Cross-Border Cartels and the Steel Trade: The Impacts of the Europe Japan Club

Andrew Szamosszegi
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Executive Summary

In its report on the causes of the U.S. steel import crisis, the U.S. Department of Commerce concluded that cyclical and structural factors were the root causes of the steel surge in the United States in 1998. Among the structural factors cited was the existence of cooperative arrangements among Japanese and European steel makers.

The Economic Strategy Institute (ESI) has attempted to verify the existence of the alleged cross-border cartel and to examine how collusion affects trade patterns and the United States. The conclusions of the study are as follows:

- The presence of cooperative arrangements among Japanese and European steel makers is a fact. The European Commission announced a cartel finding in December 1999 covering eight pipe and tube producers from Europe and Japan. According to the Commission, “The cartel restricted competition in the common market by requiring that the domestic markets of the different producers (i.e., the German, French, Italian, UK and Japanese markets) be respected.”

- Cross-border cooperation provides participating firms with incentives to divert exports from each other to third country markets like the United States, leaving it prone to dumping and import surges.

- ESI analyzed trade in oil country tubular goods (OCTGs), the product affected by the cartel, from 1980 to 1997. Even though the countries represented in the cartel are among the world’s major exporters of the product, trade among Japan and European members is minimal and varies very little from year to year.

- The wrenching import surge experienced by the United States in 1998 stands in stark contrast to the seventeen years of limited trade among members of the so-called Europe Japan club. The volume of U.S. imports of pipes and tubes from Japan expanded by 160 percent from the first quarter to the third quarter of 1998, while the price of those imports declined 28 percent.
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- Japanese firms were dumping in the United States to make up for lost demand at home. While U.S. imports from Japan rose and prices plummeted, U.S. imports from the four European countries, which supply roughly one-third of global OCTG's imports, were barely affected. Were the surge driven by U.S. demand, imports from Europe would have increased as well.

- MITI data on Japanese consumption, production, and trade of ordinary steel products provide further proof that Japan's export volumes fluctuate closely with demand for steel in the Japanese market. As demonstrated in the exhibit below, lower domestic demand is closely correlated with higher exports and vice versa. Remarkably, Japanese exports appear to respond more strongly to changes in domestic steel consumption than to changes in global steel demand.

Exhibit ES.1

Steel Exports

Steel Consumption

Source: Statistics Bureau, Management and Coordination Agency, Nihon Tokai Nenkan (Japan Statistical Year Book), various issues.
*Export and consumption volumes are expressed as natural logs.
This ESI study adds to a growing body of evidence that points to widespread market distortions in global steel markets. In order to deal with the adverse consequences of cross-border cartels, closed markets, and subsidies, the U.S. industry and its workers have turned to U.S. trade laws. Yet these laws are currently facing an assault from the very governments that maintain non-competitive market structures in their home countries. As long as those structures exist, the U.S. steel industry will remain vulnerable to severe supply shocks resulting from the poor economic performance of other countries. Until there is clear progress toward eliminating market distortions, it makes sense for the United States to resist efforts to weaken U.S. trade laws.
Chapter 1:

Introduction

In March of 1999, H.R. 975, a bill to limit monthly steel imports to levels that prevailed between 1994 and 1997, passed the U.S. House of Representatives by a margin of 289 to 141. The bill’s passage was front-page news and received a high profile in newspaper editorial pages in the United States. In Japan, a huge official loan to major Japanese steel makers received relatively scant attention.

The U.S. steel industry was in dire straights at the time. The Asian financial crisis in 1997, Japan’s seemingly interminable economic malaise, and subsequent economic troubles in Russia and Brazil in the latter half of 1998, had reduced global steel demand substantially, and the United States became the destination of choice for steel exports from a number of countries. As a result, steel prices in the United States plummeted, the

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3 The English language Nikkei Weekly, in a 100-word story, reported that NKK, Sumitomo Metal Industries, and Kobe Steel received credit lines from the government-affiliated Japan Development Bank (JDB) amounting to 120-130 billion yen. The JDB thus became the largest lender to both NKK and Sumitomo Metal. See “Japanese Companies at Home,” The Nikkei Weekly (15 March 1999). Two articles appeared in the Japanese language press. “Kaihin Yushu, Kaku 400 - 450 Oku En,” (JDB loans 40, 45 billion yen, respectively), Nihon Kaizai Shim bun (8 March 1999); and “Koteki Shukan’ Danomi, Sangyokai Mo,” (“Public capital reliance, industries as well”), Nikkei Sangyo Shim bun (8 March 1999).
industry lost jobs, and its financial performance suffered even as the U.S. economy was booming.

The much-maligned quota bill ultimately was defeated in the U.S. Senate.\(^5\) Thus, relief for the industry came almost exclusively from a series of antidumping, countervailing duty, and Section 201 cases filed in 1998. The domestic industry won many, though not all, of its trade cases, and the worst of the import surge ended following the decision on the hot-rolled case in November 1998. Afterwards, domestic sales volume rose and employment levels stabilized.\(^6\) By these criteria, at least, U.S. trade laws were reasonably successful in defusing domestic tension over rising imports and job losses.

Now, however, these trade laws are currently under attack by some of the very countries that share responsibility for the steel import crisis in the United States. Japan and Korea led a charge to weaken antidumping and anti-subsidy measures prior to the December 1999 meeting of the World Trade Organization in Seattle, Washington.\(^7\) A law firm representing Japanese steel manufacturers in the United States wrote a study harshly critical of integrated U.S. steel makers and their use of trade laws.\(^8\) Japan has also filed a complaint with the dispute settlement body of the WTO over the U.S. decision in 1999 to apply duties on hot-rolled coil from Japan.\(^9\)

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\(^5\) Paul Blustein, “Bill to Restrict Steel Imports Fails to Clear Hurdle in Senate,” *The Washington Post* (23 June 1999), A06. The hot-rolled cases against Japan, Russia, and Brazil were filed on 30 September 1998.

