	0.02%	0.01%
Sugar ⁸	0.25%	0.23%	0.10%	0.16%	0.07%
Vitamins ⁸	0.07%	0.08%	0.06%	0.07%	0.07%
<i>Total</i>	<i>3.06%</i>	<i>2.04%</i>	<i>3.34%</i>	<i>2.85%</i>	<i>1.75%</i>

Notes to Table 8:

¹ The list of developing countries is taken from *World Development Report 2000/2001: Attacking Poverty* (World Bank), pp. 334-35.

As stated on p. 335 “Low income and middle-income economies are sometimes referred to as developing countries.”

² Data include all imports in SITC classification for “inorganic chemicals, not elsewhere classified.”

³ Data include all imports in SITC classification for “boxes, bags, and other containers of paper.”

⁴ Data include all imports in SITC classification for ferroalloys.

⁵ Data include all imports in SITC classification for “other electrical machinery and equipment, not elsewhere classified.”

⁶ Data include all imports in SITC classification for “ships, boats, and floating structures.”

⁷ Data include all imports in SITC classification for “tubes and pipes of iron and steel.”

⁸ Product is an exact match for SITC classification.

TABLE 9
CARTELIZED PRODUCTS AS A SHARE OF
DEVELOPING COUNTRY GDP, 1997¹

	<i>Low Income Countries</i>	<i>Lower Middle Income Countries</i>	<i>Upper Middle Income Countries</i>	<i>All Developing Countries</i>	<i>High Income Countries</i>
Product	Percent of GDP	Percent of GDP	Percent of GDP	Percent of GDP	Percent of GDP
Aluminum Phosphide ²	0.01%	0.01%	0.01%	0.01%	0.01%
Carton-board ³	0.02%	0.03%	0.05%	0.04%	0.03%
Ferrosilicon ⁴	0.01%	0.01%	0.02%	0.02%	0.02%
Graphite Electrodes ⁵	0.07%	0.22%	0.26%	0.22%	0.14%
Paper, Carbonless	0.02%	0.07%	0.03%	0.04%	0.02%
Ship construction ⁶	0.22%	0.09%	0.34%	0.24%	0.08%
Sodium gluconate	0.07%	0.02%	0.02%	0.03%	0.01%
Steel Tubes ⁷	0.00%	0.01%	0.00%	0.00%	0.00%
Sugar ⁸	0.04%	0.06%	0.02%	0.04%	0.01%
Vitamins ⁸	0.01%	0.02%	0.01%	0.02%	0.01%
<i>Total</i>	<i>0.47%</i>	<i>0.54%</i>	<i>0.77%</i>	<i>0.65%</i>	<i>0.33%</i>

Notes to Table 9:

¹ The list of developing countries is taken from *World Development Report 2000/2001: Attacking Poverty* (World Bank), pp. 334-35. As stated on p. 335 “Low income and middle-income economies are sometimes referred to as developing countries.”

² Data include all imports in SITC classification for “inorganic chemicals, not elsewhere classified.”

³ Data include all imports in SITC classification for “boxes, bags, and other containers of paper.”

⁴ Data include all imports in SITC classification for ferroalloys.

⁵ Data include all imports in SITC classification for “other electrical machinery and equipment, not elsewhere classified.”

⁶ Data include all imports in SITC classification for “ships, boats, and floating structures.”

⁷ Data include all imports in SITC classification for “tubes and pipes of iron and steel.”

⁸ Product is an exact match for SITC classification.

