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Contemporary International Cartels And Developing Countries: Economic Effects And Implications For Competition Policy

by

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I. INTRODUCTION

During the 1990s the United States Department of Justice and the European Commission prosecuted over forty international cartels for illegal price fixing in the United States and Europe. In many cases, these cartels sell to markets in developing countries, but prosecutions in those countries have been rare. This paper attempts to quantify the potential impact of these international cartels on the international trade of developing countries, on developing country consumers, and on developing country producers. It finds that the potential impact of these cartels is large and that the existing indigenous policy institutions of developing countries are limited in their ability to address or prevent this kind of harm to their economies. We discuss policy remedies that could ameliorate this situation. However, any definitive estimate of the impact of these cartels on developing countries is undermined by the paucity of the data available to analyze this question. Thus, an important policy change must be to improve the data collection and the sharing of information between the existing competition policy authorities in the U.S. and the European Union and those in other countries.

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

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policy circles as "hard core" cartels, among private producers from multiple countries. Virtually all such agreements are illegal in the U.S. and the European Union. They are illegal in many other countries as well, although laws and enforcement vary. While other types of cartels, such as purely domestic cartels, private export cartels, and state-run cartels, can have an important impact on economic activity, the analysis in this article is limited to private hard-core international cartels.[1] Finally, tacit collusion, which we also exclude from this discussion, can have equivalent economic effects to explicit price-fixing, but is generally treated very differently under most current competition policy rules.

As with the majority of private international cartels over the last two centuries, most of the cartels recently caught in the antitrust net of the U.S. or E.U. competition authorities are made up of producers in industrialized countries. These cartels produce sophisticated manufactured goods or services; their members are largely multinational corporations based in industrialized countries. While some of these cartels lasted only a few months, several lasted many years and therefore may have had an impact not just on short-term transfers from consumers to producers, but also on the structure of the industry.

It is not surprising that most prior studies of the impact of cartels have focused on the better-documented effects on wealthy, industrialized countries.[2] Most cartel member firms come from developed countries and the largest markets targeted by the cartels are usually in developed countries. Many of these countries have a long history of opposition to price-fixing, so their governmental investigations are a source of information on the impact of these cartels on their domestic markets. More surprising perhaps is that there has been relatively 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, say, the

[1] International cartels with significant state involvement, such as OPEC, can certainly have important economic effects. Their goals, however, are much more complex than private cartels, including not only the maximization of joint profits, but economic stability and international political influence as well. The economic models that we use here, which presume a simple profit-maximizing objective function, are inadequate to address the functioning and impact of state-run international cartels. Thus, we have chosen to exclude them from our analysis.

[2] *See* ORG. FOR ECON. CO-OPERATION AND DEV., HARD CORE CARTELS 6 (2000), *available at* http://www.oecd.org/pdf/M000013000/M00013729.pdf. *See also* Mario Monti, Fighting Cartels: Why and How? Why Should We be Concerned with Cartels and Collusive Behavior?, Address at the Third Nordic Competition Policy Conference (Sept. 11, 2000), *available at* http://europa.eu.int/comm./competition/speeches/index_2000.html;

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. This apparent complacency on the part developing country governments is changing, with actions or investigations recently undertaken by the competition authorities in Brazil, Korea, and Mexico.[3] There have also now been several suits brought in the United States by consumers from developing countries, but their ability to pursue private actions against multinationals is quite limited. There are a variety of reasons – legal, political, and economic -- why there has been only limited response from developing countries to these cartels. But, as this paper demonstrates, a lack of impact on developing countries is probably not one.

We examine two aspects of the effects of private international cartels on developing countries. First, we create a quantitative snapshot of the effect of these international cartels by taking a cross-section of international cartels prosecuted by the U.S. and EU in the 1990s and asking, how much trade was there in industries affected by these price-fixing conspiracies? By calculating the imports of "cartel-affected" goods, we get a clearer sense of the magnitude of the effect that these cartels had on developing countries. We find that, in 1997, developing countries imported $51.1 billion in goods from industries that saw international cartel activity at some point during the 1990s. Second, we provide a qualitative analysis by examining in more detail the potential effects on developing countries producers, either as competitors to or collaborators with, these international cartels. We consider the creation of barriers to entry by cartels and their impact on developing country producers and potential producers. We also examine the methods used to induce developing country producers to cooperate with the cartel. Finally, we discuss the effect on developing country consumers, particularly where, as is almost always the case for these products, the consumers are themselves producers. Thus, cartel effects may not be just on the

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INT'L COMPETITION POLICY ADVISORY COMM., U.S. DEP'T OF JUSTICE, FINAL REPORT (2000) [hereinafter FINAL REPORT].

[3] Brazil has taken action against the lysine and vitamins cartels and is investigating the graphite electrodes cartel. Korea has fined the members of the graphite electrodes cartel. These investigations are discussed below, in parts III.C. and V.A. Mexico is another developing country that has become active in investigating international cartels. The Mexican competition authority has fined producers in the lysine, citric acid, and vitamins cartels. *See* Working Group on the Interaction between Trade and Competition Policy, World Trade Organization, *Hard Core Cartels: Contribution by Mexico*, WTO/WGTCP/W/196 (June 28, 2002), *available at* http://www.economia-snci.gob.mx/portal/foros/omc/w196.doc [hereinafter *Hard Core Cartels: Mexico*]; *Alleged Commission of Absolute Monopolistic Practices in the Vitamin Markets in Mexico*, Resolution of the Fed. Comm. on Competition, Doc. IO-

income of final consumers who must pay higher prices; if it undermines the profitability or competitiveness of developing country manufacturers who rely on cartelized goods for inputs to production, it may also adversely affect the development process itself. We expand on these issues in more detail in a case study of the graphite electrodes cartel, which raised the price of a critical input in mini-mill steel production. This approach gives a reasonably complete picture of the varied direct and indirect effects of international cartels on developing countries.

It is important to state at the outset that we do not believe the effects of cartels are conceptually different between developed and developing countries. Our approach implicitly relies on the same theoretical models as those used to study the impact of cartels on developed countries. Our goal in this paper is to document these effects on developing countries, which have largely been ignored in discussions of international cartels. We conclude that a more comprehensive approach to promoting competition is necessary. The establishment of formal and informal bilateral ties between competition agencies has been an important step in this direction. The recently created International Competition Network is also designed to increase cooperation among a large number of competition agencies. But current regulatory institutions are neither international enough nor sufficiently focused on promoting competition rather than simply prohibiting particular anti-competitive tactics to assure that global markets will be competitive and open to new producers. Thus, for example, 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.

Section II estimates the effects of forty-two private international cartels from the 1990s on developing country trade. Section III presents a more qualitative discussion of the effects of international cartel activity on developing country producers and consumers. Section IV develops these issues in more detail by focusing on the graphite electrodes cartel. In Section V we examine a range of policy alternatives open to developing countries to address the problem of international cartels. Section VI offers concluding remarks.

09-99 (June 26, 2002), *available at* http://sp.cfc.gob.mx:8080/cfc01/Documentos/ing/Resolutions/Investigations/June2002/IO-09-99.htm.

II. QUANTITATIVE ESTIMATE OF DEVELOPING COUNTRY TRADE AFFECTED BY 1990S INTERNATIONAL CARTELS

The U.S. Department of Justice and the European Commission (EC) have successfully prosecuted numerous international price-fixing conspiracies over the past decade. The surge in U.S. prosecutions of international cartels derives at least in part 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, and that rate appears to be increasing.[4] On the heels of this increased enforcement by the U.S., both the European Union and some non-European countries have strengthened their anti-cartel laws, stepped up enforcement, and revised their own corporate amnesty programs.[5]

A. CONTEMPORARY INTERNATIONAL CARTEL SAMPLE

From these recent international price-fixing cases, we have created a sample of forty-two international cartels on which the cross-section analysis in this paper is based. We believe that this sample is close to the universe of international cartels that have been successfully prosecuted by the United States or the European Commission for fixing prices during the 1990s. Table 1 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 (with developing country participants in italics), those markets known to have been targeted by the cartel's conspiracy, and a measure of

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[4] *See* U.S. DEP'T OF JUSTICE, 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 8 (March 27, 1996) *available at* 1996 WL 149352. In a recent speech, the Acting Assistant Attorney General for Antitrust stated: "The [leniency] application rate has surged over the last year to better than two per month, and to over four per month in the first three months of the 2003 fiscal year." R. Hewitt Pate, The DOJ International Antitrust Program – Maintaining Momentum, Address Before the American Bar Association Section of Antitrust Law 2003 Forum on International Competition Law, at 6 (February 6, 2003), *available at* http://www.usdoj.gov/atr/public/speeches/200736.htm. *See also* Howard Adler Jr. & David J. Laing, *The Explosion of International Criminal Antitrust Enforcement*, BUS. CRIMES BULL.: COMPLIANCE & LITIG. 1 (March 1997) ("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.").

[5] *See, e.g.,* Michael Reynolds, *EU Briefings*, 18 INT'L FIN. L. REV. 48 (1999) (announcing the decision within the European Commission to create a new unit to fight cartel activity). For a brief description of leniency policies introduced by the European Commission and the Britain's Office of Fair Trading, see *Cracking Down on the Cartels*, Economist.com / Global Agenda (April 3, 2003) *at* http://economist.com/agenda/displayStory.cfm?story_id=1602123.

market concentration, where available. 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 or abuse of dominance case); 2) it must include sellers 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 successfully prosecuted by the U.S. or the 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.[6]

Cartel activity has occurred in a variety of industries – from commodities like cement and citric acid to specialized services like fine arts auctions and wastewater treatment facility construction. Chemical products top the list with thirteen different cartels. The next largest product category is transportation (seven cartels in our sample), followed by steel (four), carbon and graphite products (three), plastics and paper (two each), and several miscellaneous goods and services.[7]

The mean duration of these cartels is just over five years, with a median length of roughly four years, but those figures hide significant variation in their success. In this sample, the variance of cartel duration is over 20 years. Cartel duration ranges from a low of 2 months (ferry operators cross-channel freight cartel) to 20 years (Central West African shipping cartel). Of the forty-two cartels in the sample, twenty-two (52%) are believed to have had regional effects (e.g., U.S., Europe, or specific developed countries). Sixteen cases (38%) were reported to have either direct effects on developing countries, "international" effects, effects in "US and elsewhere," or in "Europe and certain third markets." (For the remaining 10% of the cases, information on the regions in which the cartel had an affect – or an intended affect – was not available.) The last column of Table 1 shows reported market concentration figures. Where it is possible to find market share or concentration information, we find that the typical contemporary international cartel operated in a highly concentrated market.

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[6] *See* Richard A. Posner, *A Statistical Study of Antitrust Enforcement*, 13 J. LAW ECON. 365 (1970); George A. Hay & Daniel Kelley, *An Empirical Survey of Price Fixing Conspiracies*, 17 J. LAW ECON. 13 (1974); Peter Asch & Joseph J. Seneca, *Characteristics of Collusive Firms*, 23 J. IND. ECON. 223 (1975).

[7] It is important to note that there have been additional cartels recently discovered in certain product categories that are not covered in our sample. For example, in the carbon and graphite products category, our sample includes

Competition agencies and the press occasionally report estimates of the increase in price resulting from these cartels. The reported price increases vary widely by industry and by source. At the low end, for example, we have a reported price increase of ten percent for the thermal fax paper cartel, which was formed as the industry was declining and lasted for less than a year.[8] At the high end there is the stainless steel cartel, which reportedly almost doubled prices.[9] This cartel lasted slightly more than one year (from January 1994 to March 1995) and involved six European steel companies. The industry was investigated for cartel activity after buyers complained to the European Commission about the rapid increase in prices.[10]

B. ESTIMATING THE VOLUME OF IMPORTS OF CARTELIZED GOODS BY DEVELOPING COUNTRIES

In order to determine whether developing countries were consumers of one of the cartelized products in the sample, we matched the products in Table 1 with import-export data for the sample period. The trade data come from Robert Feenstra's *World Trade Flows* database.[11] The data include trade flows (imports and exports) for all countries, classified according to the Standard International Trade Classification (SITC), Revision 2.[12] The data include only trade in goods. The list of developing countries is taken from the World Bank's *World Development Report 2002*.[13]

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cartels in carbon cathode block, graphite electrodes, and isostatic graphite. There have since been indictments and guilty pleas in the "carbon brush and collector" cartel. *See* Pate, *supra* note 4, at 4.

[8] Robert L. Jackson, *Justice Department Announces Breakup of Price-Fixing Conspiracy on Fax Paper*, L.A. TIMES, July 15, 1994, at 3, *available at* 1994 WL 2186420.

[9] Press Release, European Commission, Commission Fines Stainless Steel Cartel (Jan. 21, 1998).

[10] Graham Hind, *English Cutlers 'Hit by Cartel,'* TIMES (London), Aug. 21, 1994, *available at* 1994 WL 9149991.

[11] ROBERT FEENSTRA, WORLD TRADE FLOWS, 1980-1997, WITH PRODUCTION AND TARIFF DATA (Center for Int'l Data, Univ. of Cal. at Davis, 1999).

[12] 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 Gross Domestic Product presented here simply exclude those developing countries that were formerly a 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.

[13] The World Bank classifies developing countries in three groups: low income, lower-middle income, and upper-middle income; non-developing countries are classified as "high income" countries. Examples of "low income" countries are Armenia, India, and Vietnam; examples of "lower-middle" are Albania, China, and Thailand; and, examples of "upper-middle" are Argentina, Czech Republic, and Turkey. Gross Domestic Product (GDP) 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 GDP data used here are from the World Bank web site. After eliminating countries for which trade or GDP data are not available, we have in our data set 51

Tables 2 through 4 summarize import data for thirty-two of the cartelized products in Table 1 for 1997, the most recent year for which trade data are available. We report the amount of imports of "cartel affected" production in three different ways: as a percentage of total imports, as a percentage of GDP, and as total dollar values. The sample size falls from forty-two to thirty-two for two reasons. First, the data on trade flows exclude 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.

Tables 2 through 4 contain results using the best available data for each product in the sample. Whenever possible, the narrower 4-digit SITC product code was used to track the trade data, but if the data were missing for that category, we then used the broader 3-digit code to categorize the cartel product. (In three cases, explosives, nucleotides, and zinc phosphates, we do not even have 3-digit data.) For example, international trade data for citric acid are missing (i.e., the data entries are zeroes) at the 4-digit level. As with other narrowly specified chemicals, we suspect that there is misclassification in the trade data. Of course, even if we did have import data for citric acid, they would understate the full impact of the citric acid 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, such as soft drinks (its largest end use), processed food, detergents, and pharmaceuticals and cosmetics. We can, however, obtain trade data for the broader category of "carboxylic acids and their anhydrides and halides." This latter category is so broad that it contains at least five different products that have been affected by cartels, as well as a number of other products with no recorded cartel activity. However, given that it is the best available 3-digit category for citric acid, we use data on trade in "carboxylic acids and their anhydrides and halides" in Tables 2 – 4.

There are other data problems as well. The best SITC category for graphite electrodes, a cartel that we discuss in detail below, is, unfortunately, all "otherwise unclassified electrical equipment." This broader category includes more than one cartel product, as carbon cathode blocks also fall into this same catchall. The same is true of the seamless steel tube cartel trade

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low-income countries, 35 lower-middle income countries, 24 upper-middle income countries, and 35 high-income

data match. The SITC category ("seamless tubes and pipes; blanks for tubes and pipes") 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, steel beams, pre-insulated pipes, and stainless steel during the late-1980s to mid-1990s.[14] 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 seamless steel tubes cartel, it is likely that their behavior changed the prices charged by firms who were not a party to or even aware of the price fixing of their larger competitors. Without more information about the secret activities of cartels, it is impossible to precisely determine the quantitative effect of these cartels on developing country incomes. Therefore, the data must be read with a degree of skepticism.

Table 2 reports 1997 imports of "cartel-affected" products as a *percent of total imports* to developing countries with countries aggregated by income categories. Table 3 presents 1997 import data for these same products, showing them as a *percent of total GDP*. Table 4 gives the total *dollar value of imports*. We also report in each of these tables, for comparison, the analogous import values for high-income countries.