\(^6\) Monthly employment for the blast furnace and basic steel products industry has fluctuated between 226,000 and 228,000 during the first eight months of 2000, according to data from the U.S. Bureau of Labor Statistics.


In July 2000, the U.S. Department of Commerce published its much-anticipated report on the causes of the U.S. steel import crisis.10 The well-researched study concluded that a confluence of short-term factors (i.e., lost Asian demand, currency depreciations, and strong U.S. demand) and long-term structural problems (i.e., government assistance, import barriers, and noncompetitive market structures) were at the root of the steel surge in the United States. The study took great pains to discuss many aspects of the global steel industry, including the existence of a production cartel in Japan and the so-called “East of Burma Agreement,” an alleged accord between Japanese and European steel makers that restricts steel trade between Japan and the European Union.11

Evidence of a domestic production cartel in Japan was anecdotal but also quantitative: Japanese crude steel production shares for the five major producers were virtually identical from 1978 to 1999.12 However, no quantitative evidence was provided in the discussion of the cooperative arrangement among Japanese and European producers. This omission is not surprising, given the difficulty in collecting trade data, classified in a consistent manner, for a number of countries. Moreover, analysis of such data was beyond the scope of the Department of Commerce’s mandate.

European and Japanese producers and their supporters in the United States have long denied the existence of an arrangement between them. For instance, at a Washington, DC forum in July of 2000, the Honorable Tadashi Izawa, representative of Japan’s Ministry of International Trade and Industry at the Embassy of Japan in the United States, claimed that he had been hearing about the international cartel for twenty years but had still not seen any evidence.13

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11 Global Steel Trade, 77-78.
12 Global Steel Trade, 67-68. Mark Tilton has made this point as well. See Mark Tilton, Japan’s Steel Cartel and the 1998 Export Surge (Washington, DC: Japan Information Access Project, 23 October 1998).
13 Minister Izawa made this remark while answering a question dealing with domestic and international cartels in the global steel industry. The event, “America’s Trade Agenda After the Battle in Seattle,” was sponsored by The New America Foundation and held on 20 July 2000.
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This ESI study attempts to fill the void by examining patterns of European-Japanese trade in oil country tubular goods and line pipe from 1980 to 1997, in order to detect whether the patterns are consistent with the presence of a cooperative arrangement. Chapter 2 discusses the potential consequences that such a cooperative trade arrangement would be expected to have on the United States and the cooperating countries. In Chapter 3, a methodology for detecting cooperative trade patterns is proposed. Chapter 4 reports the results of applying the proposed methodology to Japanese and European import data from 1980 to 1997. Chapter 5 discusses the impact on the U.S. steel industry of the trade distortions exposed by the data. The final chapter offers conclusions.

This paper utilizes bilateral trade data from Statistics Canada’s World Trade Analyzer, made available in the recently released CD-ROM, World Trade Flows, 1980-1997 by Robert C. Feenstra. Appendix B contains a more detailed discussion of the dataset created for this paper.
Chapter 2:
Cooperative Import Arrangements:
Potential Consequences to Third-Country Markets

Assume a world of three countries that produce and trade steel mill products. Under equilibrium, Country 1 consumes 100 million tons annually, 15 million of which are imports. Steel makers in the country produce 90 million tons, 5 million tons of which is exported. Country 2 consumes 95 million tons each year, including 20 million tons of imports. Country 2’s firms produce 100 million tons of steel, a quarter of which is exported. In Country 3, consumption is 125 million tons, imports total 25 million tons, and production and exports are 130 million tons and 30 million tons, respectively.

Exhibit 2.1
Production, Consumption, Trade of Steel between Three Countries, Millions of Tons

<table>
<thead>
<tr>
<th></th>
<th>Country 1</th>
<th>Country 2</th>
<th>Country 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption</td>
<td>100</td>
<td>95</td>
<td>125</td>
</tr>
<tr>
<td>Production</td>
<td>90</td>
<td>100</td>
<td>130</td>
</tr>
<tr>
<td>Exports</td>
<td>5</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>Imports</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

Assume that for all producers, cost per unit falls as the level of production rises. Also, firms in Country 2 have downward sloping demand curves and a production cartel that enables each domestic firm to maximize profit with respect to its own output level, given the output of others in the market. For the firms of Country 2, it makes sense to limit imports. If imports gain market share in Country 2, the ability of domestic firms to maximize profits, under given conditions of demand, would be restricted. One way for firms in Country 2 to limit imports is through a cooperative arrangement with an exporting firm(s) in Country 3 to eliminate or limit two-way trade. The firm or firms in the cooperating country would gain
from a lack of import competition in their own market because prices would likely rise and market stability would be enhanced. However, the firms in both countries would suffer from lost output associated with the forgone exports. Lost output would not only reduce revenues, but it would also raise unit costs, which rise as output falls. The solution for both countries is to divert exports to the market in Country 1. This would allow them to achieve market stability and high prices at home, while still maintaining production volumes.

The table below presents a potential outcome of collaboration between the firms in Country 2 and Country 3 to limit the bilateral trade between them. Each diverts 5 million tons of steel exports to Country 1, which finds that steel imports increase by 10 million tons due to lower prices offered. Domestic firms in Country 1 reduce their prices to avoid losing sales, but production still falls by 6 million tons. Due to lower prices, consumers in country 1 purchase 4 million more tons of steel than would otherwise be the case. In the cooperating countries, imports decline by 10 million tons and domestic production and remaining imports are sold at higher prices. As a result, both countries consume less steel than would otherwise be the case, but produce more because the drop in consumption is less than the decline in imports.