TABLE 10
TOTAL VALUE OF CARTEL-AFFECTED IMPORTS, 1997¹

	<i>Low Income Countries</i>	<i>Lower Middle Income Countries</i>	<i>Upper Middle Income Countries</i>	<i>All Developing Countries</i>	<i>High Income Countries</i>
Product	Value of total imports (\$000)	Value of total imports (\$000)	Value of total imports (\$000)	Total Imports by Developing Countries (\$000)	Value of total imports (\$000)
Aluminum Phosphide ²	70402	82664	220860	373926	1452864
Carton-board ³	181251	595795	1495838	2272884	5576247
Ferrosilicon ⁴	110896	126282	672946	910124	5130078
Graphite Electrodes ⁵	621595	3859815	7659252	12140662	30557546
Paper, carbonless	141664	1254196	1028015	2423875	5331875
Ship construction ⁶	1984798	1588461	10043702	13616961	16978097
Sodium Gluconate	630928	282361	494862	1408151	2332289
Steel Tubes ⁷	44830	112103	121262	278195	362182
Sugar ⁸	350251	1030758	710202	2091211	3086136
Vitamins ⁸	90985	367034	44804	902823	2887216
<i>Total</i>	<i>4227600</i>	<i>9299469</i>	<i>22891743</i>	<i>36418812</i>	<i>73694530</i>

Notes to Table 10:

¹ The list of developing countries is taken from *World Development Report 2000/2001: Attacking Poverty* (World Bank), pp. 334-35. As stated on p. 335 “Low income and middle-income economies are sometimes referred to as developing countries.”

² Data include all imports in SITC classification for “inorganic chemicals, not elsewhere classified.”

³ Data include all imports in SITC classification for “boxes, bags, and other containers of paper.”

⁴ Data include all imports in SITC classification for ferroalloys.

⁵ Data include all imports in SITC classification for “other electrical machinery and equipment, not elsewhere classified.”

⁶ Data include all imports in SITC classification for “ships, boats, and floating structures.”

⁷ Data include all imports in SITC classification for “tubes and pipes of iron and steel.”

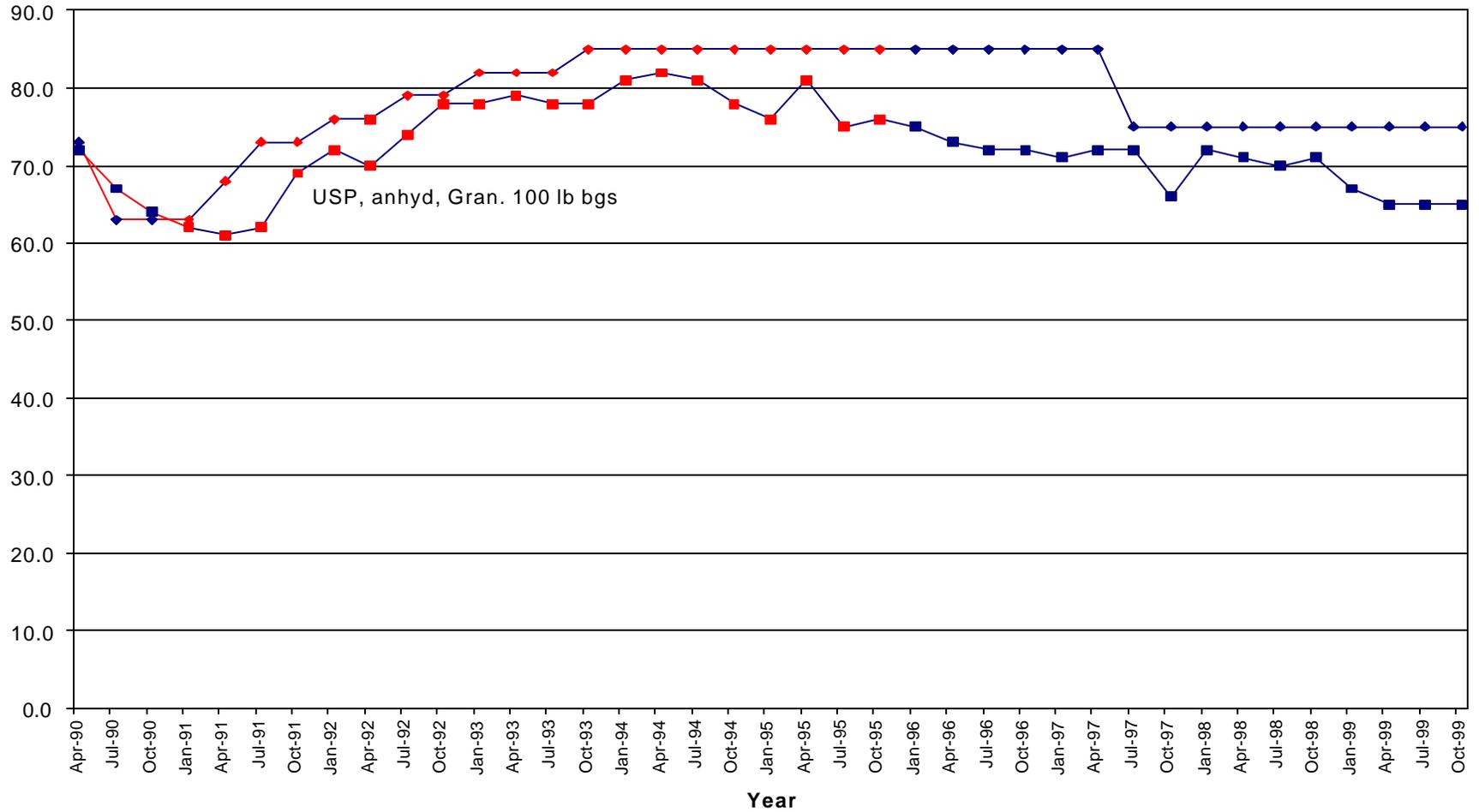
⁸ Product is an exact match for SITC classification.