Examining a sub-sample of nineteen products – those products that were cartelized at some point during the 1990s and for which we were able to obtain better-quality 4-digit trade data in 1997 – the total value of potentially "cartel-affected" imports to developing countries was $51.1 billion (see the last row in Table 4). To put this number in perspective, consider the fact that official development assistance (i.e., foreign aid) in 1997 to all developing economies totaled $39.4 billion U.S. dollars.[15] If the price of these imports increased an average of ten percent (the lowest reported price increase for this sample of cartels), then without adequate enforcement

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countries.

[14] Charles Goldsmith & Martin du Bois, *European Commission Fines Steelmakers $116.7 Million*, WALL ST. J. EUROPE, Feb. 17, 1994, at 3; Emma Tucker, *Europe – ABB Fined Heavily Over Role in Cartel*, FIN. TIMES, Oct. 22, 1998, at 3; Philip Burgert, *EC Issues Fines for Stainless Price Fixing*, AM. METAL MARKET, Jan. 26, 1998, at 2.

[15] WORLD BANK, WORLD DEVELOPMENT INDICATORS FOR 2001 (CD-ROM, April 2001). The series used was "official development assistance and official aid (current US$)."

against international cartels, producers in industrialized, high income, countries could take from developing country consumers in higher prices approximately 15% of what their governments donate in foreign aid.

The total figure of $51.1 billion represents 3.7% of all imports to developing countries in 1997 and 0.79% of their combined GDP. The impact appears to be largest on the more developed countries of the developing world. Cartel-affected imports made up 3.9% of imports and 0.85% 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 ($140.8 billion compared to $51.1 billion), these imports represent a smaller proportion of imports (3.4%) and GDP (0.6%) for richer countries. Of course, in countries where domestic producers belonged to the cartel, production for domestic consumption, which we do not measure, is affected by cartel behavior as well as the imports we do measure.

The data reported in the "Total" row of Tables 2 – 4 (second to last row) is more comprehensive, in that it includes almost all 1990s cartelized goods, but it is also less accurate, because the 3-digit data include trade in many products that were presumably not at all affected by cartel behavior. Thus, these figures present an upper bound to the value of affected trade in these industries. This upper bound for the total value of affected trade is $114.7 billion of developing country imports, representing 8.4 % of their imports and 1.7 % of their GDP.

A slightly different approach to quantifying the trade effects of these cartels is to calculate the *average* annual amount of trade affected during the 1990s (Table 5). For this estimate, we used only the period during which each cartel was known to be active (e.g., 1990 – 95) and measured the effect on trade in that industry over only those years. The average annual amount of trade affected in "cartel-affected industries" to developing countries between 1990 and 1997 is $18.5 billion (including only those industries for which 4-digit data are available), representing 1.9% of imports and 0.3% of GDP. If one adds to this calculation cartels for which only 3-digit data are available, we obtain an upper bound estimate of the size of affected imports equal to $47.0 billion, representing 4.7% of imports and 0.9% of GDP. This approach is preferable in some respects to the one above because some of the cartels in the sample were no longer active in

1997. If 1997 trade data are for some reason unrepresentative of the 1990s generally, examining this one year may be misleading. Perhaps more importantly, some of these cartels were active during much of the decade while others were active only briefly. Simply adding together the trade in these different products in one year overstates the effect of cartels that did not last for the entire period. In contrast, the *average* value of affected trade includes trade data for each year only for the cartels that were active in that particular year. Thus, this second estimate essentially weights the calculation of average imports by the length of the cartel's duration.

As we have emphasized, there are numerous problems with the calculations of cartel-affected trade that we present here. The estimates are, on the one hand, biased downward because we have data on only some of the forty-two known price-fixing conspiracies. At the same time, even our lower estimate of affected trade, including only nineteen products, includes many cases where the trade categories are broader than the products whose prices were fixed by the cartel. We have attempted, by presenting alternative measures, to give the reader an idea of the order of magnitude of the trade affected by international cartels at the end of the twentieth century. While none of these measures is without problems, they all agree that a large amount of trade has occurred in these cartel-affected industries with a potentially large impact on consuming countries. Even with the numerous qualifications, it is clear from the magnitude of the total developing country import figures that international cartels have adversely affected a not insignificant portion of the trade, and therefore the trade balance and consumption, of developing countries.[16] Thus, an important policy advance would be the systematic collection of data to improve upon the estimates available here. In the meantime, a more comprehensive picture of the activities of international cartels and their effects on both consumers and competitors can be derived from a qualitative discussion, to which we turn next.

III. QUALITATIVE EFFECTS OF CARTEL ACTIVITY ON DEVELOPING COUNTRY CONSUMERS AND PRODUCERS

A. CONSUMERS

[16] 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 have experienced severe currency crises.

We now present a qualitative assessment of potential costs and benefits of private international cartels on developing country consumers and producers. For developing country consumers, or consumers in any country for that matter, the direct cost of a cartel is plain: price will increase if the cartel is successful. Using trade flow data instead of direct price and quantity data, the previous section showed that these costs are likely to be substantial. There may be other costs as well, such as decreased product choice (if the cartelized product is differentiated and geographic markets are allocated among producers) or a slower rate of technological change.

Before proceeding, we pause here to think about what it means to add a developing country dimension to the classic "cartel problem." 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 are jointly maximized. But by raising price above marginal cost, the cartel creates an incentive for each producer to cheat.[17] Each firm has an incentive to shave its price, increase its output and market share, and thereby increase its profits. In order to collude *successfully*, cartel members must devise mechanisms that provide the necessary deterrence to cheating, including punishments for firms that do cheat.

In general, we do not believe that the functioning of cartels in developing countries requires a distinct model of cartel activity from those that we use to study cartels in industrialized countries. However, the fact that most of the firms in these cartels were large multinational companies may be significant. Greater multi-market contact – more times and places for firms to interact – increases the number of opportunities to punish cheating; and so increases the likelihood that collusion will succeed.[18] This implies that cartels made up of firms that interact in developing

[17] The classic presentation of firms' incentive to cheat on collusive agreements is George J. Stigler, *A Theory of Oligopoly*, 72 J. POLIT. ECON. 44 (1964). For further discussion of cartel economics and a survey of empirical research on cartel stability, see Margaret Levenstein & Valerie Suslow, *What Determines Cartel Success?*, (University of Michigan Business School, Working Paper No. 02-001, January 2002), *available at* http://eres.bus.umich.edu/docs/workpap/wp02-001.pdf.

[18] For a theoretical discussion see B. Douglas Bernheim & Michael D. Whinston, *Multimarket Contact and Collusive Behavior*, 21 RAND J. OF ECON. 1 (1990); Jean-Pierre Benoit &Vijay Krishna, *Renegotiation in Finitely Repeated Games*, 61 ECONOMETRICA 303 (1993). It is also theoretically possible that multi-market contact may increase informational and monitoring requirements for the cartel such that cartel organization becomes too complex for success. The empirical work is somewhat mixed. For example, Scott finds that profit rates are significantly higher for firms with multi-market contact in oligopoly industries, but his sample is not strictly limited to industries with cartels. *See* John T. Scott, *Multimarket Contact and Economic Performance*, 64 REV. OF ECON. & STAT. 368 (1982); *Multimarket Contact Among Diversified Oligopolists*, 9 INTL. J. OF IND. ORG. 225 (1991). On the other

country markets as well as the markets of high-income countries are more likely to succeed than those with a more limited global reach, holding all else equal. But this also creates the possibility that there may be short-term benefits for developing country consumers, if their markets are used to discipline transgressors. Local price wars can benefit consumers, at least in the short run. The impact on local producers, however, can be devastating, as we discuss below.

For most of the international cartels of the 1990s, there is only limited case-by-case quantitative analysis of the price effects and consumer welfare effects for developing countries. The Consumer Unity and Trust Society (CUTS), for example, has estimated the damage to vitamin consumers in six developing countries (India, Pakistan, Kenya, South Africa, Tanzania, and Zambia) at US$200 million.[19] The competition authorities in Mexico and Brazil have also concluded that their consumers were adversely affected by this cartel.[20] Similarly, the competition authorities in Korea, Mexico, and Brazil have all concluded that the lysine cartel raised prices in their home markets.[21] The only indication we have of the extent of harm, however, are the fines levied by the competition authorities (discussed in Section V below). In other words, although more evidence is becoming available on price effects for particular developing countries, there is little publicly available information on quantity effects, which would be necessary to estimate damages. Still, although concrete evidence on the harm to developing country consumers of international cartels is sparse, it is growing and we expect it will continue to do so as more countries begin their own antitrust investigations.

B. PRODUCERS

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hand, Loretta J. Mester, *Multiple Market Contact Between Savings and Loans*, 19 J. OF MONEY, CREDIT, & BANKING 538 (1987), finds that competition becomes more intense with multi-market contact.

[19] CTR. OF COMPETITION, INV. AND ECON. REGULATION, CONSUMER UNITY & TRUST SOC'Y, PULLING UP OUR SOCKS: A STUDY OF COMPETITION REGIMES OF SEVEN DEVELOPING COUNTRIES OF AFRICA AND ASIA: THE 7-UP PROJECT (2003), *available at* http://cuts.org/pulling.pdf [hereinafter *CUTS*].

[20] *See Hard Core Cartels: Mexico*, *supra* note 3; Ministerio da Fazenda Secretaria de Acompanhamento Economico Parecer n. 210/2002/COGDC/SEAE/MF (Dec. 17 2002) (obtained from the Brazilian Secretariat of Economic Supervision of the Ministry of Finance, known as the SEAE) (Brazilian vitamin decision).

[21] ORG. FOR ECON. COOPERATION AND DEV., COMPETITION LAW AND POLICY: 1998-1999 ANNUAL REPORT FOR MEXICO 3 (1998) *available at* http://www.oecd.org/pdf/M00008000/M00008350.pdf ("The agreement between the Mexican subsidiaries [of ADM and Kyowa Hakko] gave raise[sic] to substantial parallel price increases in the domestic market.") [hereinafter OECD].

For developing country producers, as with producers worldwide, there are both potential costs and benefits deriving from the existence of an international cartel. Even developing country producers who are excluded from the cartel may benefit from being able to sell under a cartel price umbrella, without having to adhere to a cartel production quota. The possibility of "free riding" on other firms' output restrictions is a clear potential benefit. There are, however, potential negative effects as well, and developing country producers may be particularly susceptible to these effects. In particular, 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). If these cartel-imposed costs are significant, there will be a cost to the pace of economic development and the development process.

In addition to those barriers intentionally or inadvertently provided by national governments, cartels can strategically construct 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 reveal 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. 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.

1. Limiting Access to Technology in Order to Raise Barriers to Entry

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.[22] 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.[23]

Or, consider the actions of graphite electrode producers from the U.S., EU, and Japan between 1992 and 1997 (discussed more fully in Section IV 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."[24] Again, while this charge appears in every individual indictment, in press releases from the U.S., EU, Canada, and Korea, the details of the firms' actions and the mechanisms they used to restrict access to technology are never given.

2. Use of Tariffs and Anti-dumping Duties as Barriers to Entry

In a particularly striking case, producers of ferrosilicon from the U.S. (one of them a subsidiary of a Norwegian firm) formed a cartel in 1989 and proceeded to use anti-dumping laws in the U.S. and Europe to bar entry to non-cartel members.[25] By reacting passively to ever-increasing imports, that is, not lowering their price to compete, the firms were able to demonstrate harm to the U.S. ferrosilicon industry. An anti-dumping complaint was then filed and anti-dumping duties were imposed in 1993 against five countries. The Department of Justice filed indictments in the price-fixing case in 1995 and 1996.[26] The International Trade Commission lifted the duties in 1999.[27]

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[22] Goldsmith & du Bois, *supra* note 14, at 3.
[23] *See, e.g.,* Leonard S. Reich, *Lighting the Path to Profit: GE's Control of the Electric Light Industry, 1892-1941*, 66 BUS. HIST. REV. 305 (1992); Steven W. Usselman, *Organizing a Market for Technological Innovation: Patent Pools and Patent Politics of American Railroads, 1860-1900*, 19 BUS. & ECON. HIST. 203 (1990).
[24] Press Release, U.S. Dep't of Justice, Japanese Subsidiary Charged with International Conspiracy to Fix Prices for Graphite Electrodes in the U.S. (Feb. 23, 1998).
[25] *See* Richard J. Pierce, Jr., *Antidumping Law as a Means of Facilitating Cartelization*, 67 ANTITRUST L. J. 725 (2000).
[26] *See, e.g.,* Press Release, U.S. Dep't of Justice, Pittsburgh Metals Producer Pleads Guilty in Nationwide Price Fixing Conspiracy (Sept. 22, 1995).
[27] *See Resentencing Date in US FeSi Price-fixing Case Due in May*, METALS WK., Feb. 14, 2000, at 2.

In another example, U.S. citric acid producers have twice tried to use the government to help protect the domestic industry from Chinese imports. The cartel ran from 1991 – 95 and involved major citric acid producers from the U.S., Germany, and Switzerland.[28] 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.[29] Several U.S. citric acid producers brought a second anti-dumping allegation at the end of 1999. Archer Daniels Midland, Cargill, and A.E. Staley (a division of Britain's Tate & Lyle PLC) 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.[30] 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.

The ITC dismissed the case in February 2000, after deciding that there was no material injury to the domestic citric acid industry.[31] At the hearings, it certainly weighed against the case that some of these same producers had just been convicted and fined for cartel behavior. Exports from China first fell dramatically and then rebounded after the cartel was broken apart, suggesting that the cartel was at least partially successful in creating barriers to entry to limit Chinese production.[32] U.S. and European governments must be extremely wary of such attempts by cartels to use the state as a tool for creating barriers to entry.

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[28] *See, e.g.,* Press Release, U.S. Dep't of Justice, Justice Department's Ongoing Probe Into Food and Feed Additives Yields Second Largest Fine Ever (Jan. 29, 1997); Press Release, U.S. Dep't of Justice, Justice Department's Ongoing Probe Into Food and Feed Additives Yields $25 Million More in Criminal Fines (Mar. 26, 1997). Note that reported cartel dates can vary, depending on the particular firm charged and the antitrust authority or private plaintiff bringing the suit.

[29] *Citric Acid Export Will Remain Good in China*, CHINA CHEMICAL REP., May 6, 1996 at 8, *available at* 1996 WL 9026358.

[30] Feliza Mirasol, *DOC Investigates Possible Dumping of Citric Acid*, CHEMICAL MARKETING REP., Jan. 17, 2000, at 4.

[31] Clay Boswell, *Pucker Up: A Taste for Tartness Drives Acidulants*, CHEMICAL MARKET REP., May 29, 2000, at 16.

[32] *See* Matthew Lerner, *Citric Acid Competitive in Wake of Big Changes*, CHEMICAL MARKET REP., Mar. 17, 1997, at 5 (discussing a 30-40 percent decline in Chinese exports to the U.S. in 1997 compared to 1996; Lerner also points out that the Chinese government has stopped giving export tax credits to Chinese citric acid producers), *available at*

There is also indirect evidence of attempts to limit Chinese citric acid exports to other markets. In 1998, India imposed anti-dumping duties on citric acid imports from China. Before the duties were imposed, China had captured close to 40% of the Indian market for citric acid. This may reflect in part China's exclusion from U.S. and European markets, either through anti-dumping duties or private restraints, so that Chinese producers may have turned to India as an outlet for their product.

It is important to note that although there are anecdotal, rather dramatic, stories of attempts by cartels to use anti-dumping duties and tariffs to raise barriers to entry, there is little evidence that this is widespread. The general claim, for example, that firms have systematically filed anti-dumping claims and then withdrawn them following an agreement with importers (presumably threat-induced) has not stood up to rigorous empirical tests.[33] Yet the fact that attempts are occasionally made suggests that government authorities should be wary. These kinds of activities may be particularly effective in limiting entry by developing country producers who are just entering international markets. If effective, developing country producers may be excluded for a long period of time, conceivably well after the breakup of the formal cartel.

3. Post-cartel Joint Ventures

Even after cartels are broken up, the existence of cartel-created barriers may force developing country producers into joint ventures that limit their distribution or restrict sales to certain markets. Such joint ventures could then function as a way for colluding firms to accommodate developing country entry into a cartel under terms favorable to incumbent firms or to engage in an implicit cooperative pricing arrangement among incumbents. 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 several recent international cartel cases, joint ventures have been established in the years following the forced break-up of

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1997 WL 8496497; Lisa Jarvis, *Outlook for Citric Acid Dismal as Prices Nosedive*, CHEMICAL MARKET REP., Mar. 31, 2003, at 6 (citing varying estimates that China may have a 25 – 34 percent share of the global citric acid market).