**Exhibit 2.2**

*Production, Consumption, Trade of Steel between Three Countries, with Cooperative Arrangement among Firms of Countries 2 and 3, Millions of Tons*

<table>
<thead>
<tr>
<th>Country 1</th>
<th>Country 2</th>
<th>Country 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption</td>
<td>104</td>
<td>92</td>
</tr>
<tr>
<td>Production</td>
<td>84</td>
<td>102</td>
</tr>
<tr>
<td>Exports</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Imports</td>
<td>25</td>
<td>15</td>
</tr>
</tbody>
</table>

The conventional analysis of the costs and benefits of this scenario is the comparative-static welfare analysis. In terms of net welfare, the world is worse off because production and consumption have declined by 3 million units. Producers in Countries 2 and 3 are better off, while producers in Country 1 are worse off. For consumers, the situation is reversed. According to comparative static analysis, the net welfare of Country 1 will improve because consumers gain more than producers lose. For the
collaborating countries in this case, the opposite is true – consumers lose more than producers gain.

So, is collaboration between Countries 2 and 3 an unequivocal benefit for Country 1? When it comes to steel, the conclusions of the comparative-static framework are less convincing. One of the problems with comparative-static analysis is that it typically assumes that resources released by the contracting industry are immediately utilized elsewhere in the economy. However, if those resources are not redeployed immediately and/or if they are redeployed in less productive endeavors, net welfare in the example of Country 1 could conceivably fall. This outcome is more likely in a high-wage, capital-intensive industry such as steel, in which workers laid off by the industry will receive lower pay in future jobs.\footnote{For discussion and data regarding this phenomenon, see Douglas L. Kruse, “International Trade and the Labor Market Experience of Displaced Workers,” \textit{Industrial and Labor Relations Review} (41), April 1988; Louis S. Jacobson, Robert J. LaLonde, and Daniel G. Sullivan, “Earnings Losses of Displaced Workers,” \textit{The American Economic Review}, (93, no. 4), September 1993, 685-709; Lawrence F. Katz and Lawrence H. Summers, “Industry Rents: Evidence and Implications,” \textit{Brookings Papers on Microeconomics 1989}; in Brookings Papers on Economic Activity (Washington, DC: Brookings Institution, 1989), 209-275; and Dale Hathaway, \textit{Can Workers Have a Voice?} (University Park, PA: Pennsylvania State University, 1993), 5-30.}

Another reason to question the conclusions derived via the comparative-static framework is that it ignores the corrosive impact of collaborative behavior over time. Because trade between the two collaborators does not respond to market forces, an economic slowdown in either or both countries can result in a sharp increase in exports to Country 1 at prices lower than those in the collaborators’ markets.\footnote{The resulting excess capacity provides an incentive for oligopolists to dump excess production while maintaining high prices at home. See Richard Caves and Reginald Jones, \textit{World Trade and Payments} (Boston: Little, Brown and Company, 1984) 175-177.} Such dumping can result in rising industry unemployment and even bankruptcies in Country 1, reducing the domestic industry’s ability to expand once the import surge abates. This dynamic would result in Country 1 becoming increasingly dependent on imports over time. The industry would thus receive less investment, employ fewer people, and achieve a lower market capitalization than if the collaboration did not exist.
Ultimately, the companies of Country 1 would become attractive acquisitions to buyers in the cooperating countries. As the number of firms in the three countries declined, the chances of further collaboration could increase.\textsuperscript{16} Thus, the short-run benefits of collaboration predicted by the comparative-static framework may not hold in the long run, while the cost of foreign collaboration to U.S. producers almost certainly will.

By now, it should be obvious that the scenario above loosely depicts the United States as Country 1 and Japan and Europe as the two “countries” that cut a deal. The Commerce Department study, citing a decision by the European Commission in 1999, as well as several comments from traders, notes that market-sharing arrangements between steel makers in Japan and European countries continued into the 1990s.\textsuperscript{17} The market power of Japan’s integrated steel producers is also documented by scholars such as Mark Tilton (production cartel, refusal to deal, and discriminatory government procurement); Richard Katz (government promotion of steel industry and cartels); Michael Gerlach (keiretsu relationships and inter-group alliances); and Ulrike Schaeide (weak antitrust enforcement by Japan Fair Trade Commission).\textsuperscript{18}

The United States does seem more vulnerable to import surges than either Europe or Japan. Japanese firms, despite their prolonged recession at home, seem to have the financial wherewithal to maintain their U.S. investments and excess capacity at home. Meanwhile, the United States is becoming increasingly dependant on imports to supply domestic consumption.

The U.S. experience during the late 1990s is consistent with the above scenario only up to a point. The industry’s use of trade laws enabled the U.S. industry to increase employment following the layoffs of 1998. And

\textsuperscript{16} This phenomenon is discussed in Andrew Szamosszegi, \textit{Short-Circuited: Dumping and America’s Consumer Electronics Industry} (Washington, DC: Economic Strategy Institute, 2000), 40-57.