FIGURE 1

Citric Acid Prices, 1990 - 1999
(Cartel: 1991 - 1995)

Comparison: CMR v PM Spot Avg Price

USD cents per lb



Sources: Chemical Market Reporter (CMR), Purchasing Magazine (PM)

◆ CMR Price ■ PM Spot Avg Price

FIGURE 2

Graphite Electrode Prices, 1980 - 2000
(Cartel: July 1992 - June 1997)

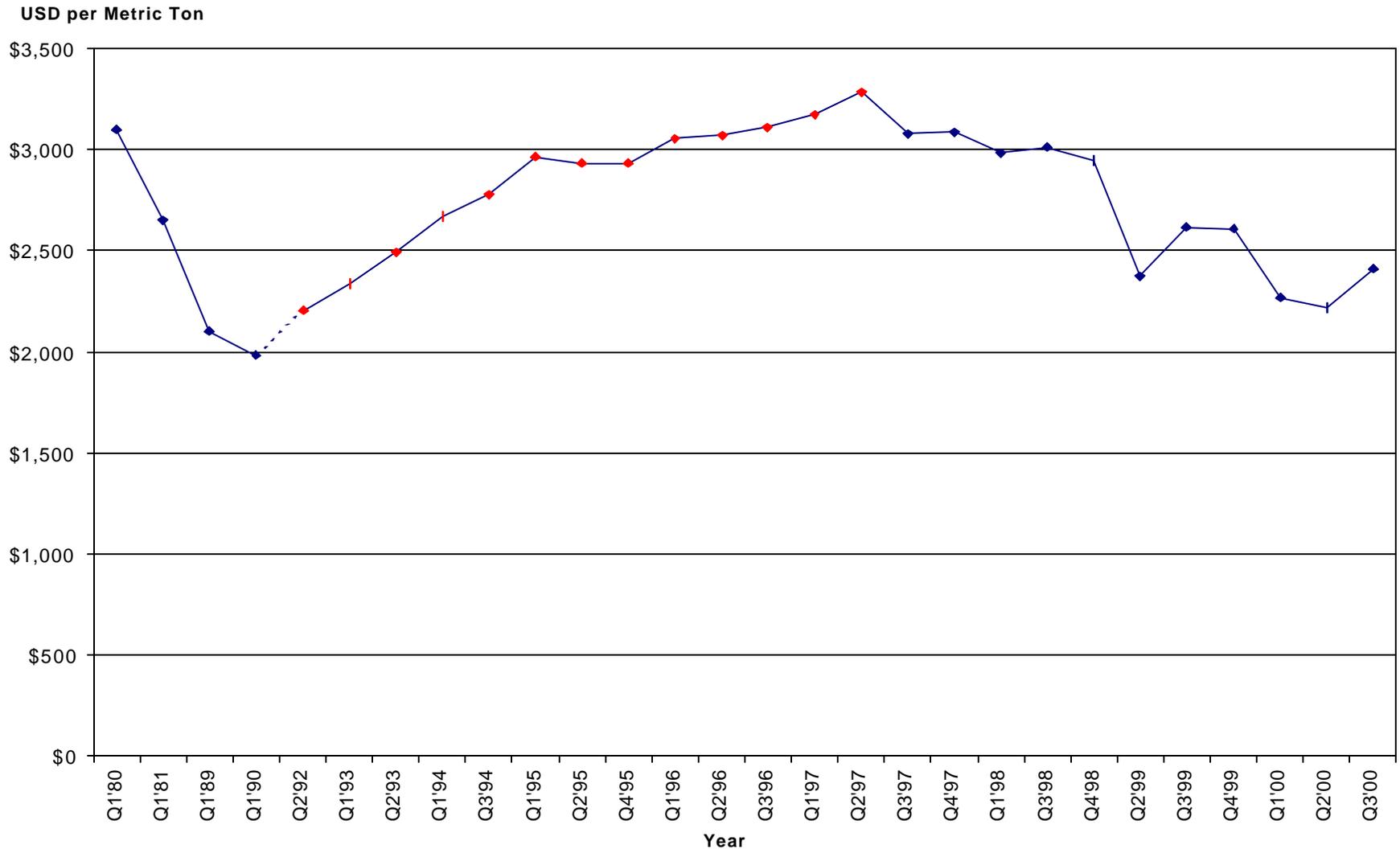


FIGURE 3