[33] Using data from 1990 to 1997, Taylor 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. *See* Christopher T. Taylor, *The Economic Effects of Withdrawn Antidumping Investigations: Is There Evidence of Collusive Settlements* (U.S. Federal Trade Commission, Working Paper 240, Aug. 2001).

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.

For example, there has been rapid consolidation in the citric acid industry since the price-fixing conspiracy was uncovered in 1995. Internationally, Hoffmann-La Roche has made numerous investments in China for a variety of products it manufactures, including a citric acid facility that opened in 1997 (its partner, Wuxi Zhongya, is one of China's three largest citric acid producers).[34] Cargill and Tate & Lyle are both investing in Brazil, where a high quality and low cost sugar supply is attracting citric acid manufacturers.[35] There are two ways to interpret these events. One is that, as citric acid prices have fallen following the demise of the cartel and Chinese exports have grown, western producers are more accommodating of entry by Chinese producers, by sharing their technology in exchange for access to low-cost production methods and an Asian base from which to export.[36] An alternative explanation, though speculative, is that former cartel members are attempting to assure continued market dominance, without resorting to a formal cartel.

The seamless steel tubes cartel provides another illustration of significant post-cartel industry restructuring. 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). Leading producers are located in the U.S., Japan, Germany, France, Italy, Argentina, Mexico, Brazil, and Sweden. 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.

Since the demise of the seamless steel tubes 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 alliances had a 25% market share of world consumption of OCTG

[34] *See Roche Opens New Vitamin A Plant in China*, CHEMICAL MARKET REP., Oct. 25, 1999, at 44, *available at* 1999 WL 22724963; Kevin Gopal, *Keeping the Faith*, PHARMACEUTICAL EXECUTIVE, Jan. 1, 1998, at 36.
[35] Kiernan Gartlan, *Tate & Lyle To Expand Brazilian Citric Acid Operations*, DOW JONES COMMODITIES SERVICES (Oct. 19, 2000).
[36] Jarvis, *supra* note 32.

in 1999, and is led by Techint (an Italian–Argentinean firm controlled by the Rocca family).[37] Tenaris includes steel tube and pipe producers from 24 countries including Dalmine, the Italian member of the cartel and NKK, another former cartel member based in Japan.[38]

The other three Japanese producers who were members of the cartel (Nippon, Kawasaki, and Sumitomo Metal) have formed an alliance in which they use a joint sales agency to distribute goods worldwide.[39] Mannesmann and Vallourec, the other two firms in the cartel have formed a joint venture to which they have transferred all their OCTG production.[40]

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 gaining access to 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 carefully 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 description of how cartel activity might affect developing countries, we now turn to a more detailed discussion of one particular cartel, the graphite electrodes cartel. This case illustrates many of the issues discussed above, including the adverse developmental impact that an international cartel can have. The graphite electrodes case also illustrates recent attempts by developing country consumers and their governments to find policy instruments with which to respond to these cartels.

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[37] Jonathan Friedland, *Oilfield Pipe Maker DST Aims to Service Entire Globe,* WALL ST. J., Sept. 10, 1999, at A12.
[38] *See Tenaris Group of Tube Makers Launches Advertising Campaign*, AM. METAL MARKET, OCT. 9, 2001, at 3; *About Tenaris*, *at* http://www.tenaris.com/infokit/eng/html/0datashe.htm (last visited June 15, 2003); Friedland, *supra* note 37.
[39] Audrey McAvoy, *Japanese Steel Companies Discussing Seamless Steel Pipe Tie-Up*, DOW JONES INT'L NEWS (Aug. 18, 1999).
[40] *See* Commission Decision 31997M0906 of 03/06/1997: Declaring a Concentration to be Compatible with the Common Market (Case No IV/M.906 – Mannesmann/Vallourec) According to Council Regulation (EEC) No 4064/89, (Aug. 5, 1997) (providing an analysis of the OCTG market in Europe and reasons for approval of the acquisition of 21% of the shares of Vallourec SA by Mannesmannroehren-Werke AG).

IV. THE GRAPHITE ELECTRODES CARTEL

In order to better illustrate both the effects of an international cartel on developing country producers and consumers, and the difficulties and options for antitrust policy in addressing these effects, we turn now to a discussion of the graphite electrodes cartel. For five years the major graphite electrode producers around the world coordinated prices for this critical input into mini-mill steel manufacturing. Many developing countries rely on the mini-mill (electric arc furnace) technology for producing steel. This case therefore not only provides an interesting illustration of the operation of a contemporary international cartel in a sophisticated industrial product, but it also provides useful background information for our discussion in the next section of policy remedies for developing countries.

A. INDUSTRY BACKGROUND AND STRUCTURE

Graphite electrodes (GE) are large carbon columns used by electric arc furnaces (EAF) or "mini-mills" in the making of steel. Although there are other uses for graphite electrodes, EAF steel producers account for the vast majority of demand.[41] Mini-mills use graphite electrodes to generate the enormous 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. Almost fifty percent of GE manufacturing costs goes toward raw materials, the bulk of which is petroleum coke (also called needle coke for electrodes applications). Labor costs represent roughly twenty percent of total costs.[42] The electrodes are baked and undergo a series of refinements, making the production process highly electricity-intensive. The electricity portion of the cost varies by location within a country and across countries. In the final stages of production the electrodes are machined into a

[41] *See* Commission Decision of 18 July 2001 Relating to a Proceeding Under Article 81 of the EC Treaty and Article 53 of the EEA Agreement, Case COMP/E-1/36.490 — Graphite electrodes, 2002 O.J. (L 100) 1, 3, *available at* http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/l_100/l_10020020416en00010042.pdf) [hereinafter *EC Graphite Electrodes Decision*] ("[steel producers] account for some 85% of demand." It is not clear whether this 85% figure refers to only the European market, but we expect that the percentage would be similar on a global basis.) GE's are also used for refining steel in ladle furnaces. *See Canadian Subsidiary of UCAR Pleads Guilty to Price Fixing*, WALL ST. J., Mar. 19, 1999, at A4.

[42] Barbara Martinez, *Robert Krass Chairman CEO and President of UCAR International*, DOW JONES INVESTOR NETWORK, Oct. 6, 1995, at 3.

number of standard sizes or on a custom basis to meet the buyer's specifications. The processing time for an electrode is approximately two months.[43] Cost savings have been achieved over the years through technological and process improvements. One graphite electrode producer estimates that the average graphite electrode production cost per metric ton has fallen from about $1,950 in 1998 to $1,651 in 2001.[44]

There are three basic processes for steel making: open hearth, basic oxygen furnaces, and electric arc furnaces. The first electric arc furnace used for commercial specialty steelmaking in the U.S. was installed in 1906; however, the growth of electric furnaces was limited by the high cost of electricity.[45] The mini-mill industry began to take off in earnest in the late 1980s.[46] As the industry progressed, graphite electrodes grew from 12 inches in diameter to what are now called "supersize" graphite electrodes of 28-30 inches (used in newer, high-powered, furnaces).[47] GEs are currently 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). In the EAF process, GEs are consumed on a continuous basis. "Nine electrodes, joined in columns of three" are typically used, and "one electrode is consumed approximately every eight hours."[48] The three electrodes carry an alternating current, which causes an arc to jump between the electrodes, raising the temperature and melting the scrap. GEs make up about 6-7 percent of the cost of converting scrap to steel.[49]

Competition in the U.S. graphite electrodes market intensified in the early 1980s when Japanese producers increased their exports of high quality GEs to the U.S. to take advantage of the strong dollar.[50] There was a shakeout and consolidation in the industry in the late 1980s and early

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[43] *EC Graphite Electrodes Decision*, *supra* note 41, at 2.
[44] GRAFTECH INT'L LTD., 2001 ANNUAL REPORT TO STOCKHOLDERS, chart at 5.
[45] Dr. John Stubbles, *EAF Steelmaking – Past, Present and Future*, DIRECT FROM MIDREX (3rd Quarter 2000) at 3, *available at* http://www.midrex.com/uploadedfiles/3Q%202000.pdf) (a publication of Midrex Technologies, Inc).
[46] Hans D. Rosebrock, *Dynamic Changes and Locational Shifts in the U.S. Steel Industry*, 16 ECON. DEV. REV. 55, 59 (1999).
[47] Bryan Berry, Adam Ritt, & Michael Greissel, *A Retrospective of Twentieth-Century Steel*, NEW STEEL, Nov. 1999, *at* http://www.newsteel.com/features/NS9911f2.htm.
[48] *EC Graphite Electrodes Decision*, *supra* note 41, at 2.
[49] This figure is for one company, Keystone Steel, which was part of a civil suit filed by several steel producers against the graphite electrode cartel members. Conversion costs may vary across mini-mills. See *Electrode Manufacturers Admit to Fixing Prices*, IRON AGE NEW STEEL, May 1, 1998, at 8, *available at* 1998 WL 190759445.
[50] Jerry A. Acciarri & Gordon H. Stockman, *Demand for Superpremium Needle Cokes on Upswing*, OIL & GAS J., Dec. 25, 1989, at 118.

1990s, just prior to the price-fixing conspiracy, reducing the number of major firms in the industry from eighteen to ten.[51] In addition to increased competition, the consolidation was precipitated in part by slumping steel production, which "chipped 30 percent off electrode prices late in the decade, triggering a round of consolidations."[52] Although mini-mill steel production may not have been hit as hard as the rest of the steel industry during the downward cycle in steel demand, demand growth was also slowed by simultaneous improvements in EAF production technology that lowered the rate of graphite electrode consumption.[53]

Table 6 provides a summary of the major firms in the GE industry and their world market shares in the mid to late 1990s. In this highly concentrated market, UCAR International of the United States and SGL Carbon Corporation of Germany dominate, with a combined world market share of roughly two-thirds. Another U.S. company (Carbide/Graphite Group) and four Japanese producers, Showa Denko, Tokai Carbon, Showa Electrodes Corporation (SEC), and Nippon Carbon, round out the list of major world producers.

Both UCAR and SGL manufacture electrodes in many countries (including developing and transition economies such as Brazil, Mexico, South Africa, Russia, and Poland) and sell throughout the world. There are a number of firms who are not global producers, but who sell their product globally. The Carbide/Graphite Group, for example, has plants only in the United States, but sells throughout the world. The Japanese manufacturers rely heavily on Japanese trading companies, of which there were several, to distribute their graphite electrodes around the world.[54] In contrast, companies such as SGL and UCAR have their own sales organizations.

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[51] Daily Trial Transcript Day 2 at 93, United States v. Mitsubishi Corp., No. 00-033, (E.D. Pa. Jan. 31, 2001). (hereinafter *Mitsubishi*).

[52] Mark Houser, *Steelmakers Going Wild for Electric Furnaces*, TRIBUNE REV. (Greensburg Pa.), Oct. 8, 1995, at 1 *available at* 1995 WL 8269032.

[53] CANADIAN INT'L TRADE TRIBUNAL, REVIEW NO.: RR-91-002, FINISHED ARTIFICIAL GRAPHITE ELECTRODES AND CONNECTING PINS ORIGINATING IN OR EXPORTED FROM BELGIUM, JAPAN, SWEDEN AND THE UNITED STATES OF AMERICA 6 (NOV. 27, 1991) ("Since 1985, specific graphite electrode consumption rates have fallen 17 percent, from 4.49 kg/t of steel produced to 3.71 kg/t in 1990."). See also *EC Graphite Electrodes Decision*, *supra* note 41, at 3 ("During the 1980s improvements in both electrode and electric steelmaking technology led to a substantial decline in the specific consumption of electrodes per tonne of steel produced (from 6 kg/tonne in 1979 to 3 kg in 1991: the West European average is now some 2.4 kg).").

[54] Memorandum in Support of Government's Response in Opposition to Defendant's Motion to Strike, United States v. Mitsubishi Corp., No. 00-033 (E.D. Pa. filed May 23, 2000), *available at* http://www.usdoj.gov/atr/cases/f7500/7510.pdf.

SGL, for example, uses exclusive sales agents who deal only in SGL's graphite electrodes.[55] One of the largest Japanese trading companies is Mitsubishi, which, at the time of the cartel, had small equity interests in both Tokai Carbon and SEC, and was one of the distributors for Tokai, SEC, and Showa Denko. Mitsubishi purchased a 50% ownership in UCAR in 1991, and sold their interest in January 1995.

There are also a number of smaller GE producers worldwide: the European Commission reports, for example, that in addition to the major suppliers, Europe receives GEs from producers in India, China, and Russia.[56] The major producers in India are Hindustan Electro Graphite (HEG), Carbon Everflow Ltd., and Graphite India. In 1997, total Indian graphite electrode production was approximately five percent of world production and fourteen percent of global exports.[57] Supporting this world market are fairly low transportation costs, generally less than 5% of the cost of the electrodes.[58]

The Antitrust Division of the Department of Justice asserts, as does everyone familiar with the industry, that barriers to entry are high: "There have been no significant entrants in the graphite electrode industry since 1950….[P]roducing large graphite electrodes requires highly specialized equipment and a significant capital investment….Opening a new facility would require approximately a $250 million investment and roughly 18 to 24 months."[59] It is difficult to document the source of barriers to entry in this industry. References to proprietary knowledge are made on occasion, as in this brief description of GE operations: "[g]raphite electrodes are composed of a mixture of finely divided, calcined petroleum coke mixed with about 30% coal tar pitch as a binder, *plus proprietary additives unique to each manufacturer*" (emphasis added).[60] Clearly entry is limited not only by high capital requirements, but also by the importance of implicit technical and market knowledge. For example, in a Securities and Exchange Commission filing, SGL states:

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[55] Daily Trial Transcript Day 2 at 79, *Mitsubishi* (No. 00-033).
[56] *EC Graphite Electrodes Decision*, *supra* note 41 at 4.
[57] *Graphite Electrodes to Attract Dumping Duty*, ECON. TIMES, Oct. 24, 1997.
[58] Second Amended Complaint at ¶50, *Ferromin Int'l Trade Corp. v. UCAR*, 153 F. Supp. 2d 700 (E.D. Pa. 2001) (No. 99-693) [hereinafter *Ferromin* Complaint].
[59] Verified Complaint, United States v. SGL Carbon Aktiengesellschaft, No. 03-521 (W.D. Pa filed Apr. 15, 2003), *available at* http://www.usdoj.gov/atr/cases/f200900/200935.htm.

> The manufacture of high-quality graphite and carbon electrodes is a mature, capital intensive business that requires extensive process know-how, developed over years of experience working with the various raw materials and their suppliers, furnace manufacturers and steelmakers (including working on the specific applications for finished electrodes). It also requires high-quality raw material sources and a developed energy supply infrastructure.[61]

Whatever the varied sources of barriers to entry, it is clear that it is a difficult industry to enter, and, as a result, the industry is highly concentrated. This becomes an issue of concern since GEs are a vital input into EAF steelmaking and EAF technology is the preferred steel technology for many developing countries. In the mid-1990s, EAF plants cost roughly eighty percent less to build than blast furnaces "making them the furnace of choice among rapidly industrializing nations."[62] It is thus not surprising that the share of EAF production as a percentage of total world steel production has grown rapidly over the past two decades.

Mini-mills currently account for about one-third of total steel production. Table 7 presents the distribution of steel output by production method around the globe. It is interesting to note which regions were major consumers of graphite electrodes at the start of the graphite electrodes cartel in 1992. Asia ranks highest, with a share of world EAF steel production near thirty-five percent. The European Union is next at almost twenty-two percent. Although the Middle East ranks near the bottom at 1.72 percent of world EAF output, the last column of Table 7 shows that the Middle East is in fact almost completely reliant on EAF technology – and therefore GEs – for the steel it produces internally. Close to eighty-two percent of Middle East steel was produced using EAF technology in 2000. Next highest is "Other North America" at roughly sixty-seven percent, which includes Mexico, Cuba, El Salvador, Trinidad and Tobago. Some individual countries are entirely dependent on EAF steel production: Croatia, Slovenia, Cuba, Ecuador,

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[60] Jeremy A.T. Jones, *Electric Arc Furnace Steelmaking*, AMERICAN IRON & STEEL INSTITUTE, *available at* http://www.steel.org/learning/howmade/eaf.htm (last visited June 22, 2003).
[61] SGL Carbon Aktiengesellschaft, Securities and Exchange Commission, Form 20-F, for the fiscal year ended December 31, 1999, at 16, *available at* http://www.sglcarbon.com/ir/public/form/pdf/form00_e.pdf.
[62] Junius Ellis, *Why Two Steals in Today's Lowly Steel Sector Could Gain 35% to 50% Next Year*, MONEY, Dec. 1996, at 35, *available at* 1996 WL 8793212.