\textsuperscript{17} \textit{Global Steel Trade}, 77-78.

even though market valuations are currently low, the U.S. industry has continued to invest in new facilities to expand domestic production capacity, which remains well below U.S. consumption levels.\textsuperscript{19}

Chapter 3:
Detecting Cooperative Arrangements in Steel Trade

The existence of cooperative arrangements among Japanese steel makers and certain steel makers in France, Germany, Italy and the United Kingdom is fact. The European Commission’s cartel finding was announced in December 1999 and resulted in fines totaling EUR 99 million spread among eight companies, including four of Japan’s main integrated producers: Nippon Steel Corporation, Kawasaki Steel Corporation, NKK, and Sumitomo Metal Industries Limited. The European Union’s 29th Report on Competition Policy described the cartel in the following way:

These firms, which are among the largest producers of seamless tubes in the world, had colluded until 1995 over keeping to their respective domestic markets for certain seamless tubes used in oil and gas prospecting and transportation…. To coordinate their behavior on the standard [oil country tubular goods] and project line pipe markets, the European and Japanese producers set up a cartel, which they called the ‘Europe Japan Club.’ The cartel restricted competition in the common market by requiring that the domestic markets of the different producers (i.e., the German, French, Italian, UK and Japanese markets) be respected: the supply of seamless tubes to Member States of the Community where a national producer was established was limited by the other producers party to the agreement refraining from delivering tubes to those markets.20

Is this collaboration evident in the steel trade of Japan and the European countries named in the EC decision? One way to approach this question is to determine whether steel trade flows between Japan and those particular

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countries in Europe respond to market forces differently than do Japanese and European steel trade with other countries.

Imports of any product are a function of demand in the importing country and relative prices between the domestic product and imports. If steel demand in the importing country rises, steel imports are likely to rise. If steel prices in the domestic country rise, steel buyers are likely to substitute some imports for purchases from domestic firms. If there were no cooperative arrangement among Japanese and European firms, the response of Japan’s imports from EU countries should be indistinguishable from the response of Japan’s imports from other countries, given changes in demand and relative price. The same goes for Europe’s imports from Japan.

For the purposes of this study, a reduced form equation was devised to test the hypothesis that a cooperative arrangement between Japanese and certain EU producers affects steel trade. Demand is represented by industrial production – as economy-wide production expands, the need for steel also expands. The exchange rate serves as a proxy for price. If the yen appreciates relative to other currencies, imports become relatively inexpensive and more attractive to steel users in Japan. Readers interested in a more technical description of the equation are encouraged to read Appendix A.
Chapter 4:  
Results for Japan and Europe

Results for Japan

A summary of the results of the tests on OCTG trade flows from the club’s European member countries to Japan appear in Exhibit 4.1 below. The coefficient for demand (i.e., industrial production), which describes the impact of a one percent change in demand on OCTGs imports, ranges from 0.79 to 1.58 in the five equations. However, the coefficients are less than one for all but one regression. In all, the coefficient implies that a one percent change in nominal demand produces approximately a one percent increase in the value of OCTG imports from the club’s European members: France, Germany, Italy, and the United Kingdom.

Exhibit 4.1  
Trade of OCTGs from Club Members to Japan, Range of Parameters for 5 Regressions

<table>
<thead>
<tr>
<th></th>
<th>Range of Coefficients</th>
<th>Range of t Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>0.79 - 1.58</td>
<td>0.59 - 1.25</td>
</tr>
<tr>
<td>Price</td>
<td>0.96 - 1.31</td>
<td>1.21 - 2.99</td>
</tr>
<tr>
<td>Coefficient of Determination</td>
<td>0.55 - 0.68</td>
<td></td>
</tr>
</tbody>
</table>

Critical to interpreting this value is the t statistic, shown in the right hand column. In general, if this statistic is too low, the value of the coefficient is considered unreliable. Put another way, a low value (the definition of “low” depends on the number of observations in the sample) indicates that the coefficient for demand is not statistically different than zero.21 Indeed, the range of t statistics for the demand coefficient indicates that the relationship between demand for OCTGs in Japan and the value of imports from club members is not statistically significant.

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21 For the parameters in Exhibits 4 and 5, the critical value for a one-sided t statistic at the five percent level of significance ranges from 1.66 to 1.76, depending on the degrees of freedom for each regression.
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The positive value of price variable (i.e., the exchange rate) indicates that the stronger yen does lead to an increase in imports. As with demand, a one percent increase in the yen’s value leads to about a one percent increase in the value of imports from club members. Yet, in contrast to the demand coefficient, some of the t statistics are high enough to suggest a meaningful relationship between the yen’s value and Japan’s absorption of OCTGs from club members.

Exhibit 4.2 includes the regression parameters for trade flowing to Japan from the rest of the world. Unlike the trade with club members, there is a strong and meaningful relationship between changes in demand and changes in imports. The range of coefficients suggest that a one percent increase in demand in Japan is associated with a three percent increase in the value of OCTG trade from rest-of-world to Japan. Just as important, the high t statistics indicate that the results are robust and not likely due to chance. The results for the exchange rate coefficients are very similar to those of the Europe Japan Club members. A one percent increase in the value of the yen produces about a one percent increase in OCTG trade from rest-of-world to Japan.

### Exhibit 4.2
Trade of OCTGs from Rest-of-World to Japan, Range of Parameters for 3 Regressions

<table>
<thead>
<tr>
<th></th>
<th>Range of Coefficients</th>
<th>Range of t Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>2.83 - 3.34</td>
<td>3.92 - 4.95</td>
</tr>
<tr>
<td>Price</td>
<td>1.13 - 1.22</td>
<td>0.80 - 6.20</td>
</tr>
<tr>
<td>Coefficient of Determination</td>
<td>0.91 - 0.92</td>
<td></td>
</tr>
</tbody>
</table>

Overall, the results indicate that Japan’s import patterns differ between club members and rest-of-world. First, in general, the variables in the rest-of-world equation explain a greater level of variation in Japan’s trade than they do the Europe Japan Club equations, as evidenced by the relatively high coefficient of determination for the rest-of-world equations. This outcome is consistent with the hypothesis that something other than demand and price – such as the Europe Japan Club – is affecting trade flows from the four European countries and Japan.