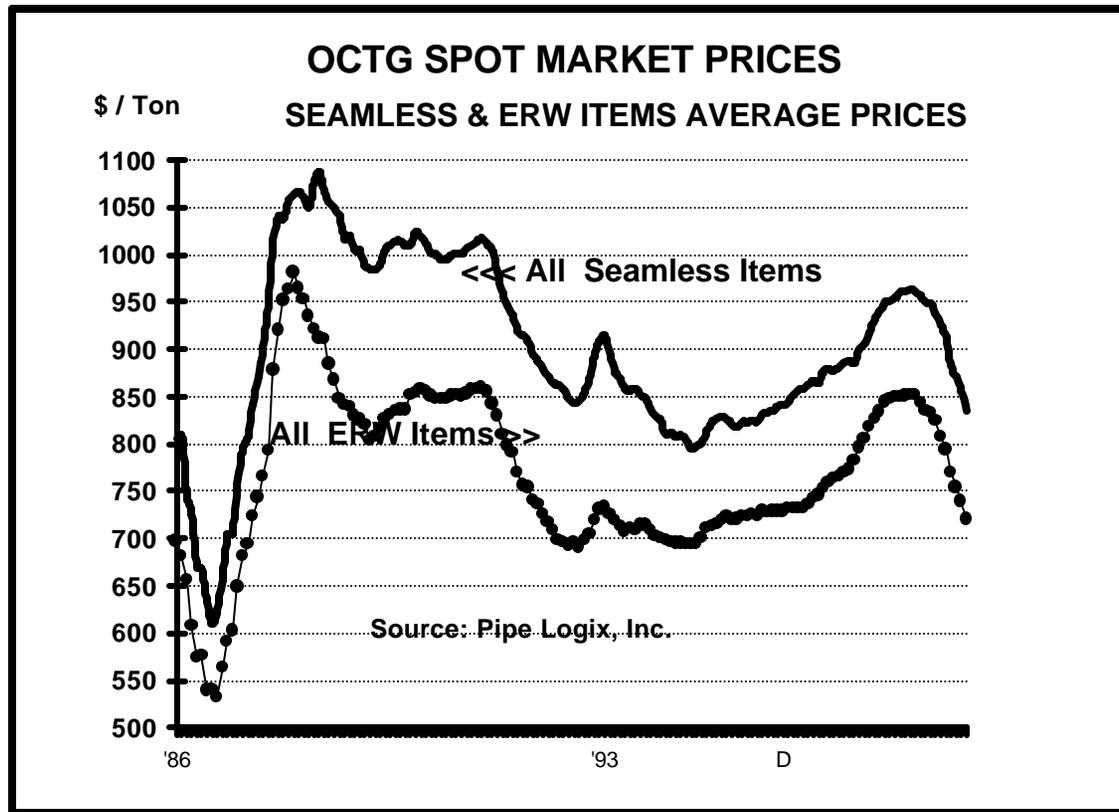


FIGURE 4

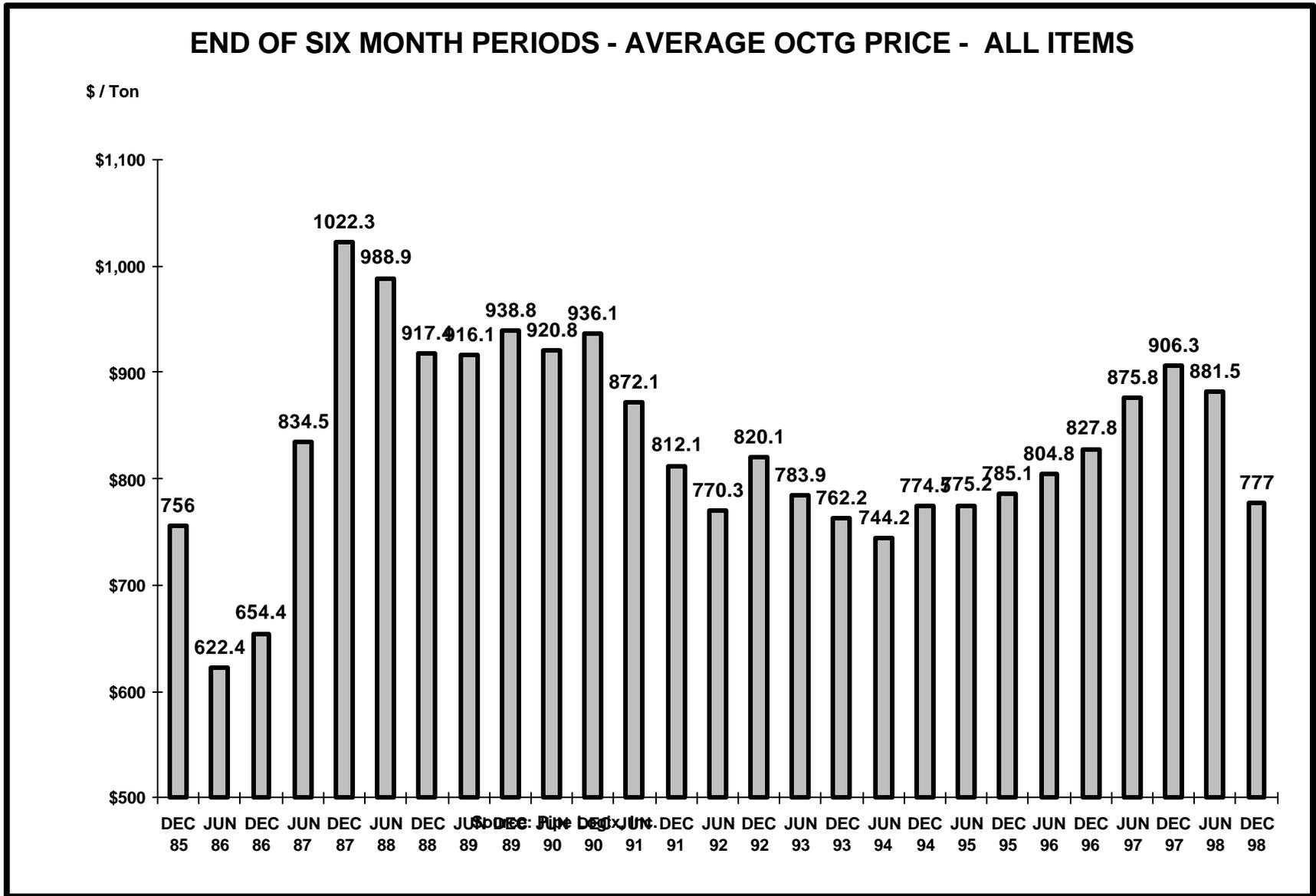
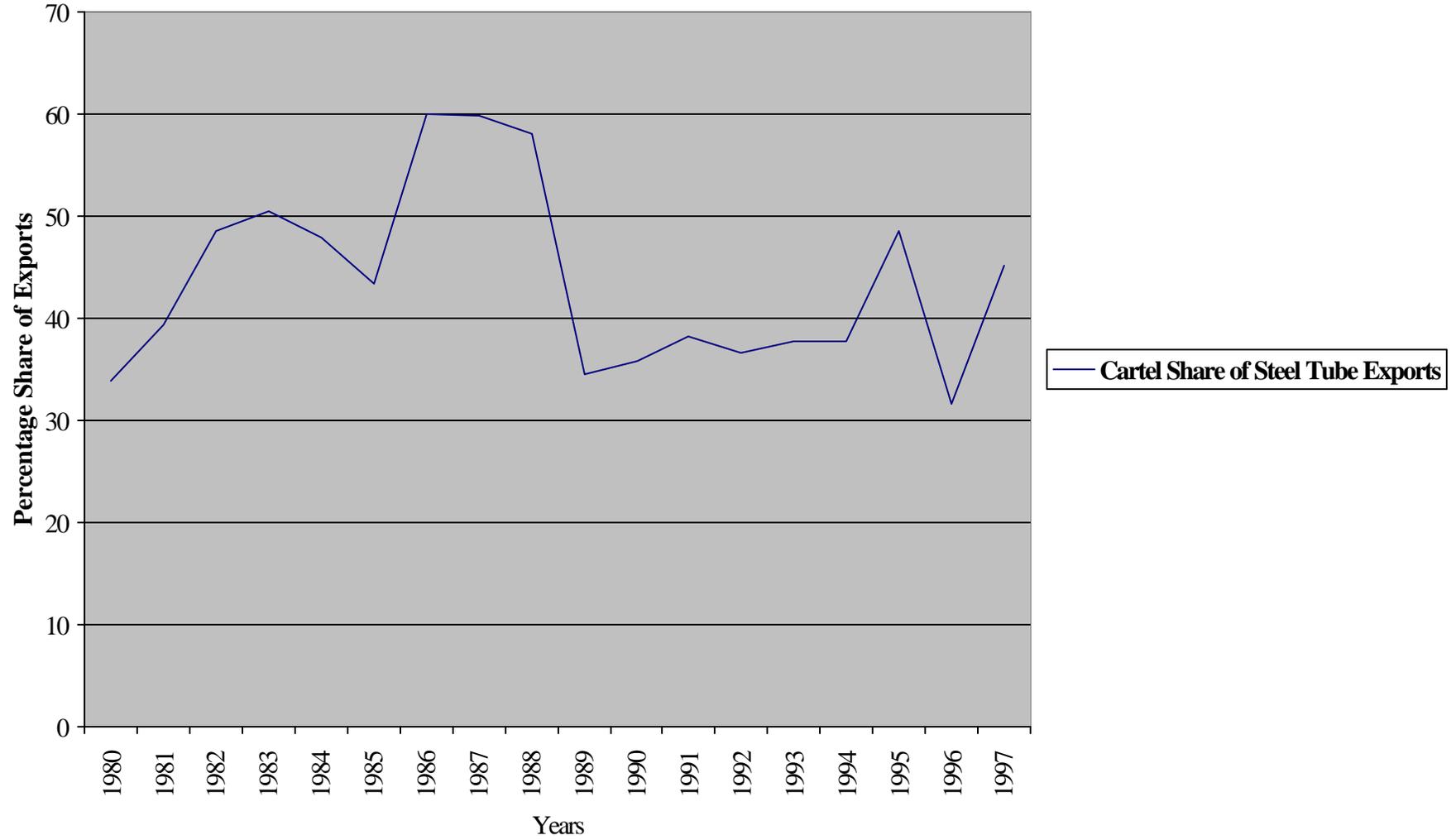