Indonesia, Malaysia, and Thailand all relied on EAFs for one hundred percent of their domestic steel production in the year 2000.

The development of a domestic steel industry has been considered central to the development strategies of many countries. Anti-competitive behavior in the graphite electrode industry which affects mini-mill steel production could therefore have spillover effects on rates of industrialization in developing countries heavily reliant on mini-mill technology. Many developing countries had rapid rates of EAF production growth during the conspiracy period of 1992-97: Cuba, Chile, Bosnia-Herzegovina, Iran, Hungary, Ecuador, Slovak Republic, Peru, Thailand, Mexico, Malaysia, Vietnam, and Poland all increased their production of EAF steel at a rate of more than ten percent per year over the entire period of the conspiracy.[63] In order to understand the implications of this conspiracy for these countries and others, we now turn to an account of the graphite electrodes cartel and its potential economic effects on developing country consumers and producers.

B. PRICE-FIXING CONSPIRACY

According to reports in the press, the U.S. investigation of alleged price-fixing by U.S., German, and Japanese graphite electrodes producers began after a complaint from a steel manufacturer.[64] Antitrust investigations began in the U.S. and have since been initiated in several other jurisdictions as well, including Canada, the European Union, Japan, Korea, and Brazil.[65]

Price-fixing by graphite electrode producers began in 1992 and continued through at least 1997 (the DOJ lists the cartel dates as July 1992 – June 1997, while the European Commission lists the dates as May 1992 through either 1996 or 1998, depending on the company).[66] Price-fixing

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[63] *See* COMM. ON ECON. STUDIES, INT'L IRON AND STEEL INST, STEEL STATISTICAL YEARBOOK 2002 39-41 (December 2002), *available at* http://www.worldsteel.org/media/ssy/iisi_ssy_2002.pdf.

[64] Adam Jones, *Blowing the Whistle – American-Style*, THE TIMES (LONDON), Feb. 24, 2000, at 33, *available at* 2000 WL 2869555.

[65] The Japanese Fair Trade Commission issued a warning to Japanese GE firms in March 1999. There was no conviction or fine, apparently due to a lack of evidence. FINAL REPORT, *supra* note 2, at 173

[66] Press Release, European Union, Commission Fines Eight Companies in Graphite Electrode Cartel (July 18, 2001). As is true 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. For detailed information on specific European Commission conspiracy dates by company, see *EC Graphite Electrodes Decision*, *supra* note 41, at 2.

convictions are detailed in Table 8 for the U.S., Canada, EU, and Korea. In the U.S., there were seven firms indicted for price-fixing: UCAR, SGL, Carbide/Graphite Group, Showa Denko, Tokai, SEC, and Nippon, and six firms fined (C/G was granted leniency by the Department of Justice). Mitsubishi was convicted of aiding and abetting the conspiracy in 2002 and fined $134 million.[67] The European Commission also fined an eighth firm, VAW Aluminum. In addition to the fines listed in Table 8, individual executives were fined and imprisoned.

Fines (not including civil damages) against these eight firms total more than $500 million; the largest single fine was $135 million, levied on SGL by the United States. One can put these U.S. and EU fines somewhat into context by comparing them to estimates of the size of the market during the conspiracy period. The Department of Justice estimates the value of the graphite electrode market in the U.S. in 1992 at $275 million per year. Another source estimates that total U.S. sales of graphite electrodes were $500 million in 1996.[68] The European market was valued at approximately 420 million Euros in 1998 and the global market at $1.7 billion.[69] Thus, the government fines are relatively large when compared to the U.S. market alone (at least on an annual basis), but seem less so when compared to global sales. U.S. fines may be sufficient to provide deterrence if one focuses on the U.S. market alone, but that may not be the case if the benefits to the cartel are global.

According to the U.S. Department of Justice's investigation, cartel members agreed to: 1) increase and maintain prices, 2) eliminate price discounts,[70] 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. The cartel was organized into a "top level" group and a "working level" group. The top-level

[67] Sentencing Memorandum of the United States at 1, United States v. Mitsubishi Corp., No. 00-033, (E.D. Pa. filed Apr. 19, 2001).
[68] Russell Mokhiber, *Stealing from Steel*, MULTINATIONAL MONITOR, Apr. 1998, at 30.
[69] *See EC Graphite Electrodes Decision*, *supra* note 41, at 3-4.

meetings included primarily company presidents and managing directors and were designed to set policies. Lower level managers, who met more frequently, worked out the details of the agreement and its implementation.

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 critical elements of the agreement was that the firms respect each other's "home markets." In practice, this meant that there was a designated price leader for various regional markets (e.g., UCAR was the price leader in the U.S.) and other cartel members agreed to follow any price increase led by a designated home market producer. In addition, there was an agreement that firms would refrain from exporting into each other's home markets (e.g., Japanese firms would not export to the United States), although this export agreement may have covered only the supersize graphite electrodes.[71] Southeast Asia was called a "non-home market" because none of the cartel members had a production facility in Asia (outside of Japan). Although the Japanese firms did the bulk of the selling to this region, there was no established price leader, which became the source of many negotiations at the top-level cartel meetings.[72]

One of the most interesting aspects of the conspiracy is the agreement to restrict access to technology, although there are few details of these allegations. Evidence points to some sharing of technical information between cartel members. According to the Mitsubishi trial documents there was a "technological exchange" between SEC and UCAR (an "agreement" that entailed an exchange of visits of "technical people" between the two firms' plants).[73] They also apparently attempted to control outside competitors' access to critical inputs: at one cartel meeting SGL accused Mitsubishi of exporting needle coke to India, and the Mitsubishi representative denied the charge.[74] During the cartel period, Indian producers integrated backward into coke

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[70] More specific information on this point is given in *Government's Sentencing Memorandum and Government's Motion for a Guidelines Downward Departure, United States v. Krass*, No. 99-626 (E.D. Pa. filed Oct. 18, 1999) (stating that all forms of discounts were to be eliminated, including rebates and consumption guarantees).
[71] Daily Trial Transcript Day 1 at 12, 63, 77, *Mitsubishi* (No. 00-033).
[72] Daily Trial Transcript Day 2 at 94-95, 99, *Mitsubishi* (No. 00-033).
[73] Daily Trial Transcript Day 7 at 121, *Mitsubishi* (No. 00-033).
[74] Daily Trial Transcript Day 4 at 82-83, *Mitsubishi* (No. 00-033).

production, something that western producers (other than Carbide/Graphite) have chosen not to do.[75]

One noteworthy absence in this cartel's organizational structure is a provision for penalties in the event of cheating on the agreement. There do appear to have been side payments between members in response to unexpected fluctuations in demand in different regional markets (as discussed more fully later in this section), but these differ from punishments for cheating. Threats to punish were made, but they appear to be concentrated in the period leading up to the formation of the cartel. For example, there was a meeting between Mitsubishi and SEC representatives in February 1991 (prior to the first formal meeting of cartel members in May 1992); this meeting apparently was held because the Japanese graphite electrode manufacturers were concerned with the dual role that Mitsubishi would be playing as both a distributor and a competitor, via its relationship with UCAR. A follow-up memo to the meeting said, "MC [Mitsubishi Corporation] will convince [UCAR] to control volume…MC will continue doing business with Japanese manufacturers as before…In the future, UCAR would like to make policies on volume, pricing, etc., by region, country or user through discussions with Japanese manufacturers. It will take retaliatory actions, although the expression sounds terrible, against anyone who cannot keep promises made in such discussions."[76]

These threats can be distinguished both in theory and in practice from other cartel organization devices. Put simply, there are three types of mechanisms that can be used to anticipate cheating and respond to it. First, there are pre-cartel threats of future price wars, as in this case. These are akin to off-the-equilibrium-path price war threats. Such threats can be used *ex ante* to induce cooperation by making it incentive compatible; these threats, if credible, can enforce cooperative behavior, but are never actually implemented in a collusive equilibrium.[77] Second, there are side-payments between colluding firms that neutralize any gains from cheating. If there is uncertainty about demand that leads actual market shares to differ from agreed upon market shares (even in the absence of cheating by cartel members), these side-payments may occur in

[75] *See, e.g., Bruised Battered and Dumped*, FIN. EXPRESS INVESTMENT WK., Nov. 3, 1996, at 17; *Graphite India to Raise Electrodes Capacity*, BUS. LINE (THE HINDU), Sept. 12, 1995, at 5.
[76] Daily Trial Transcript Day 3 at 16-17, *Mitsubishi* (No. 00-033).
[77] J.W. Friedman, *A Non-cooperative Equilibrium for Supergames*, 38 REV. OF ECON. STUD. 1 (1971).

equilibrium. Firms participating in the lysine cartel, for example, had an end-of-the-year meeting at which they would compute total sales for each firm. If Firm A had sold less than its agreed upon quota that year and Firm B had sold more than its quota, Firm B would buy the appropriate amount of lysine from Firm A.[78] Given this compensation system, and assuming that sales monitoring is sufficiently accurate, there is no incentive to cheat on the agreement. At the end of the year, everyone will have in fact sold their cartel quota. The graphite electrode cartel apparently relied on an informal system of side payments in its early years. Mr. Burkett (UCAR) said that "the goal was that there would not be any cheating but…they had set up a system so that if someone did cheat, people could complain, and then if it was determined that someone had cheated, then they might have to give up tons somewhere else. So it was a check and a balance."[79] In 1995 the cartel formalized the reporting of sales with the establishment of the "Central Monitoring System" which called for Tokai Carbon to collect data from UCAR, SGL, and the other Japanese producers and compare actual sales with commitments to adhere to agreed-upon market shares.[80]

Third, there are actual price wars. However, when we do observe price wars, it is because of fundamental disagreements about price and individual market shares, not because of cheating on a cartel agreement (or cartel members' inability to distinguish cheating from fluctuations in demand). It is the bargaining issues, not the monitoring issues, which are the real challenge for this cartel.[81] There were, in fact, several instances of disagreement between cartel members:

- There was an "odd-sized product" that was manufactured by Showa Denko (SDK) that was "disruptive to the USA market."[82] This graphite electrode was 28 and three-quarters inches in diameter, which was apparently the largest diameter that SDK could produce. SDK agreed to try to shift their production to the standard 30 inch size "and price it accordingly."[83]

[78] *See* JOHN M. CONNOR, GLOBAL PRICE FIXING: OUR CUSTOMERS ARE THE ENEMY 207 ("Had some of the cartel's members been far from their targeted shares, a compensation system had been designed involving intra-cartel sales at the elevated monopoly price by deficit firms…").
[79] Daily Trial Transcript Day 8 at 118, *Mitsubishi* (No. 00-033).
[80] *EC Graphite Electrodes Decision*, *supra* note 41, at 17.
[81] We discuss the distinction between bargaining and monitoring price wars further in Levenstein & Suslow, *supra* note 17, at 14, 17-18.
[82] Daily Trial Transcript Day 7 at 27, *Mitsubishi* (No. 00-033).
[83] *Id.*, at 28.

- The Carbide/Graphite Group normally priced at a discount, compared to the major world manufacturers, and apparently produced graphite electrodes that were of lower quality.[84] Mitsubishi, Tokai, and UCAR worked on a plan in 1996-97 to buy Carbide/Graphite, since they were considered "a discounter who was disruptive to the cartel" but the plan was scuttled when the Department of Justice investigation began.[85]

- In November 1993 there was a top-level meeting at which UCAR and SGL executives discussed their actions over the past decade to reduce capacity and shut down plants. They accused the Japanese producers of not doing their share of downsizing. They proposed that the Japanese firms cut their exports by 15,000 tons in 1994. After much discussion, the Japanese offered a compromise cut of 5,000 tons.[86]

- Price discounts given in certain regions. For example, it appears as though the customers in Southeast Asia, particularly Taiwan, would not accept the series of price increases attempted by the cartel.[87] There are also documented instances when discounts had to be given for certain large customers. In late 1993, for example, UCAR raised their price and proceeded to lose a number of customers because the Japanese manufacturers did not follow the price increase. In response, UCAR rolled back the price increase for 7 or 8 important customers.[88]

- In one incident in a meeting in February 1995 there was a disagreement between the Japanese firms and UCAR about the next price increase. The Japanese firms were satisfied with the current price of $3,000 per metric ton ("on which all recovering our cost") and felt that an increase to $3,300, desired by UCAR, was not justified. However, they agreed to the price increase after discussion.[89]

The story told by many executives testifying in the Mitsubishi case is that the cartel did not work perfectly, but it worked. Prices did not always rise to the goal set at the top-level meetings, but

[84] *Id.*, at 47.
[85] *Id.*, at 154, and Day 1 at, 30.
[86] Daily Trial Transcript Day 1 at 52, *Mitsubishi* (No. 00-033).
[87] *Id*.
[88] Daily Trial Transcript Day 6 at 82, *Mitsubishi* (No. 00-033).
[89] Daily Trial Transcript Day 1 at 68-69, *Mitsubishi* (No. 00-033).

prices rose significantly. Price discounts occasionally occurred, but there were no severe price wars.

The inner workings of the graphite electrodes cartel supports our view that bargaining problems are much more likely to undermine collusion than secret cheating. Deciding how to divide Southeast Asia and hoping that the negotiated agreement remains an equilibrium (in the face of fluctuations in the demand for steel, for example) was one of the biggest challenges for this cartel. Successful cartels must develop an organizational design that allows the agreement to accommodate fluctuations in the external environment without requiring costly renegotiations. Secret cheating undermines cartels in some industries, but if collusion is really to be successful, the firms have to make a significant investment in the collusive organization, such as the frequent working-level meetings in this case, and in the development of organizational skills. Cheating becomes a secondary issue.

Thus, the evidence from the graphite electrodes cartel suggests that the focus of recent game-theoretic work on cartel organization has been misplaced. There are two distinct questions to consider that are central to cartel stability: (1) Do firms cheat? That is, is it cheating that causes cause cartel failure? (2) When cheating occurs, do firms punish with price wars? Theoretical research on cartel stability has focused on price wars.[90] But price wars are expensive. Our hypothesis is that successful colluders would rather invest in mechanisms to assure that cheating is observable, and therefore prevent it, than to implement costly punishments because of *ex-post* uncertainty. Industries where collusion is attempted but fails due to recurrent cheating are often industries that cannot actually sustain collusion because of some other structural factor that proves impossible to overcome.

There are other historical examples that support this conjecture. The bromine and sugar cartels, for example (both of which began in the late 1800s), got off to a rocky start and then managed to sustain collusion for longer periods. It appears that the participants learned about each other and about organizational features that would help to support collusion in their industry. An excellent

[90] *See, e.g.,* Edward J. Green & Robert H. Porter, *Noncooperative Collusion Under Imperfect Price Information*, 52 ECONOMETRICA 87 (1984); Dilip Abreu et al., *Optimal Cartel Equilibria With Imperfect Monitoring*, 39 J. OF ECON. THEORY 251 (1986).

example of this feature of cartel design is given in the case of the Sugar Institute, a trade association formed in 1927 that facilitated a cartel agreement among fourteen firms in the United States until 1936. The records show that cheating occurred, but that sharp retaliation by cartel members was not common. Instead, price discounts or other deviations from the agreement were either "*ignored* or *matched*" (emphasis original).[91]

C. ECONOMIC EFFECTS OF THE CARTEL

Figure 1 shows graphite electrode prices from 1981 through early 1997. These prices were presented as Exhibit 280 in the Mitsubishi trial.[92] The chart captures the fall in nominal prices during the 1980s and a clear increasing trend in the nominal price of GEs during the cartel period. Data presented by the U.S. Department of Justice for graphite electrode prices in the United States paints a similar picture, with a rise in prices of over sixty percent: from $0.95 per pound in January 1992, to $1.21 in January 1994, $1.43 in February 1996, and finally $1.56 in February 1997.[93] Prices dropped sharply after the firms were convicted by the Department of Justice. By mid-2000 the average price was $2,500 per ton (or $2,756 per metric ton), compared to roughly $3,500 per metric ton price indicated as the last observation in Figure 1.[94]

The alleged price increases by the cartel varied by country. In Canada, for example, the size of the market affected was roughly $440 million between 1992 and 1997 and prices rose by more than 90% over that same period.[95] The Canadian market was much more concentrated at the time, consisting only of UCAR and SGL, with a combined market share during the conspiracy years of over 90 percent. (Evidence of increases in price during the cartel period 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 information presented here is purely

[91] David Genesove & Wallace P. Mullin, *Rules, Communication, and Collusion: Narrative Evidence from the Sugar Institute Case*, 91 AM. ECON. REV. 379 (2001). For a discussion of bargaining price wars in the bromine industry, see Margaret Levenstein*, Do Price Wars Facilitate Collusion? A Study of the Bromine Cartel Before World War I*, 33 EXPLORATIONS IN ECON. HIST. 107 (1996). These and other such cases are discussed more fully in Levenstein & Suslow *supra* note 17 ,at 14.