Second, ignoring for a moment the lack of statistical significance of the demand coefficient in Exhibit 4.2, OCTG trade from club members to Japan responds much less to changes in Japanese demand than do rest-of-
world trade flows. This conclusion is illustrated in Exhibit 4.3, which plots the level of Japan’s imports determined by demand against industrial production, using the fitted values from the regression equations. The line depicting rest-of-world imports is more than three times steeper than the line for club members. This, too, is suggestive of a collusive arrangement: some other factor must be limiting the sensitivity of club trade flows to Japan.

Exhibit 4.3
Impact of Japanese Demand on OCTG Trade from Club

Members and Rest-of-World - Fitted Values

Third, there does not appear to be a substantial difference in Japan’s import patterns with respect to price. A one percent change in relative price, as measured by the exchange rate, appears to affect member and non-member trade in roughly the same way. This result was unexpected.

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Cross-Border Cartels and the Steel Trade

Given the competitiveness of European producers, these results are striking. Since producers in these countries are among the world's largest, one would expect robust intra-industry trade between them and Japan. Yet, as the following exhibit illustrates, the combined import share of these countries in Japan remained absurdly low, consistent with the picture of managed trade depicted by the above regressions. Moreover, the combined market shares of imports held by the Europe Japan Club countries had grown to 7 percent in 1997, two years after the arrangement is said to have ended. The four countries last reached this penetration level in 1983.

Exhibit 4.4

![Graph showing import market shares for Japan.


This abysmal performance in Japan contrasts sharply with the overall competitive position of the four European countries in the world market. The four countries supply more than one-third of the world's imports of SITC-678 (see Exhibit 4.5), based on WTA data, and their competitive position in global markets has remained stable throughout the 1980-1997 period. These data further reinforce the view that Japanese-EU trade from 1980 to 1997 was responding to something other than market forces.
Exhibit 4.5


Results for the European Members of the Europe Japan Club

Import patterns of France, Germany, Italy, and the United Kingdom were examined using the same methodology explained in Chapter 3. Readers interested in a more detailed explanation of the methodology and results are encouraged to consult Appendix A.

The regression parameters are shown in the exhibit below. They demonstrate that French and Italian imports of OCTGs from Japan responded to changes in demand no differently than imports from rest-of-world. In fact, the demand coefficients were virtually identical for trade flows from Japan and those from other countries. These results were also statistically strong, as illustrated by the high t scores.
Cross-Border Cartels and the Steel Trade

Imports from Japan were also more responsive to changes in relative price (proxied by the exchange rate) than rest-of-world imports were, though Italy's results were not statistically significant. One possible explanation for the relatively weak exchange-rate effect in the rest-of-world equations is the use of the dollar exchange rate. This variable made sense for Japan because many of the countries that export steel to Japan had their currencies tied to the dollar during the 1980-1997 period. Using the dollar makes less sense for Europe members, where much trade occurs with countries whose currencies are not tied to the dollar.

Exhibit 4.6
Trade of OCTGs from Japan and Rest-of-World to Club Members,
Range of Parameters for 4 Regressions

(t statistics in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>French Imports</th>
<th></th>
<th>Italian Imports</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Japan</td>
<td>ROW</td>
<td>Japan</td>
<td>ROW</td>
</tr>
<tr>
<td>Demand</td>
<td>1.91</td>
<td>1.81</td>
<td>1.72</td>
<td>1.81</td>
</tr>
<tr>
<td>Price*</td>
<td>1.53</td>
<td>0.48</td>
<td>1.25</td>
<td>0.50</td>
</tr>
<tr>
<td>Coefficient of Determination</td>
<td>0.60</td>
<td>0.97</td>
<td>0.44</td>
<td>0.97</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>German Imports</th>
<th></th>
<th>UK Imports</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Japan</td>
<td>ROW</td>
<td>Japan</td>
<td>ROW</td>
</tr>
<tr>
<td>Demand</td>
<td>-0.20</td>
<td>2.20</td>
<td>2.69</td>
<td>1.51</td>
</tr>
<tr>
<td>Price*</td>
<td>0.51</td>
<td>0.21</td>
<td>1.33</td>
<td>0.85</td>
</tr>
<tr>
<td>Coefficient of Determination</td>
<td>0.13</td>
<td>0.98</td>
<td>0.60</td>
<td>0.94</td>
</tr>
</tbody>
</table>

*The sum of two price coefficients and the highest t statistic are reported for each country regression. Individual coefficients and t statistics are reported in Appendix A.

Trade from Japan to the United Kingdom, according to the demand coefficient, was more sensitive than rest-of-world trade to fluctuations in UK demand, but the low t statistic argues against drawing any firm conclusion from this result. As with France and Italy, trade with Japan was more sensitive than trade with rest-of-world to changes in relative price,
perhaps reflecting the inadequacy of the dollar exchange rate as a measure of price.

The German results offer the strongest evidence of the collaborative arrangement affecting trade. The t statistic of the demand coefficient is extremely low and the sign of the demand coefficient is actually negative—that is, higher demand in Germany was associated with a decline in imports from Japan. On the other hand, Germany's imports from rest-of-world behaved as expected. A one percent increase in demand translated into a two percent increase in imports.

As with the equations for OCTG trade flows to Japan, the coefficients of determination for European member trade are far lower for trade with Japan than for trade with rest-of-world. The German and Italian figures (0.13 and 0.44, respectively) are especially low. This offers further evidence that the cartel distorted trade flows between Japan and other club members.