FIGURE 5

Cartel Share of Steel Tube Exports



APPENDIX

Description of Data Sources

A. Trade Data

Worldwide import and export data were obtained from the Center for International Data at the University of California at Davis: *World Trade Flows, 1980-1997, with Production and Tariff Data*, compiled and edited by Robert Feenstra. The data include trade flows (imports and exports) by Standard International Trade Code (second revision) and by country. The data include only trade in goods. Each of the goods in Table 6 was matched to its corresponding SITC code.

We were able to obtain data for the following products:

PRODUCT	PRODUCT DESCRIPTION (WORLD TRADE FLOWS DATA)	SITC CODE
Aluminum Phosphide	Inorganic Chemical Products Not Elsewhere Classified	5239
Cartonboard	Boxes, Bags and Other Packing Containers of Paper, Paperboard	6421
Ferrosilicon	Ferro - Alloys	6716
Graphite Electrodes	Other electrical machinery and equipment	7788
Paper, Carbonless	Kraft paper and paperboard, in rolls or sheets	6413
Ship Construction	Ships, Boats and Other Floating Structures	793A
Sodium Gluconate	Inorganic Acids and Compounds of Non-metals	5222
Steel Tubes	Tubes and pipes of cast iron	6781
Sugar	Sugars, beet and cane, raw solid	0611
Vitamins	Provitamins and Vitamins	5411

For the following products, the matching SITC codes yielded zeros for the corresponding trade data in every year:

Product	SITC code
Cement	6612
Citric Acid	5139
Explosives	572A
Lysine	5146
Methionine	
Pigments	5311
Plastic Dinnerware	8933
Steel Heating Pipes	
Zinc Phosphate	

For the following products, no suitable SITC match could be found. These products were excluded altogether from the analysis:

Product
Maltol
Sodium Erythorbate
Sorbates
Tampico Fiber
Thermal Fax Paper
Cable-Stayed Bridges

Former Soviet Union and Smaller Countries:

Countries that were formerly part of the Soviet Union are conspicuous by their absence from *World Trade Flows*. Thus the data on imports, exports, and GDP presented here simply exclude those developing countries that were formerly part of the Soviet Union. There are also cases where *World Trade Flows* grouped smaller countries together (especially smaller island countries). We do not believe that this leads to any substantial misclassification in the data presented here.

B. Supporting Data Sources

Countries are categorized according to the World Bank's (2000) classification of lower income countries, lower-middle income countries, upper-middle income, and high income countries. Gross Domestic Product figures are calculated from World Bank data (www.worldbank.org/data/countrydata/countrydata.html). The World Bank provides detailed data on its website with country specific statistics. The figures for total GDP by country categories are based on the same set of countries as those in the *World Trade Flows* sample.

C. Cartel Case Sources

The information presented in Table 6 on individual cartels was gathered from various industry and government sources including:

- 1) The US Department of Justice (www.usdoj.gov/atr) which lists legal and public documentation for all specific companies, their country of origin and individuals charged with price fixing in the United States since the early 1990's.
- 2) The European Court of Justice (<http://europa.eu.int/cj>) , which contains legal documentation for violation of European laws of competition (article 84 in the charter). It lists the companies involved and countries of origin.
- 3) Industry and Business News, such as:

American Metal Market
Chemical Marketing Reporter
EU Business
European Business Week
International Cement Magazine
News Line
Oil and Gas Journal
Rocks and Mineral Market
Wall Street Journal

Specific sources are available from the authors upon request.