[92] Daily Trial Transcript Day 8 at 92, *Mitsubishi* (No. 00-033).

[93] Government's Sentencing Memorandum and Government's Motion for a Guidelines Downward Departure at 3-4, United States v. Krass, No. 99-626 (E.D. Pa. Filed Oct. 18, 1999).

[94] *Purchasing Hotline*, PURCHASING, June 1, 2000, at 3, *available at* 2000 WL 14166458.

[95] News Release, Competition Bureau, Industry Canada, Foreign Corporation Fined $12.5 Million for Price Fixing, (July 18, 2000), *available at* http://strategis.ic.gc.ca/SSG/ct01800e.html.

descriptive and does not purport to control for other relevant factors that may have affected prices during the conspiracy period. Ideally, one would want to compare the cartel price with a counterfactual or "but-for" price that would have been set under competitive industry conditions, but publicly available data are lacking in this case to do such calculations.)

Given the steep price increases, one Canadian reporter wondered why steel producers had not begun a movement to integrate vertically backwards into graphite electrode production. His sources in the industry estimated "that electrode prices would have to increase 25% or more just to justify the ever-rising capital investment required of a newcomer to the field."[96] A ninety percent increase in prices without any discernible effort on the part of steel producers to enter into graphite electrode production once again points to entry barriers other than raising the necessary capital.

After the GE firms pled guilty to the U.S. charges, dozens of civil suits followed (in Canada as well as the U.S.).[97] Most of these suits have been settled. One civil lawsuit of particular interest, *Ferromin International Trade Corp. v. UCAR International Inc*., was filed by a group of non-U.S. steel producers.[98] Twenty-seven international EAF steel producers, from Turkey, Thailand, Australia, China, Austria, New Zealand, and Sweden, filed a complaint in February 1999, naming as defendants UCAR, SGL, Tokai, C/G, Nippon and SEC. [99] The plaintiffs claimed 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 most of these cases, agreeing to hear only the complaints of those foreign plaintiffs who could show that the GEs they purchased were *invoiced* in the United States.[100] We will discuss the legal issues arising from this case and others in more detail in Section V.

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[96] Ellis, *supra* note 62, at 35.
[97] *EC Graphite Electrodes Decision*, supra note 41, at 10 ("Civil proceedings were instituted by purchasers (steel producers) in Canada on 18 June 1998 against UCAR, SGL, C/G and SDK claiming damages for conspiracy and violation of the Canadian Competition Act. In some cases restitution has been negotiated").
[98] 153 F. Supp. 2d 700, 705 (E.D. Pa. 2001).
[99] 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. Second Amended Complaint at ¶¶1-3, *Ferromin*, 153 F. Supp. 2d 700.
[100] *Ferromin*, 153 F. Supp. 2d at 706.

Korea and Brazil have recently investigated and fined the graphite electrode producers who were party to the cartel. The Brazilian antitrust agency is becoming increasingly active in international cartel investigations. They initiated an investigation into the lysine cartel in 1999 and the vitamins cartel in 2000. Although there are few details available, Brazilian authorities are also investigating the graphite electrodes cartel. In April 2001, the Secretariat of Economic Supervision of the Ministry of Finance recommended to the Secretariat of Economic Law of the same ministry to open a full investigation of the effects of the graphite electrodes cartel on the Brazilian market.[101]

The Korea Fair Trade Commission also conducted its investigation in 2001. Korea has no graphite electrode producer of its own, and according to the KFTC's report, ninety percent of Korea's imports of GEs were made from cartel members. The KFTC estimates that Korea demands about four percent of the graphite electrodes sold on the world market.[102] The investigation by the KFTC resulted in fines of US$8.5 million for six GE manufacturers (UCAR, SGL, Showa Denko, Tokai Carbon, Nippon Carbon, and SEC).[103]

The commission estimated that Korea imported GEs valued at US$553 million from these six cartel members from May 1992 to February 1998. The average import price increased from US$2,255 per ton in 1992 to US$3,356 in 1997, or about a 48.9% increase. The total damage to importing companies was estimated at US$139 million. Note that the total fine is less than one-tenth of the estimated damages. The Monopoly Regulation and Fair Trade Act (enacted in 1980), Article 22, states that the KFTC can impose fines of up to 5% of sales, but there are no specific guidelines for setting cartel fines.

Developing country GE 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

[101] Press Release, Brazilian Ministry of Fin., Seae Recomenda Punição aos Cartéis Internacionais se Lisinas e Vitaminas [Secretariat of Economic Supervision of the Ministry of Finances Recommends Punishment of the International Lysine and Vitamins Cartels] *at* http://www.fazenda.gov.br/portugues/releases/2002/r021219.asp (Dec. 19, 2002).
[102] Sun Hur & Young Keun Choi, *Theories and Case Study of Extraterritorial Application in International Cartel Cases*, 86 FAIR COMPETITION, at 11 n.16 (Oct. 2002).
[103] Press Release, Korea Fair Trade Comm., Korea Fair Trade Commission Imposes Surcharge of US $8.5 Million on International Cartel of Graphite Electrodes Manufacturers from the U.S., Germany and Japan (Mar. 21, 2002), *available at* http://ftc.go.kr/data/hwp/pressreleae0321.doc.

charged the cartel price; there may be quality differences, differences in transportation costs, supply assurance, contract terms, and so on.[104] In one of the few pieces of direct information that we have on the difference in price between cartel and non-cartel members, the KFTC reported that "imports from non-cartel member companies amounted to about US$54 million, and the import price increased from US$2,205 per ton in 1992 to US$2,407 in 1997."[105] Outside producers thus appear to have raised their price just over 9% during the cartel period. This price was still almost 30% below the cartel's average import price of $3,356 to Korean steel producers (and of course this increase is well below the 48.9% the cartel price increase claimed by the KFTC). This sizeable price difference between cartel and non-cartel member producers was not confined to Korea: a report on prices of graphite electrodes in India claims that the average price in late 1996 was $1,972 per ton in India versus $2,753 per ton in Japan.[106]

But somewhat higher prices are not the only possible effect of the cartel on outside producers. Developing country GE producers may have been damaged if the cartel was able to limit developing country access to global markets. This was presumably the intention of the agreements described above to limit access to technology and critical inputs to cartel members. Earlier cases of sharing of technology had allowed developing country producers to improve quality; for example, Indian graphite electrode producer HEG collaborated with the French firm Pechiney in the late 1970s, obtaining access to its state-of-the-art GE technology.[107] This collaboration ended in 1994.[108]

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[104] A 1991 Canadian review of the graphite electrodes industry as part of a dumping complaint, for example, states that graphite electrodes produced in China and the USSR are of a "quality [that] is not up to that required for modern electric arc furnaces." CANADIAN INT'L TRADE TRIBUNAL, *supra* note 53, at 5.

[105] Press Release, Korea Fair Trade Commission, *supra* note 103.

[106] *Bruised Battered and Dumped*, *supra* note 75.

[107] In 1977, HEG's graphite electrode division was set up in technical and financial collaboration with Societe Des Electrodes Et Refractaires Savoie (SERS), a subsidiary of Pechiney of France. *See Graphite Electrode Division ...Soaring High*, HEG LIMITED ONLINE (2002), *available at* http://www.hegltd.com/heg_electrodes.html. In the collaboration, a plant, located in Mandideep, India, began operations with a capacity of 12,500 tons per annum. Over the years, the facility was modernized by deploying Pechiney's upgraded Lengthwise Graphitisation (LWG) technology. LWG allowed the manufacturing of larger diameter and longer length graphite electrodes. *See ICRA Rating Rational*, HEG LIMITED ONLINE (Dec. 2001), *available at* http://www.debtonnet.com/icrarr/mc200112hl.htm.

[108] *HEG Snaps Ties With Pechiney*, FIN. EXPRESS, June 15, 1994, at 16. By the time that this relationship was terminated, Pechiney had exited the graphite electrode business, selling it in 1993 to SGL. *See Graphite Products – Pechiney Sells 70% of Carbone Savoie to UCAR International*, CHIMIE ACTUALITES, June 21, 1996.

It is also possible that developing country producers' ability to take advantage of the "umbrella" provided by the high cartel price was limited by cartel retaliation. Indian graphite electrode producers made this accusation in 1997: "Producers claim that the electrodes are being dumped into India at a price of $2200 per tonne as against the international price of $3200 per tonne."[109] In response to a complaint filed by the Indian Graphite Electrode Manufacturers Association, the government imposed anti-dumping duties in 1997 on imports from the U.S., several European countries, and China.[110] These anti-dumping claims were filed in 1996, while the conspiracy was still operating. Indian exports had increased substantially during the cartel period, reportedly by 25% per year to account for 14% of the world market.[111] Indian GE producers explicitly claimed that these low import prices were in retaliation for the expansion of Indian exports.[112]

D. POST-CARTEL INDUSTRY RESTRUCTURING

As noted above, there has been a clear downward price trend since the conspiracy ended. This certainly reflects in part the Asian financial crisis that hit the steel industry and therefore the graphite electrode industry in late 1998. Still, there is some evidence, albeit anecdotal, that points to readjustment to a new equilibrium in the industry (a "market share driven price war") since the cartel ended.[113] There has also been a wave of cost cutting and plant shutdowns. UCAR closed its U.S. GE capacity in 2001.[114] The Carbide/Graphite group began suffering losses and shutting down plants in 1999, finally filing for bankruptcy in 2001.[115] It is worthwhile to mention, given our discussion above regarding a general lack of post-cartel industry monitoring by competition agencies, that the Department of Justice filed a lawsuit to block SGL and its U.S. subsidiary from acquiring pieces of Carbide/Graphite, citing concerns about industry

[109] *CVD on Graphite Electrodes Imports Likely*, FIN. EXPRESS, Apr. 20, 1997, at 2.
[110] Sharad Goel, *HEG, Graphite Not Elated Over Dumping Duty on Electrodes*, ECON. TIMES, June 16, 1997.
[111] *CVD on Graphite Electrodes Imports Likely*, *supra* note 109.
[112] *Id*.
[113] Purchasing Hotline, *supra* note 94.
[114] *UCAR Announces $275 Million of Future Cost Savings and Asset Sales; Will Seek Name Change to GrafTech International Ltd.*, BUS. WIRE (Jan. 9, 2002).
[115] *AMERICA – US Electrode Maker Files for Chapter 11 Protection*, METAL BULL. (Sept. 27, 2001).

competition.[116] The lawsuit was subsequently dismissed when SGL lost its bid in bankruptcy court to another firm. [117]

Joint ventures are also being formed. In 1999, for example, UCAR entered into a production and marketing joint venture with Jilin Carbon, the largest Chinese producer of graphite electrodes.[118] UCAR's contribution to the venture is expected to be cash and technical assistance.[119] SGL signed an $80 million joint venture agreement with Shanghai Carbon Works in 1997 (where SGL had a seventy percent interest). According to Hoechst, then parent company of SGL, this was the first Chinese joint venture of its kind in this industry.[120] More recently, SGL entered into joint venture with the Japan-based Tokai Carbon Co., Ltd., to make ultra high power graphite electrodes in China.[121]

Whether these joint ventures facilitate or control 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, certainly in the case of participation by multiple former cartel conspirators.

E. LESSONS FOR DEVELOPING COUNTRIES

There are a number of lessons to draw from the graphite electrodes case. First, consider the potential for consumer welfare effects. This cartel significantly raised graphite electrode prices in many parts of the world for several years, between roughly 45 – 90%. Because GEs are sophisticated intermediate goods, these price increases were passed on, at least in part, to both downstream producers and final consumers of steel. It is particularly costly to the development process to raise prices and limit entry on such goods. Without prosecution by government authorities, consumers lack the information, resources, and, in some cases, legal structure to protect their own interests.

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[116] Jeff Bater, *U.S. Sues to Block SGL Carbon Acquisition*, DOW JONES BUS. NEWS (April 15, 2003).
[117] Jeff Bater, *U.S. Justice Dept. Dismisses Antitrust Lawsuit vs. SGL Carbon*, DOW JONES NEWS SERVICE (May 8, 2003).
[118] John E. Sacco, *UCAR In Venture with Chinese Jilin Carbon*, AM. METAL MARKET, Oct. 18, 2000, at 4.
[119] *China*, ENGINEERING & MINING J. (July 1, 2001).
[120] *China Shanghai Carbon – Hoechst – 3: First of Kind in China*, DOW JONES INT'L NEWS, (Nov. 21, 1995).
[121] *SGL Carbon and Tokai Carbon Sign Joint Venture for Carbon Electrodes*, ADVANCED CERAMICS REP., Aug. 1, 2002, at 10.

There is also 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 an individual country or product 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 antitrust 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. Even where there have been developing country prosecutions, they have relied heavily on U.S. and EU investigations to determine the impact of the cartel on their own domestic markets.

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 (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. We turn now to a discussion of the challenges and dilemmas of devising and enforcing competition policy in developing countries.

V. POLICY OPTIONS FOR DEVELOPING COUNTRIES

With roughly $60 billion in annual imports in cartel-affected industries, developing country consumers and governments must ask themselves, what is to be done? What options do individual consumers and individual countries have at their disposal to protect themselves from international cartels? Are international fora, such as the World Trade Organization, better suited to provide effective protection to developing countries from international cartels?

A. DOMESTIC PROSECUTION

At its face, the simplest and most obvious solution to the problem of international cartels raising prices for developing country consumers is for governments in affected countries to take action directly against those cartels, as the United States and the European Union have done. In recent years we have seen several countries, especially South Korea, Mexico, and Brazil, take steps in that direction. Other countries, such as South Africa, have invested substantially in developing indigenous competition capability, but have yet to take on a particular international cartel case.

Korea adopted its Monopoly Regulation and Fair Trade Act in 1980. Up until 2002, however, the Korean Fair Trade Commission had not used its powers to respond to anti-competitive actions taken by international cartels.[122] In May 2002, South Korea became the first developing country to fine members of an international cartel when it issued $8.5 million in fines against the members of the graphite electrodes cartel.[123] A year later in April 2003, it announced fines of $3 million in the vitamin cartel case.[124] Mexico has fined two participants in the lysine cartel 1.6 million pesos for price fixing.[125] It has also issued fines or plea agreements in citric acid and vitamins.[126] Brazil has concluded investigations and recommended punishments in the vitamin and lysine cartels, and is soon to announce its decisions regarding the graphite electrode cartel.

But this approach has significant problems. Even where the country that has been harmed by an international cartel has both the legal infrastructure and the political and human resources in its competition policy offices to investigate and prosecute international cartels, it can be very difficult for these offices to obtain the necessary evidence to do so. This evidence usually rests on activities undertaken in foreign countries; evidence gathering thus relies on the cooperation of investigative units elsewhere. But as we discuss at greater length below, the policies that have allowed U.S. and E.U. competition authorities to successfully prosecute international cartels in

[122] Korea Fair Trade Comm., *Competition Law and Policy in Korea* (Oct. 15, 2002) at 8, 10, *available at* http://ftc.go.kr/data/hwp/0210.doc.
[123] *Korea's FTC Imposes Fines on Graphite Electrode Cartel*, ASIA PULSE (Mar. 21, 2002).
[124] Press Release, Korea Fair Trade Comm., *The KFTC Imposes Surcharges on the International Cartel of Vitamin Companies* (Apr. 23, 2003), *available at* http://ftc.go.kr/data/hwp/vitaminl.doc.
[125] OECD, *supra* note 21 ("Based on the above, the CFC imposed fines of 1,132,500 and 566,250 pesos on ADM Bioproductos and Fermentaciones Mexcianas respectively, for engaging in absolute monopolistic practices forbidden in Article 9(I) of the FLEC").
[126] *See* Comisión Federal de Competencia, *Absolute Monopolistic Practices in the Market for Production, Marketing, Distribution and Sale of Citric Acid*, Resolution of the Fed. Comm. on Competition, *available at* http://www.cfc.gob.mx/EnIndex.asp; *Hard Core Cartels: Mexico*, *supra* at note 3, at 9-10.

recent years often undermine the ability of developing countries to obtain information regarding these cartels.