Among the four European members of the club, Germany is the largest importer of OCTGs, and the peculiarities of its trade relationship with Japan overshadow the results of the other three members. Thus, as the following two exhibits illustrate, imports into the four combined European markets have generally come from countries other than Japan, even though Japan remains one of the world's major suppliers of OCTGs, accounting for one-eighth of global exports as late as 1997.
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Exhibit 4.7
Import Market Shares in Europe Japan Club Members, for Japan and Rest-of-World, for SITC 678 (Rev. 2), 1980-1997

Exhibit 4.8
World Import Market Shares for Japan and Rest-of-World, for SITC 678 (Rev. 2), 1980-1997


-- 24 --
Japan’s relatively poor showing in the markets of its fellow collaborators seems to hold even if intra-European Union trade is excluded. In Germany, for instance, Japan’s share of non-EU imports for SITC 678 (Rev. 2) steadily declined from 10 percent to 2 percent from 1980 to 1997 (see Exhibit 4.9).

**Exhibit 4.9**
*Germany’s Extra-EU Trade in SITC 678 (Rev. 2), 1980-1997, Japan versus Rest-of-World*

Chapter 5:
Impact on the United States

What has been the impact on the U.S. steel industry of the trade distortions exposed in Chapter 4? Throughout most of the 1980s, the impact was probably muted by the voluntary restraint agreements that limited the potential for import surges in the U.S. market. Those agreements lapsed in the early 1990s, but the cartel was apparently disbanded by 1996, leaving very little time to analyze how the cartel affected trade with the United States.

Nevertheless, it is worth examining the import patterns of the United States after the financial crisis in Asia began in the summer of 1997. In the wake of the crisis, and of subsequent turmoil in Brazil and Russia, a massive import surge struck the U.S. market for many categories of steel, including OCTGs. European members of the EJ Club did not substantially increase the dollar value of their exports to the United States, but Japan did. As evident in Exhibit 5.1, the volume of U.S. imports from Japan of pipes and tubes expanded by 160 percent from the first quarter of 1998 to the third quarter of that year, while the price of those imports declined 28 percent.
Exhibit 5.1
Price and Quantity of U.S. Oil Country Tubular Goods* Imports from Japan, 1996-1998, Quarterly Data
Millions of Kilograms and Dollars per Kilogram,

![Graph showing the price and quantity of U.S. Oil Country Tubular Goods imports from Japan, 1996-1998.](image)

*This data is based on SITC (Rev. 3) 679, which is analogous to SITC (Rev. 2) 678.


Of course, this response neither proves nor disproves the hypothesis that the Europe Japan club led to higher levels of U.S. imports from the collaborating firms. However, the stable price and volume of U.S. OCTG imports from European members of the club suggest that surging imports from Japan were not driven by U.S. demand. While the price of imports from Japan was collapsing and volume was exploding, the average price of U.S. imports from the other club members was actually rising (by nearly 7 percent) and volumes were actually shrinking (14 percent). If the import surge had been caused by a substantial rise in U.S. demand, U.S. imports from the four European countries – which supply roughly one-third of global OCTGs imports – surely would have risen along with imports from Japan.
A much more likely explanation for the surge in low-priced imports from Japan is suggested by the Department of Commerce’s study, which quotes one Japanese industry official as saying, “[sometimes] we took measures that could be fairly characterized as dumping in order to boost capacity utilization.”

In fact, MITI data on the consumption, production, and trade of ordinary steel products provide strong evidence that Japan’s export volumes fluctuate closely with demand for steel in the Japanese market. As evident in Exhibit 5.2, higher domestic demand is closely correlated with lower exports and vice versa. The correlation coefficient between Japanese demand for steel products and Japanese exports of steel is minus 0.81. Its absolute value is actually higher than the correlation coefficients between steel demand and imports, and steel demand and steel production, respectively.

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23 Quotation in Global Steel Trade, 66, from “Japan Firms Must Do their Part to End Steel Row,” Nihon Keizai Shimbun (7 August 1999).
Exhibit 5.2
Relationship between Japanese Steel Exports and Japanese Demand for Steel\textsuperscript{a}, 1980-1997

![Steel Exports Graph](image)

Source: Statistics Bureau, Management and Coordination Agency, \textit{Nihon Tokei Nenkan} (Japan Statistical Year Book), various issues.

\textsuperscript{a}Export and consumption volumes are expressed as natural logs.

It is conceivable that fluctuations in Japan's exports resulted primarily from fluctuations in global demand for steel, not fluctuations in domestic demand for steel. To control for this possibility, the volume of Japanese steel exports was regressed against the volume of domestic steel demand and the volume of global steel imports.\textsuperscript{24} The results of this regression are even more robust when global demand is taken into account. A one percent decrease in domestic demand is associated with an increase in exports of more than one percent.\textsuperscript{25}

\textsuperscript{24} Global steel imports are equal to global steel exports of finished and semi-finished products, as calculated by the International Iron and Steel Institute (http://www.worldsteel.org), minus Japanese imports of ordinary steel products, as calculated by the Ministry for International Trade.

\textsuperscript{25} The coefficients for domestic demand and global steel demand were minus 1.75 and minus 0.42, respectively, with both significant at the five percent level. The equation had an R-square of 0.82 and a Durbin-Watson statistic of 1.55.
Theoretically, it is possible that causality between domestic demand and exports travels in the other direction, with exports determining domestic demand. For example, weak export demand could conceivably produce price declines in the Japanese market, thus encouraging domestic steel buyers to purchase more steel. This wag-the-dog scenario seems unlikely because the domestic market for steel in recent years is about four times larger than Japanese exports. Though a series of granger causality tests could not rule out this scenario completely, they do make clear that the impact of exports on domestic demand is tiny, if it exists at all. These tests also confirm the significant effect that domestic steel demand in Japan has on Japanese steel exports.