Developing countries can take actions to increase the collection of firm level data, including import and export data. At least as important, they can make sure that such data is accessible by the domestic competition authority, so that any information collected in the regular regulation of business is available for competition analyses. The collection and organization of such statistical information could be an important first step for a new competition authority.

In most developing countries, the question of obtaining information from foreign investigations never even comes to the fore because the country does not have the legal, political, or bureaucratic resources necessary to prosecute international cartels. As documented in the CUTS report on competition policy in seven south Asian and African countries, "The competition authorities [in India, Kenya, Pakistan, South Africa, Sri Lanka, Tanzania, and Zambia] find it very difficult to attract and retain competent and qualified staff. …Adequacy of legal provisions is the most important aspect of a competition regime determining its effectiveness. The inadequacy or lack of legal clarity in dealing with cases, though prevalent in all countries, was most prominent in the case of India. The lack of research and investigative capacity in the seven countries makes it very difficult for the competition authorities to deal with cases judiciously."[127]

For each of these countries, the most basic question is whether an investment in competition advocacy and enforcement is an appropriate allocation of scarce governmental resources, given the impact of international cartels on the country and the competing domestic claims on those resources. This is particularly problematic if the country is relatively small or lacking in the economic and political clout necessary to enforce any fines or punishments on which it decides.[128]

An alternative "domestic" strategy is for consumers to sue cartel conspirators for damages in their national courts. For example, Canadian steel producers sued in Canadian courts to recoup

[127] CUTS, *supra* note 19, at ix.

[128] Jason Beaubien, a reporter for National Public Radio, recently described a bribery scandal surrounding the construction of a dam in Lesotho, Africa (not related to competition policy), where fines were levied on multi-national companies, but have not been collected yet because the case is on appeal. Jason Beaubien, *Analysis: Bribery Scandal in Lesotho* (NPR radio broadcast, May 19, 2003) (transcript on file with author).

damages from the members of the graphite electrodes cartel.[129] Private actions for damages resulting from violations of competition law are permitted in over 20 countries, including Argentina, Brazil, Russia, Slovakia, and Venezuela.[130] However, the damages that can be recouped in most countries are small relative to the U.S., which is the only country, except for Taiwan, which provides for punitive damages in addition to actual damages incurred by the plaintiff. It is also more costly and cumbersome to sue in many of these countries, because they do not allow class action suits (either at all or for violations of competition law). There are in many countries significant legal and procedural hurdles to such suits. Whatever the *de jure* potential of private implementation of competition policy, in practice such private suits are rare.

B. MULTINATIONAL SHARING OF INFORMATION

Another important avenue for the development of competition policy for developing countries is the sharing of information between countries. There are now agreements in place between the U.S. and several other countries for sharing information in competition cases, including an agreement between the U.S. and Brazil. There are also similar agreements between Canada, the European Union and Australia, and some developing countries, as well as agreements among developing countries themselves, such as the recent agreements between Korea and Russia and the other CIS countries.[131] These agreements are a useful step for those countries that are actively pursuing domestic enforcement of competition policy violations.

There are trade-offs to the expansion of information sharing as well as legal limitations on countries' ability to share information. As mentioned above, the leniency programs of the U.S. and Canada now promise firms that come forward and are the first member of a cartel to confess and provide information to the authorities that they will not disclose the identity of the firm or

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[129] *EC Graphite Electrodes Decision*, *supra* note 41, at 10.

[130] *See* (1) Argentina: WORLD ANTITRUST LAW & PRACTICE: A COMPREHENSIVE MANUAL FOR LAWYERS AND BUSINESSES §34.3 (James J. Garrett ed. Supp. 1999) [hereinafter WORLD ANTITRUST LAW]; (2) Brazil: ABA SECTION OF ANTITRUST LAW, 1 COMPETITION LAWS OUTSIDE THE UNITED STATES 16-17 (2001); (3) China: WORLD ANTITRUST LAW, §§ 38.3, 38.5.3, 38.7; (4) Russia: WORLD ANTITRUST LAW,§§31.8, 31.10, (5) Slovak Republic: Antimonopoly Office of the Slovak Republic, Legislation in Force, *available at* www.antimon.gov.sk/default_a.htm; and (6) Venezuela: WORLD ANTITRUST LAW, § 34.22.2.

[131] *See, e.g.,*, Korea Fair Trade Comm., Memorandum on Cooperation between the Fair Trade Commission of the Republic of Korea and the Ministry of the Russian Federation for Antimonopoly Policy and Support to Entrepreneurship (Dec. 26, 2000) *, available at* http://ftc.go.kr/data/hwp/new/MEMORANDUM.doc; Korea Fair Trade Comm., Cooperation Arrangement Between the Fair Trade Commission of the Republic of Korea and the

make public any information that it provides. The European Commission, on the other hand, is required to reveal the identity of the firm receiving amnesty and provide an explanation of any reductions in fines. This promise of non-disclosure is critical to the willingness of many companies to come forward, as any information that becomes public may be used against them in civil damage suits or prosecutions in other jurisdictions. This issue has become so problematic that the European Commission has now reverted to oral requests for amnesty so that there is no written documentation that can be subpoenaed by U.S. courts for civil suits. There is, however, precedent for firms to voluntarily agree to information sharing, as was done in the initial stages of the Microsoft investigation. At the urging of Microsoft, the European Commission and the U.S. Justice Department coordinated both their investigations and their rulings.[132] Microsoft waived its rights to confidentiality in both jurisdictions. Microsoft did this in order to expedite the investigation and its resolution. Firms requesting amnesty or leniency for cartel violations might similarly prefer a quick and consolidated resolution of the charges.

Two possible resolutions of this conflict between providing firms with an incentive to apply for leniency and providing more countries with information about actions taken against their consumers include first, coordinated leniency programs across jurisdictions. In such programs, firms automatically apply for leniency in several jurisdictions, providing information to and receiving leniency from all jurisdictions simultaneously. A second resolution is the creation of an international or supra-national competition authority that, in cooperation with national authorities, can punish anti-competitive acts that span national borders. The creation of such a supra-national authority raises other issues of sovereignty as well as other difficulties; increasing the number of agreements for multi-lateral information sharing, combined with joint leniency programs, may be much easier to achieve. It may also encourage developing countries, most of which do not now have leniency programs, to adopt them in order to participate in broader information sharing.

C. MULTINATIONAL "PROSECUTION"

Australian Competition and Consumer Commission Regarding the Application of their Competition and Consumer Protection Laws (Oct. 9, 2002), *available at* http://ftc.go.kr/data/hwp/cooperationarrangement.doc.

[132] Spencer Weber Waller, *Anticartel Cooperation,* eds. Simon J. Evenett, Alexander Lehmann, and Benn Steil, ANTITRUST GOES GLOBAL: WHAT FUTURE FOR TRANSATLANTIC COOPERATION 2000 at p. 108 (Royal Institute of International Affairs, London and Brookings Institution Press, Washington, D.C.).

Ongoing negotiations among World Trade Organizations have discussed a variety of proposals for multi-lateral or plurilateral agreements on competition policy. We do not have space here for a full discussion of this topic, which we have treated at greater length elsewhere.[133] While there is significant potential payoff for developing countries from international sharing of information on price-fixing conspiracies and from assistance in developing appropriate domestic competition policy apparatus, it is important to keep in mind the practical limitations of any agreement that amounts to a requirement for standardized domestic competition policy rules on the part of developing countries. Given the practical difficulties of creating and implementing domestic antitrust policies in many developing countries, a WTO requirement for such policies is bound to have limited impact. Or, put another way, its unintended consequences could be much greater than its intended consequences. This is particularly the case if there is a requirement that "phases in" competition policy rules, first making hard-core cartels illegal and only after some period of time trying to introduce the much more costly and complex process of regulating mergers. Since the response of many firms to the enforcement of cartel laws appears to be merger or consolidation, the limited adoption of a competition policy against cartels could result in *more* consolidation and *less* competition, not the opposite.[134] Rather than imposing potentially inappropriate requirements on developing countries, a more constructive approach might involve the creation of an international agency charged with responsibility for promoting competition in international markets.[135]

D. MAINTAIN THE STATUS QUO

Developing countries may feel that they do not have the resources to develop their own capacity to prosecute international cartels and may hope that U.S. and EU prosecutions are sufficient to deter developing country harm. One study that made a direct comparison of the costs of international cartels and the costs of operating a competition policy office, on a nation-by-nation

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[133] *See* Simon J. Evenett, Margaret C. Levenstein, and Valerie Y. Suslow, *International Cartel Enforcement: Lessons from the 1990s*, 24 WORLD ECONOMY 1221 (2001).

[134] For an example of this in an earlier period, see Symeonidis's examination of Britain's adoption of an anti-cartel policy in the 1950s and 1960s. GEORGE SYMEONIDIS, THE EFFECTS OF COMPETITION: CARTEL POLICY AND THE EVOLUTION OF STRATEGY AND STRUCTURE IN BRITISH INDUSTRY (2002).

[135] *See, e.g.* Ajit Singh, *Competition and Competition Policy in Emerging Markets: International Developmental Dimensions* (UNCTAD and Center for International Development Harvard University, G-24 Discussion Paper Series No. 18, 2002).

basis concludes that there would be a real payoff for many developing countries.[136] The authors argue that the harm to consumers is much greater than the expenditures necessary for operating a competition policy office. But it is also clear that many developing countries must decide how to allocate scarce human capital – that is, competent economists, lawyers, and bureaucrats -- among the many demands of the national government. Just as the best domestic competition law must necessarily be specific to the economic and legal structure of the country, the available resources and the opportunity costs of using them for competition policy is necessarily a country-specific question.

Some have argued that that the lowering of trade barriers and the opening up of domestic markets to foreign competition ameliorates or lessens the need for competition policy instruments for developing countries. But if foreign participants in domestic markets are not actually competing, their presence or the potential for their entry may not provide for real or fair competition. In some cases, where the developing country has no indigenous industry, prices may remain high because of private international agreements. Where the developing country does have its own production capacity, developing countries may have justifiable complaints that their markets are being used as the dumping ground for excess inventories that multinational producers want to keep out of markets where they have raised prices above competitive levels, while simultaneously undermining the ability of developing country producers to disrupt those price-fixing agreements.

E. PRIVATE ENFORCEMENT IN FOREIGN COURTS OF LAW

As noted above, consumers in developing countries harmed by the activities of international cartels may be unable to pursue legal remedies in their own countries, either because domestic antitrust laws prohibiting such behavior do not exist, do not provide adequate remedies, are not enforced by the relevant authorities, or are simply not a priority given limited resources.[137] In many such instances, those consumers may look to the courts of developed countries for remedies for the antitrust injuries they have suffered. An English court has recently ruled in a

[136] *CUTS*, *supra* note 19, at 88.
[137] *See*, part V.A. *supra* (discussing domestic prosecutions in developing countries) and Ajit Singh, *supra* note 134, at 6-7 (noting that until recently, most developing countries did not have a formal competition policy, and that treatment of cartels and effectiveness of enforcement varies widely among countries).

case involving the vitamin cartel that non-English plaintiffs can sue for damages there.[138] The ability of such plaintiffs to sue in U.S. courts has been restricted by the fact that U.S. antitrust laws do not reach *all* anticompetitive conduct.

The access of foreign antitrust plaintiffs to U.S. courts is largely governed by the Foreign Trade Antitrust Improvements Act (FTAIA) of 1982,[139] 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.[140] Historically, U.S. courts have not been sympathetic to the claims of foreign antitrust plaintiffs whose claims arise from anticompetitive conduct directed at foreign markets. In *Ferromin International Trade Corp. v. UCAR International, Inc.*,[141] for example, twenty-seven 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 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 markets).[142] 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 United States.[143]

However, two recent decisions -- the March 2002 decision of the U.S. Court of Appeals for the Second Circuit in *Kruman v. Christie's International PLC*,[144] and the January 2003 decision of the U.S. Court of Appeals for the D.C. Circuit in *Empagran S.A. v. F. Hoffman-LaRoche Ltd*.,[145] have suggested a broader mechanism by which foreign plaintiffs can pursue legal remedies in the

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[138] Bruce A. Baird, David W. Hull, and Steven J. Rosenbaum, *Corporate leniency applications*, THE ANTITRUST REVIEW OF THE AMERICAS 2004, p. 21, and *Provimi Ltd. v Aventis Animal Nutrition SA and others*, Queen's Bench Division (Commercial Court) [2003] EWHC 1211 (Comm) (6 May 2003)..

[139] Pub. L. No. 97-290, 96 Stat. 1246 (codified at 15 U.S.C. § 6a (2000)).
[140] *See* Eurim-Pharm v. Pfizer Inc., 593 F. Supp. 1102, 1105 (S.D. N.Y. 1984) (Congress enacted FTAIA "to eliminate the uncertainty that had arisen from the confusing array of standards employed by federal courts for determining when United States antitrust jurisdiction attaches to international business transactions").
[141] 153 F. Supp.2d 700 (E.D. Pa. 2001), discussed *supra* note 98 and accompanying text.
[142] *Id*. at 705-06.
[143] *Id*. at 706.
[144] 284 F.3d 384 (2d Cir. 2002).
[145] 315 F.3d 338 (D.C. Cir. 2003).

U.S. courts for the anticompetitive behavior of international cartels. Prior to *Kruman,* all of the federal courts that had addressed this issue had agreed that the FTAIA requires foreign plaintiffs suing under U.S. antitrust law to show that: (1) 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.[146] The coupling of these two requirements effectively barred many foreign plaintiffs from suing in U.S. courts for international cartel activities.

In its recent decision in *Kruman*, however, the Second Circuit deviated from prevailing precedent on the meaning of Section 6a(2) of the FTAIA, opening the door to more suits by foreign plaintiffs and creating a circuit split on an issue of significant importance. The *Kruman* court held that foreign plaintiffs need only show that the domestic effects of an international conspiracy violate the Sherman Act, and not that those effects were the basis for their injury, in order to bring suit in the United States.[147]

In January 2003, the U.S. Court of Appeals for the D.C. Circuit issued its ruling in *Empagran S.A. v. F. Hoffman-LaRoche Ltd*.,[148] which, like *Kruman*, held that the FTAIA permits suits by foreign plaintiffs who are injured by anticompetitive conduct that has effects on foreign commerce, provided that the conduct also has effects on domestic commerce.[149] In *Empagran*, the plaintiffs had filed a class action suit on behalf of foreign and domestic purchasers of vitamins, alleging that the defendants, companies that manufactured and distributed vitamins and vitamin products, had engaged in a long-term conspiracy to, *inter alia*, fix prices and allocate market share.[150] The trial court dismissed the foreign purchasers' federal claims, stating that under the FTAIA, it did not have subject matter jurisdiction over those claims.[151] The D.C. Circuit reversed, finding that the federal courts did have subject matter jurisdiction over the

[146] *See, e.g.*, Den Norske Stats Oljeselskap AS v. HeereMac vof., 241 F.3d 420, 428-29 (5th Cir. 2001); Ferromin Int'l Trade Corp. v. UCAR Int'l, Inc., 153 F. Supp.2d 700, 705 (E.D. Pa. 2001); *In re* Copper Antitrust Litigation, 117 F. Supp. 2d 875, 876 (W.D. Wis. 2000); de Atucha v. Commodity Exch., Inc., 608 F. Supp. 510, 518 (S.D.N.Y. 1985).
[147] *Id*. at 400.
[148] 315 F.3d 338 (D.C. Cir. 2003).
[149] *Id*. at 341.
[150] *Id.* at 342.
[151] *Id*. at 342-43 (citing Empagran S.A. v. F. Hoffman-La-Roche, Ltd., 2001 WL 761360, at 2-4 (D.C.C. June 7, 2001)).

foreign plaintiffs' claims under the FTAIA and that the foreign plaintiffs had standing to sue.[152] The Fifth Circuit based its rationale on deterrence, stating: "Disallowing suits by foreign purchasers injured by a global conspiracy because they themselves were not injured by the conspiracy's U.S. effects runs the risk of inadequately deterring global conspiracies that harm U.S. commerce."[153]

These decisions raise significant legal and policy issues. On the policy side, the reliance on U.S. courts by injured parties from developing countries amounts to the quasi-privatization of anti-trust enforcement in those countries. Two important questions arise from such an approach. First, as we discuss in the section on information sharing above, the increasing frequency of *civil* suits may undermine the tools, such as leniency, that the state uses to deter anti-competitive activity. Second, it is not clear that punishments enacted through U.S. courts will provide the right amount or the right type of deterrence of anti-competitive activity in developing countries. The reach of U.S. anti-trust laws may be arbitrary in the sense that it could treat very differently activities which are economically indistinguishable from the point of view of developing countries. Clearly, such a policy would provide no deterrence to domestic cartels. Developing country consumers harmed by an international cartel, which happened not to affect the U.S. market, would still have no recourse. In this respect, greater international cooperation among national competition authorities and the creation of a supra-national authority may be preferable to the expansion of private suits in the U.S. On the other hand, in the absence of such international cooperation, the possibility of turning to U.S. courts to collect damages could be a powerful deterrent and a useful compensation mechanism for otherwise vulnerable consumers.

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 discussion shows 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

[152] *Id*. at 341.
[153] *Id*. at 356.

producers. We have emphasized the short-term costs, specifically higher prices and significant trade effects, as well as possible long-term costs due to the creation of durable barriers to entry.

There are several tentative conclusions that can be drawn and a number of policy implications (and questions) that follow. First, international cartels appear to have an economically significant effect on trade with developing countries. However, in order to properly quantify the effects, governments must do a better job of collecting trade data at the product level. Second, antitrust institutions either do not exist in most developing countries or do not have the wherewithal to address this problem. Antitrust institutions in the United States and European Union, although highly developed, do not include the effects on "certain third markets" when calculating punishments for price fixers; the details regarding the effects of the cartels outside of the U.S. and EU markets will, in general, never be made public. The competition authorities may well have information regarding restrictions on competition in developing countries, but under current law and multi-national agreements there is often not permission, let alone responsibility, to share that information with affected parties. 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 and the level of deterrence U.S. law provides. A competition regime in which cartels need only fear damages in a part of the world market, while reaping global benefits may provide insufficient deterrence.

Several potentially useful policy proposals emerge from this discussion of cartels and their effect on developing countries. These include the establishment of an international competition authority, increased information sharing and other kinds of international cooperation among national competition authorities, and greater access for developing country consumers to the civil courts of developed countries. We have also highlighted an important pitfall in the current policy of industrial countries, namely the neglect, in general, of "post-cartel" industry monitoring. The failure to maintain competition after the prosecution of cartels may mean that cartel prosecutions have the unintended effect of encouraging consolidation rather than competition. Greater international surveillance of cartel-affected industries could assure the emergence of real competition after the break up of a cartel. This is particularly important in

light of the alternative, which could be the consolidation of the cartel alliance in a single multinational firm.

TABLE 1

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

Industry	Start[1]	End	Conviction	Country of Origin of Indicted Firms (Developing Country Cartel Members in Italics)	Country(ies) Known To Be Affected[2]	Market Concentration[3]
Aluminum Phosphide	Jan 1990	Nov 1990	DOJ	*Brazil*, Germany, *India*, US	US	US: C4 = 90%
Beer	1993	1998	EC	Belgium, France	Belgium	Belgium: C2 = 70%
Bromine Products	Jul 1995	Apr 1998	DOJ	Israel, US	US	World: C3 = 76%
Cable-Stayed Bridges	Sep 1996	Dec 1997	DOJ	France, US	US	
Carbon Cathode Block	Feb 1996	Dec 1997	DOJ	Germany, Japan, US	US and elsewhere	
Carbonless Paper	1992	1995	EC	France, Germany, Spain, *South Africa*, UK	Europe	Europe: Cartel Share = 85-90%
Cartonboard	1986	1991	EC[4]	Austria, Canada, Finland, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, UK, US (via European subsidiaries)	Europe	Europe: Cartel Share = 80%
Cement	1983	Aug 1994	EC	33 European firms, 8 national cement trade associations, and the European Cement Association	Europe	Europe: C6 = 50%
Citric Acid	1991	1995	DOJ & EC	Austria, France, Germany, Netherlands, Switzerland, US	International	World: C4 = 60% W. Europe: C4 = 85%
Explosives	1988	1992	DOJ	Norway, UK, US	US	
Ferrosilicon	Oct 1989	June 1991	DOJ	Germany, Norway, US	International	US: C4 = 100%
Ferry Operators (Adriatic Sea)	1987	1994	EC	Greece, Italy	Greece, Italy	
Ferry Operators (Cross-Channel Freight)	Oct 1992	Dec 1992	EC	France, Netherlands, Sweden, UK	Europe	

Industry	Start[1]	End	Conviction	Country of Origin of Indicted Firms (Developing Country Cartel Members in Italics)	Country(ies) Known To Be Affected[2]	Market Concentration[3]
Fine Arts	Apr 1993	Dec 1999	DOJ (EC issued "Statement of Objections" on April 19, 2002)	UK, US	Australia, Japan, United States, Europe	C2 = 95%
Graphite Electrodes	Jul 1992	Jun 1997	DOJ & EC	Germany, Japan, US	International	US: C4 = 93% Canada: C2 = 90% World: Cg = 80%
Isostatic Graphite	Jul 1993	Feb 1998	DOJ	Japan, US	Canada, US	World: 6 major firms
Laminated Plastic Tubes	1987	1996	DOJ	Switzerland, US	US	US: C3 = 95%
Lysine	Jun 1992	Jun 1995	DOJ & EC	Germany, Japan, *South Korea*, US	International	World: C3 = 95% in late 1980s Mexico: C2 = 90%
Maltol	Dec 1989	Dec 1995	DOJ	US + unnamed firms	US and elsewhere	World: C2 = 80-90%
Marine Construction Services (Heavy-Lift)	1993	1997	DOJ	Netherlands, US	US and elsewhere	
Marine Transportation Services (Heavy-Lift)	1990	1995	DOJ	Belgium, US	US and elsewhere	
Monochloroacetic Acid	Sep 1995	Aug 1999	DOJ	France, Germany, *Netherlands*	NA	World: Cartel market share = 63%
Nucleotides	Jul 1992	Aug 1996	DOJ	Japan, *South* Korea	NA	World: C1 = 45%
Organic Peroxides	1997	1998	DOJ	France + unnamed firms	NA	World: C2 = 60%
Plastic Dinnerware	Nov 1991	Apr 1992	DOJ	Canada, US	US	US: C2 > 90%
Shipping (Central West African)	1972	1992	EC (conviction, but fine overturned)	*Zaire*, *Angola*, Northern part of continental Europe, excluding UK	NA	Shipping conference held more than 90% market share
Shipping (Far East)	1991	1994	EC	30 countries (including *Malaysia*, *South Korea*)	International	Shipping conference held 80% market share between northern Europe and Far East

Industry	Start[1]	End	Conviction	Country of Origin of Indicted Firms (Developing Country Cartel Members in Italics)	Country(ies) Known To Be Affected[2]	Market Concentration[3]
Shipping (French-African)	1975	1992	EC	12 countries (including *Senegal*, *Cameroon*)	France, Senegal, Gabon, Central African Republic, Niger, Burkina, Faso, Guinea, Congo, Mali, Togo, and Cameroon	C4 = 90%
Shipping (North Atlantic)	1994	1996	EC	11 countries (including *Poland*)	International	Shipping conference held between 70-80% of trans-North Atlantic container market
Sodium Erythorbate	Jul 1992	Dec 1994	DOJ	US + unnamed firms	US	US: C2 = 90%
Sodium Gluconate	Aug 1993	June 1995	DOJ & EC	France, Japan, Netherlands, Switzerland, US	International	Cartel members were world's major producers
Sorbates	1979	1996	DOJ	Germany, Japan, US	International	World: C2 = 71%
Stainless Steel	Jan 1994	Mar 1995	EC	Belgium, France, Germany, Italy, Spain, Sweden, UK	Europe	World: C4 = 52%
Steel Beam	1988	1994	EC	Belgium, France, Germany, Luxembourg, Spain, UK	W. Europe	Europe: C10 = 66%
Steel Heating Pipe (Pre-Insulated Pipe)	late 1990	1996	EC	Austria, Denmark, Finland, Germany, Italy, Sweden, Switzerland	Europe	W. Europe: C4 = 80%
Steel Tube, Seamless	1990	1995	EC	France, Germany, Italy, Japan, UK	Europe and "certain third markets"	Europe Cartel Share = 19%
Sugar	Jun 1986	Jul 1990	EC	Denmark, Ireland, UK	UK	Great Britain: C2 = 90%
Tampico Fiber	Jan 1990	Apr 1995	DOJ	*Mexico*, Netherlands, US	US	Cartel members had "overwhelming" share of US market

Industry	Start[1]	End	Conviction	Country of Origin of Indicted Firms (Developing Country Cartel Members in Italics)	Country(ies) Known To Be Affected[2]	Market Concentration[3]
Thermal Fax Paper	1991	1992	DOJ (1 Japanese firm went to trial and won)	Japan, US	North America	US: C3 = 40-45%
Vitamins	Jan 1990	Feb 1999	DOJ & EC	Canada, Germany, Japan, Switzerland, US	International	World: C3 = 75% for bulk vitamins
Wastewater Construction	Jun 1988	Jan 1995	DOJ	Germany, Switzerland, US	Egypt	
Zinc Phosphate	Mar 1994	May 1998	EC	France, Germany, Norway, UK	Europe	Europe cartel share = 90%

Notes to Table 1:

1. Cartel dates are approximate. In particular, indictments of different firms may list different conspiracy dates. Also, for those cartels prosecuted by both the DOJ and EC, we list the DOJ dates only; sometimes the EC cases will have different dates. In general, the information presented in this table was gathered from various industry and government sources, including DOJ and EC press releases, European Court of Justice decisions, and industry and business news sources, such as *American Metal Market*, *Chemical Marketing Reporter*, *European Business Week*, *International Cement Magazine*, *Oil and Gas Journal*, and *Wall Street Journal*. Specific sources are available from the authors upon request.
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. All concentration and market share figures are approximate. Wherever possible, concentration measures date to the period of the cartel. In other instances, the data were only available for more recent years. References are available from the authors.
4. Companies appealed, but Court of First Instance confirmed the basic decision, although annulling minor parts of the decision.

TABLE 2
IMPORTANCE OF CARTELIZED GOODS IN DEVELOPING COUNTRY IMPORTS, 1997[1]

	Low Income Countries	*Lower Middle Income Countries*	*Upper Middle Income Countries*	*All Developing Countries*	*High Income Countries*
Product	**Percent of total imports**	**Percent of total imports**	**Percent of total imports**	**Percent of total imports**	**Percent of total imports**
Aluminum Phosphide	0.0509%	0.0198%	0.0324%	0.0290%	0.0354%
Beer	0.0563%	0.0633%	0.0301%	0.0574%	0.0995%
Bromine	0.1088%	0.1121%	0.1510%	0.1268%	0.1622%
Cable-Stayed Bridges	0.5248%	0.2821%	0.2146%	0.2898%	0.2174%
Carbon Cathode Block	0.4484%	0.8529%	1.1221%	0.9111%	0.7439%
Carbonless Paper	0.1031%	0.1003%	0.1020%	0.1051%	0.1142%
Cartonboard	0.1330%	0.1406%	0.2209%	0.1958%	0.1359%
Cement	0.3587%	0.1033%	0.1052%	0.1250%	0.0747%
Citric Acid	0.7726%	0.4192%	0.3403%	0.3919%	0.2865%
Explosives	NA	NA	NA	NA	NA
Ferrosilicon	0.0798%	0.0344%	0.0989%	0.0825%	0.1246%
Fine Arts	0.0183%	0.0178%	0.0336%	0.0270%	0.1852%
Graphite Electrodes	0.4484%	0.8529%	1.1221%	0.9111%	0.7439%
Isostatic Graphite	0.7726%	0.4192%	0.3403%	0.3919%	0.2865%
Laminated Plastic Tubes	0.3431%	1.1412%	0.6553%	0.7172%	0.0485%
Lysine	0.7286%	0.3710%	0.5384%	0.4735%	0.5970%
Maltol	0.0432%	0.0262%	0.0348%	0.0325%	0.0330%
Marine Construction	1.4344%	0.3058%	1.3818%	0.9803%	0.4191%

	Low Income Countries	*Lower Middle Income Countries*	*Upper Middle Income Countries*	*All Developing Countries*	*High Income Countries*
Product	**Percent of total imports**	**Percent of total imports**	**Percent of total imports**	**Percent of total imports**	**Percent of total imports**
Monochloroacetic Acid	0.7726%	0.4192%	0.3403%	0.3919%	0.2865%
Nucleotides	NA	NA	NA	NA	NA
Organic Peroxides	0.7726%	0.4192%	0.3403%	0.3919%	0.2865%
Plastic Dinnerware	0.3543%	0.5759%	0.9202%	0.7457%	0.7493%
Sodium Erythorbate	0.4078%	0.3097%	0.4869%	0.3914%	0.4873%
Sodium Gluconate	0.7726%	0.4192%	0.3403%	0.3919%	0.2865%
Sorbates	0.7726%	0.4192%	0.3403%	0.3919%	0.2865%
Stainless Steel	1.7104%	2.3528%	1.4514%	1.7180%	1.0909%
Steel Beam	0.1715%	0.1561%	0.1501%	0.1527%	0.1228%
Steel Heating Pipe	0.4260%	0.2693%	0.2554%	0.2810%	0.1278%
Steel Tube, Seamless	0.4260%	0.2693%	0.2554%	0.2810%	0.1278%
Sugar	0.8475%	0.2547%	0.0576%	0.2329%	0.0611%
Tampico Fiber	0.0039%	0.0101%	0.0061%	0.0071%	0.0075%
Thermal Fax Paper	0.2960%	0.4078%	0.2379%	0.2922%	0.3108%
Vitamins	0.0655%	0.0831%	0.0651%	0.0698%	0.0702%
Wastewater Construction	0.3676%	0.3996%	0.3995%	0.3886	0.2545%
Zinc Phosphate	NA	NA	NA	NA	NA
Total	9.6314%	7.8764%	8.7230%	8.3677%	6.7776%
Total (4 digit industries)	3.6813%	3.4260%	3.9039%	3.7270%	3.4174%

[1] Product definitions and SITC classifications are given at the end of Table 4.