Unless Japan’s domestic economy strengthens, or the Japanese steel industry restructures, there will continue to be substantial incentive to support capacity utilization via exports, even if those exports must be dumped. Indeed, Japan’s steel producers hold an estimated 20 million to 60 million tons in excess capacity, according to recent estimates.\textsuperscript{26} Unless chronic excess capacity in Japan and elsewhere is eliminated, the problem of dumping is likely to remain a problem in the United States.

Chapter 6:  
Conclusions

In July 2000, the U.S. Department of Commerce released a study arguing that the steel import surge of 1998-1999 was the byproduct of both cyclical events and structural factors that left U.S. producers vulnerable to import surges. That detailed study's analysis included a discussion of a cooperative arrangement between certain Japanese and European producers.

This study has attempted to validate the claim of a collaborative arrangement by using import data covering the period 1980 to 1997, with a focus on trade in oil country tubular goods between Japan, on the one hand, and France, Germany, Italy, and the United Kingdom on the other hand. This product category is ideal for this analysis, because eight companies from these countries were recently found to have collaborated in an agreement “requiring that the domestic markets of the different producers (i.e., the German, French, Italian, UK and Japanese markets) be respected.”

The results of the analysis performed here strongly suggest that trade flows between the countries were influenced by this collaboration. Although these countries account for one-half or more of global exports in OCTGs, trade between them has been extremely low. During the entire 1980-1997 period, European members of the Europe Japan Club accounted for less than ten percent of Japanese OCTGs imports, and Japan accounted for less than ten percent of their partners' imports in Europe. In contrast, since 1990, Club members accounted for 33 to 44 percent of U.S. imports in these products.

Tests of the sensitivity of member imports to changes in demand and the exchange rate indicate that Japanese imports from their European partners are much less sensitive to fluctuations in economic variables than Japanese imports from other countries. However, tests on the import patterns of European members of the Europe Japan Club were less conclusive. Germany's imports from Japan behaved significantly different from Germany's imports from other countries, but the French, Italian, and British imports did not. Over all, the cartel appears to have had less of an

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27 See footnote 21.
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impact on European imports from Japan than on Japanese imports from Europe, though Japanese market share in Europe, again, is remarkably low given Japan’s competitiveness in global markets. Overall, the U.S. industry’s complaints of the existence of a cooperative arrangement are borne out in this product category.

This study’s other hypothesis – that the collaboration among major producers of OCTGs leads to surges of dumped imports – was not tested directly. However, long-term trends in Japanese steel export patterns, as well as fluctuations in the price and volume of U.S. OCTG imports from Japan during the 1996-1998 period, are suggestive. Japanese data illustrate a strong and negative relationship between the level of steel consumption in Japan and the level of Japanese exports. That is, exports rise as domestic demand for steel falls. U.S. data indicate that U.S. imports of OCTGs from Japan skyrocketed and Japanese import prices declined at a time when domestic demand for such goods in Japan was weak. These relationships validate the Department of Commerce’s conclusion that “Japan’s non-competitive market structure helped producers sustain low-priced exports, which in turn exacerbated the 1998 U.S. steel crisis.”

This study adds to a growing body of evidence that points to the existence of market distortions in global steel markets. The existence of such distortions clearly contributed to the turmoil experienced by the U.S. steel industry in 1998 and 1999. To deal with the adverse consequences of the crisis, the U.S. industry and its workers called on trade laws that ultimately helped the U.S. market move toward its pre-crisis equilibrium. At the same time, use of these laws punished companies that chose to shift adjustment costs to the U.S. industry and its workers.

These laws currently face an assault from the very governments that maintain non-competitive market structures in their home countries. Yet as long as these structures exist, the U.S. steel industry, as well as other U.S. industries where global distortions exist, will remain vulnerable to severe supply shocks resulting from the poor economic performance of other countries.

The U.S. government is thus faced with a simple choice: maintain the effectiveness of current laws or reward countries that influence trade flows by allowing cartels, protecting their markets, and supporting excess capacity. Until there is clear progress toward eliminating these distortions, it makes

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28 Global Steel Trade, 66.
sense for the United States to fight against efforts to weaken U.S. trade laws.
Appendix A:

Description of Regression Equations and Parameters

The goal of this paper is to determine whether cooperation among European and Japanese steel producers in Europe and Japan influenced trade flows between Japan and Europe. Regression analysis was used to test whether trade flows of oil country tubular goods (data for SITC (rev. 2) 678, also known as tubes, pipes, and fittings of iron or steel, were used) between member countries in Europe and Japan behaved any differently than trade from the rest of the world to the countries of club members.

The theory underlying these tests is that changes in home country demand and relative prices should affect trade flows in a predictable manner. An increase in home country (nominal) output, for instance, should result in higher levels of (nominal) imports. Similarly, an increase in the price of the home country product relative to imports should lead to a higher level of imports, unless the price elasticity of demand for imports is less than one. If the club does not limit trade among its members, trade within the club should respond to changes in demand and price no differently than trade between the club and the rest of the world. On the other hand, if the response of intra-club trade to fluctuations in demand and price is statistically insignificant, or sharply lower than the response of rest-of-world trade flows, one could reasonably conclude that the cartel is affecting trade flows.

Ideally, the quantity of imports would serve as the dependent variable; the price of OCTGs, adjusted for the exchange rate, would serve as one of the dependent variables; and quarterly data would be used. However, acquiring the consistent price and import volume data across countries on a quarterly basis is a Herculean task and requires many judgments that could bias the results. Moreover, in principle, the issue of whether trade between Japan and other club members behaves differently than their trade with other countries should not be affected by the use of value data. An increase in nominal Japanese demand, for instance, should increase the value of Japanese steel imports because foreign exporters are unlikely to reduce prices in the face of rising Japanese demand (unless they are dumping). This is true for companies that belong to the club and those who do not.
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Thus, in a low inflationary environment, the increase in nominal Japanese demand would lead to an increase in import volume and little change in the yen price; the value of imports would then rise. Currency fluctuations would change the yen price of imports, but such effects should be captured by the exchange-rate variables. More important for the purpose of this study, there is little reason to expect imports from members and non-members to respond in a radically different manner to given bilateral exchange-rate movements.