TABLE 3

CARTELIZED GOODS AS A SHARE OF DEVELOPING COUNTRY GDP, 1997[1]

	Low Income Countries	***Lower Middle Income Countries***	***Upper Middle Income Countries***	***All Developing Countries***	High Income Countries
Product	**Percent of GDP**	**Percent of GDP**	**Percent of GDP**	**Percent of GDP**	Percent of GDP
Aluminum Phosphide	0.0074%	0.0050%	0.0070%	0.0061%	0.0064%
Beer	0.0068%	0.0158%	0.0065%	0.0119%	0.0178%
Bromine	0.0159%	0.0283%	0.0328%	0.0269%	0.0293%
Cable-Stayed Bridges	0.0736%	0.0703%	0.0466%	0.0608%	0.0391%
Carbon Cathode Block	0.0636%	0.2151%	0.2434%	0.1932%	0.1342%
Carbonless Paper	0.0148%	0.0252%	0.0221%	0.0222%	0.0206%
Cartonboard	0.0185%	0.0351%	0.0479%	0.0414%	0.0245%
Cement	0.0477%	0.0261%	0.0228%	0.0258%	0.0131%
Citric Acid	0.1129%	0.1056%	0.0738%	0.0831%	0.0517%
Explosives	NA	NA	NA	NA	NA
Ferrosilicon	0.0113%	0.0086%	0.0215%	0.0175%	0.0225%
Fine Arts	0.0026%	0.0044%	0.0073%	0.0057%	0.0334%
Graphite Electrodes	0.0636%	0.2151%	0.2434%	0.1932%	0.1342%
Isostatic Graphite	0.1129%	0.1056%	0.0738%	0.0831%	0.0517%
Laminated Plastic Tubes	0.3431%	1.1412%	0.6553%	0.7172%	0.0485%
Lysine	0.1016%	0.0934%	0.1168%	0.0998%	0.1077%
Maltol	0.0063%	0.0066%	0.0075%	0.0069%	0.0060%
Marine Construction	0.2000%	0.0772%	0.2997%	0.2068%	0.0744%
Monochloroacetic Acid	0.1129%	0.1056%	0.0738%	0.0831%	0.0517%

	Low Income Countries	*Lower Middle Income Countries*	*Upper Middle Income Countries*	*All Developing Countries*	High Income Countries
Product	**Percent of GDP**	**Percent of GDP**	**Percent of GDP**	**Percent of GDP**	Percent of GDP
Nucleotides	NA	NA	NA	NA	NA
Organic Peroxides	0.1129%	0.1056%	0.0738%	0.0831%	NA
Plastic Dinnerware[23]	0.0490%	0.1445%	0.1996%	0.1578%	0.1351%
Sodium Erythorbate	0.0597%	0.0779%	0.1056%	0.0831%	0.0880%
Sodium Gluconate	0.1129%	0.1056%	0.0738%	0.0831%	0.0517%
Sorbates	0.1129%	0.1056%	0.0738%	0.0831%	0.0517%
Stainless Steel	0.2463%	0.5938%	0.3149%	0.3642%	0.1969%
Steel Beam	0.0244%	0.0390%	0.0326%	0.0322%	0.0222%
Steel Heating Pipe	0.0610%	0.0675%	0.0554%	0.0593%	0.0231%
Steel Tube, Seamless	0.0610%	0.0675%	0.0554%	0.0593%	0.0231%
Sugar	0.1216%	0.0594%	0.0125%	0.0477%	0.0110%
Tampico Fiber	0.0006%	0.0026%	0.0013%	0.0015%	0.0013%
Thermal Fax Paper	0.0428%	0.0125%	0.0503%	0.0618%	0.0561%
Vitamins	0.0094%	0.0209%	0.0141%	0.0148%	0.0127%
Wastewater Construction	0.0526%	0.1005%	0.0867%	0.0823%	0.0459%
Zinc Phosphate	NA	NA	NA	NA	NA
Total	1.3672%	1.9772%	1.8923%	1.7679%	1.2214%
Total (4 digit industries)	0.5200%	0.8560%	0.8469%	0.7864%	0.6163%

[1] Product definitions and SITC classifications are given at the end of Table 4.

TABLE 4

TOTAL VALUE OF CARTEL-AFFECTED IMPORTS, 1997[1]

	Low Income Countries	*Lower Middle Income Countries*	*Upper Middle Income Countries*	*All Developing Countries*	*High Income Countries*
Product	**Value of imports ($000)**	**Value of imports ($000)**	**Value of imports ($000)**	**Total Imports by Developing Countries ($000)**	**Value of imports ($000)**
Aluminum Phosphide	70,667	89,465	221,248	397,799	1,457,120
Beer	78,242	286,555	205,502	787,333	4,096,711
Bromine	151,131	507,828	1,031,193	1,739,026	6,679,997
Cable-Stayed Bridges	729,121	1,277,491	1,465,478	3,974,115	8,952,019
Carbon Cathode Block	622,913	3,862,337	7,661,002	12,493,738	30,636,990
Carbonless Paper	143,208	454,327	696,087	1,440,652	4,704,615
Cartonboard	184,744	636,747	1,508,258	2,685,390	5,595,488
Cement	498,338	467,785	717,975	1,713,716	3,077,450
Citric Acid	1,073,396	1,898,373	2,323,480	5,373,873	11,798,216
Explosives	NA	NA	NA	NA	NA
Ferrosilicon	110,896	155,723	675,533	1,131,337	5,130,916
Fine Arts	25,458	80,681	229,506	370,564	7,625,846
Graphite Electrodes	622,913	3,862,337	7,661,002	12,493,738	30,636,990
Isostatic Graphite	1,073,396	1,898,373	2,323,480	5,373,873	11,798,216
Laminated Plastic Tubes	166,650	943,062	1,997,697	3,571,599	11,070,148

	Low Income Countries	*Lower Middle Income Countries*	*Upper Middle Income Countries*	*All Developing Countries*	*High Income Countries*
Product	**Value of imports ($000)**	**Value of imports ($000)**	**Value of imports ($000)**	**Total Imports by Developing Countries ($000)**	**Value of imports ($000)**
Lysine	1,012,138	1,680,002	3,676,131	6,493,439	24,586,007
Maltol	60,059	118,589	237,502	445,878	1,359,342
Marine Construction	1,992,773	1,384,950	9,434,171	13,442,963	17,260,101
Monochloroacetic Acid	1,073,396	1,898,373	2,323,480	5,373,873	11,798,216
Nucleotides	NA	NA	NA	NA	NA
Organic Peroxides	1,073,396	1,898,373	2,323,480	5,373,873	11,798,216
Plastic Dinnerware	492,193	2,608,027	6,282,835	10,225,289	30,858,496
Sodium Erythorbate	566,568	1,402,623	3,324,597	5,366,674	20,070,815
Sodium Gluconate	1,073,396	1,898,373	2,323,480	5,373,873	11,798,216
Sorbates	1,073,396	1,898,373	2,323,480	5,373,873	11,798,216
Stainless Steel	2,376,175	10,654,538	9,909,502	23,558,242	44,930,416
Steel Beam	238,269	707,059	1,024,930	2,093,764	5,057,488
Steel Heating Pipe	591,773	1,219,593	1,743,731	3,852,942	5,264,820
Steel Tube, Seamless	591,773	1,219,593	1,743,731	3,852,942	5,264,820
Sugar	1,177,404	1,153,567	392,938	3,194,315	2,517,935
Tampico Fiber	5,398	45,870	41,650	97,350	307,625
Thermal Fax Paper	411,205	1,846,847	1,583,142	4,007,146	12,801,473
Vitamins	91,014	376,534	444,787	956,633	2,889,761
Wastewater Construction	510,619	1,809,355	2,727,780	5,329,002	10,483,064

	Low Income Countries	*Lower Middle Income Countries*	*Upper Middle Income Countries*	*All Developing Countries*	*High Income Countries*
Product	**Value of imports ($000)**	**Value of imports ($000)**	**Value of imports ($000)**	**Total Imports by Developing Countries ($000)**	**Value of imports ($000)**
Zinc Phosphate	NA	NA	NA	NA	NA
Total	13,380,412	35,667,928	59,556,655	114,742,779	279,142,859
Total (4 digit industries)	5,114,224	15,514,726	26,653,866	51,107,121	140,754,596

Product Definitions and SITC Classifications:

Tables 2-4 use a combination of 3-digit and 4-digit SITC category matches. The 3-digit codes were used only when 4-digit data were unavailable. 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." The column "developing countries" is the sum of "Low Income", "Low-Middle Income", "Middle-High Income", and statistics for the countries of the former Union of Soviet Socialist Republics (not shown). Therefore, the fourth column is *not* the sum of the first three columns.

Product	Product Definition	3- or 4-digit SITC
Aluminum Phosphide	Aluminum Phosphide: Inorganic chemical products, n.e.s	4
Beer	Beer: Beer made from malt (including ale, stout and porter)	4
Bromine	Bromine: Phenols and phenyl alcohols and their halogenated derivatives; ethers, alcohol peroxides, ether peroxides, epoxides etc; halogenated derivatives of hydrocarbons	4
Cable-Stayed Bridges	Structures and parts of structures: iron, steel, aluminum	3
Carbon Cathode Block	Electrical machinery and apparatus, n.e.s.	4
Carbonless Paper	Paper and paperboard, cut to size or shape, n.e.s.	4

Product	Product Definition	3- or 4-digit SITC
Cartonboard	Boxes, bags & other packing containers, of paper or paperboard	4
Cement	Portland cement, cement fondu, slag cement, etc.	4
Citric Acid	Carboxylic acids, and their anhydrides, halides, etc.	3
Explosives	Explosives and pyrotechnic products	3 (data missing)
Ferrosilicon	Ferro-alloys	4
Fine Arts	Art, collectors' pieces and antiques	4
Graphite Electrodes	Other electrical machinery and equipment	4
Isostatic Graphite	Carboxylic acids, and their anhydrides, halides, etc.	3
Laminated Plastic Tubes	Articles for the conveyance or packing of goods	4
Lysine	Nitrogen-function compounds	3
Maltol	Other sugars; sugar syrups; artificial honey; caramel	4
Marine Construction	Ships, boats and floating structures	3
Monochloroacetic Acid	Carboxylic acids, and their anhydrides, halides, etc.	3
Nucleotides	Other inorganic chemicals	3 (data missing)
Organic Peroxides	Carboxylic acids, and their anhydrides, halides, etc.	3
Plastic Dinnerware	Miscellaneous articles of materials of division 58	4
Sodium Erythorbate	Organo-inorganic and heterocyclic compounds	3
Sodium Gluconate	Carboxylic acids, and their anhydrides, halides, etc.	3
Sorbates	Carboxylic acids, and their anhydrides, halides, etc.	3
Stainless Steel	Universals, plates and sheets of iron or steel; ingots and other primary forms of iron or steel	3
Steel Beam	Angles, shapes & sections & sheet piling of iron or steel; structures & parts of structures, iron or steel; plates	4
Steel Heating Pipe	Seamless tubes and pipes; blanks for tubes & pipes	4
Steel Tube, Seamless	Seamless tubes and pipes; blanks for tubes & pipes	4
Sugar	Refined sugars and other products of refined beet or cane	4
Tampico Fiber	Vegetable textile fibers and waste of such fibers	3
Thermal Fax Paper	Paper and paperboard, in rolls or sheets, n.e.s.	4
Vitamins	Provitamins and vitamins, natural or produced by synthesis	4
Wastewater Construction	Pumps and compressors, fans & blowers, centrifuges	3

Product	Product Definition	3- or 4-digit SITC
Zinc Phosphate	Other inorganic chemicals	3 (data missing)

TABLE 5

CARTEL AFFECTED IMPORTS: AVERAGE STATISTICS FOR ACTIVE CARTELS 1990-1997

		Low Income	Low-Middle Income	Middle-High Income	Developing Countries	High Income
Value of Cartel-Affected Imports ($000)	**3 and 4 digit**	7,520,421	13,881,943	23,930,676	47,043,424	118,135,121
	4-digit only	1,890,044	6,251,263	9,338,353	18,529,824	59,775,867
Value of Cartel-Affected Imports as Percentage of Total Imports	**3 and 4 digit**	6.2201%	4.1884%	4.8448%	4.7009%	3.5256%
	4-digit only	1.6716%	1.9613%	1.9506%	1.9287%	1.7917%
Value of Cartel-Affected Imports as a Percentage of GDP	**3 and 4 digit**	0.6517%	1.0646%	0.9516%	0.8717%	0.5904%
	4-digit only	0.2461%	0.4940%	0.3761%	0.3081%	0.3668%

TABLE 6

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)
UCAR	34%	31%
SGL	23%	27%
Carbide/Graphite Group	18%	6%
Showa Denko	18%	6%
Tokai Carbon	1%	11%
SEC Corp.		5%
Nippon Carbon		4%

Sources: (1) Government's Sentencing Memorandum and Government's Motion for a Guidelines Downward Departure *United States v. Krass*, No. 99-626 (E.D. Pa. filed Oct. 18, 1999); and (2) Second Amended Complaint at ¶¶ 54-59, Ferromin Int'l Trade Corp. v. UCAR, 153 F. Supp. 2d 700 (E.D. Pa. 2001) (No. 99-693).

TABLE 7

GLOBAL TRENDS IN PRODUCTION OF CRUDE STEEL IN ELECTRIC ARC FURNACES

Region	1992 EAF Output (1,000s metric tons)	Percent of World Steel Output from EAFs in 1992	Percent of Each Region's Steel Output from EAFs in 2000
European Union	45,868	21.61%	41.09%
Non-EU Europe (including Baltic States)	13,593	6.40%	38.67%
Russia & Ukraine	13,588	6.40%	10.61%
Asian Former Soviets	2,441	1.15%	36.94%
Canada & United States	36,589	17.24%	46.58%
Other North America	5,367	2.53%	66.57%
South America	10,519	4.96%	33.18%
Africa	5,902	2.78%	51.68%
Middle East	3,641	1.72%	81.46%
Asia	74,077	34.90%	28.34%
Oceania	648	0.31%	16.61%
WORLD	212,233	100%	--

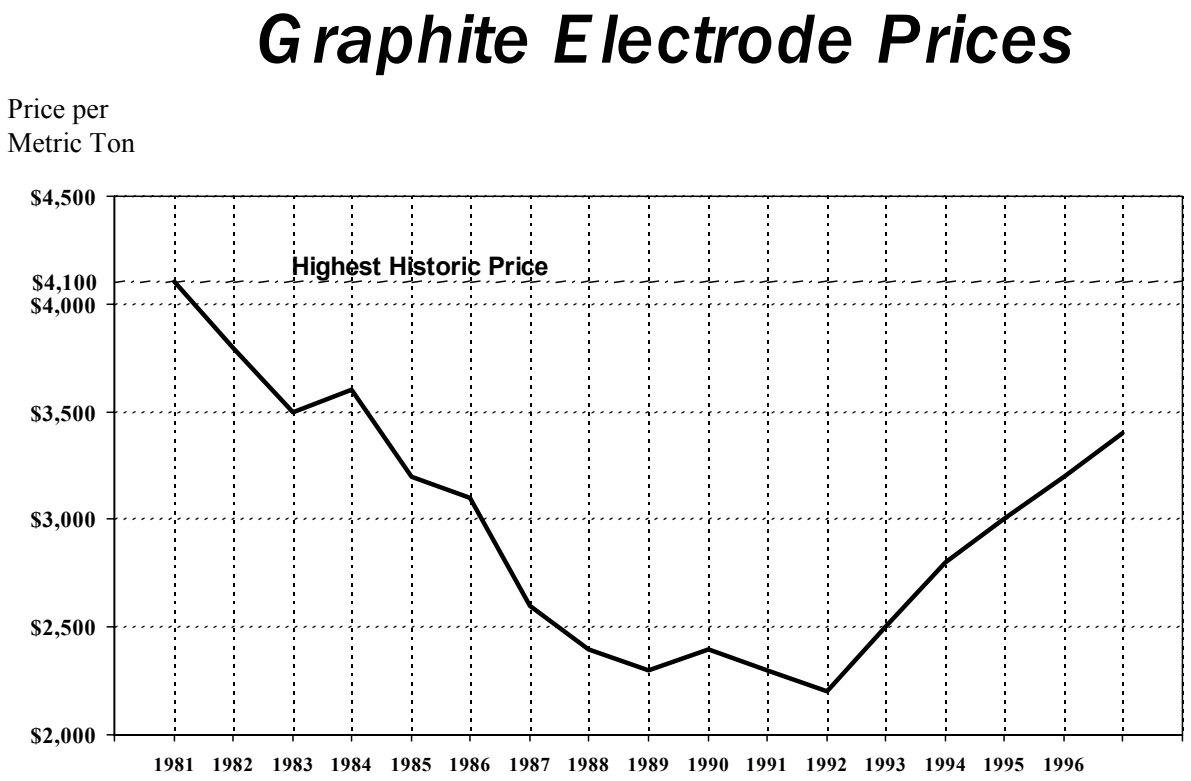
Source: Steel Statistical Yearbook, 2002 Edition (December 2002), International Iron and Steel Institute, Committee on Economic Studies, Brussels (http://www.worldsteel.org/media/ssy/iisi_ssy_2002.pdf): 1992 data from pages 39-41, 2000 data from pages 33-34.

TABLE 8

GRAPHITE ELECTRODES CARTEL: GOVERNMENT FINES

Firm Name	Fine
UCAR (U.S.)	$110m (US) $11m (Canada) €50.4m (EU) $513,000 (Korea)
SGL (Germany)	$135m (US) $12.5m (Canada) €80.2m (EU) $731,000 (Korea)
Carbide/Graphite Group (U.S.)	Granted leniency (US) €10.3m (EU)
Showa Denko (Japan)	$32.5m (US) €17.4m (EU) $3.3m (Korea)
Tokai Carbon (Japan)	$6m (US) €24.5m (EU) $913,000 (Korea)
SEC Corp (Japan)	$4.8m (US) €12.2m (EU) $273,000 (Korea)
Nippon Carbon (Japan)	$2.5m (US) €12.2m (EU) $2.8m (Korea)
VAW Aluminum (Germany)	€11.6m (EU)

FIGURE 1



Source: U.S. v. Mitsubishi Corp. (E.D. Pa. Jan. 31, 2001) (No. 00-033), defendant's exhibit 280.