Changes in relative price could also be captured by other variables, including raw materials costs, compensation, and capital costs, as well as the exchange rate. However, doing so would have reduced degrees of freedom, which are already low due to the constraint of using annual data. Moreover, the utility of these variables in practice is limited. For instance, raw materials for steel makers are sold on world markets, so variations would tend to affect manufacturers from most countries in the same manner. Compensation costs across countries have varied, but in practice, much of this variation is reflected in the exchange rate. For instance, hourly compensation in the United States and Japan tracked closely from 1980 to 1996 on an own-currency basis. The relative increase in Japanese compensation in dollar terms was driven in large measure by the increasing strength of the yen during the period. The exchange rate therefore seemed like a natural choice for measuring changes in relative steel prices among global producers.

For Japanese trade, the equation is:

$$ Y_t = \alpha + \beta_1 IP_t + \beta_2 ER_t + \beta_3 ER_{t-1}, $$

where

- $Y_t$ = the value of Japanese imports of SITC (Rev. 2) 678 (OCTGs) at time $t$, in yen;
- $\alpha$ = a constant;
- $IP_t$ = industrial production in Japan at time $t$;
- $ER_t$ = the nominal exchange rate per yen at time $t$; and
- $ER_{t-1}$ = the nominal exchange rate per yen at time $t-1$.

The equation takes a double log functional form, so that the coefficients can be interpreted as elasticities. Two sets of regressions were run with Japanese import data from 1980 to 1997.29 In the first set (EJ-1 through

29 The 1980-1997 period was used even though the European Commission only found the cartel active from 1990 to 1995. In light of the durability of Japan’s domestic steel cartel, and the possibility that the Europe Japan Club existed
EJ-3), the combined imports from France, Germany, Italy, and the United Kingdom served as the dependent variable. The exchange rate was an average of the four countries’ yen exchange rate, weighted by their share of OCTG imports among them. A one-year lag was used to reflect the fact that the reaction of imports to a shift in exchange rates is not instantaneous. In the second set of regressions (ROW-1 through ROW-3), imports of SITC 678 from the rest of the world served as the dependent variable, and the dollar-yen rate was used for the exchange rate variables on the right side of the equation. In both groups of equations, Japan’s industrial production was inflated by the wholesale price index. This adjustment was necessary for the industrial production variable to match the exchange rate and import data, which are both nominal.\footnote{William R. Cline, \textit{United States External Adjustment and the World Economy} (Washington, DC: Institute for International Economics, 1989), 80-81.}

Due to serial correlation in the first set of regressions, the four countries’ data were pooled and used in another ordinary least squares regression (EJ-4). The yen exchange for each individual country was used instead of the weighted average employed in the first set of equations. Three dummy variables were added to reflect the fact that each country would likely require its own intercept. This equation exhibited first-order serial correlation, which was corrected with a time-series autocorrelation procedure (EJ-5).

In all equations, the coefficient $\beta_1$ is expected to have a positive sign in both equations because higher demand should lead to higher imports. Since EU data is expected to be less responsive than imports from other countries, the magnitude of $\beta_1$ for the Europe Japan Club equation is expected to be lower than for the rest-of-world equation. The sum of coefficients $\beta_2$ and $\beta_3$ are also expected to be positive, because a stronger yen (a rise in the exchange rate variable) should reduce the yen price of importing steel, thereby increasing the attractiveness of imports. Here, too, the coefficients for the Europe Japan Club members are expected to be lower than those for rest-of-world.

The import data was taken from the CD-ROM \textit{World Trade Flows, 1980-1997}, by Robert C. Feenstra. The data was then converted from dollars previously under a different designation, I viewed the longer time period as appropriate.
into yen using the period average exchange rate from the International Monetary Fund’s *International Financial Statistics Yearbook 1999* (IFS). The exchange rates used in the regressions were also drawn from the *IFS*, and were converted into yen rates. Data on Japan’s industrial production were taken from *The Economic Report of the President: 2000*.

**Results for Japan**

The results for the regressions on Japanese imports are shown below. The statistics in the column EJ-1 indicate that none of the coefficients are statistically significant at the 5 percent level, though each one has the expected sign. EJ-2 and EJ-3 are variations of the original regression. In both cases, the industrial production coefficient is not statistically different from zero. However, the exchange rate coefficient in each of these regressions is statistically significant and indicates that a one percent appreciation of the yen translates into a one percent increase in the yen value of Japanese imports of steel OCTGs. The coefficient of determination is about 0.6 for each equation, indicating that the equations explain 60 percent of the variation of Japanese OCTG imports from France, Germany, Italy, and the United Kingdom.

**Exhibit A.1**

Results of Regressions Testing the Response of Japan’s OCTG Imports from Europe Japan Club Members

(\(t\) statistics in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>EJ-1</th>
<th>EJ-2</th>
<th>EJ-3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industrial Production</strong></td>
<td>0.83</td>
<td>1.58</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>(0.59)</td>
<td>(1.25)</td>
<td>(0.60)</td>
</tr>
<tr>
<td><strong>Exchange Rate</strong></td>
<td>0.11</td>
<td>0.96</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(0.14)</td>
<td>(2.58)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Exchange Rate (lagged)</strong></td>
<td>0.99</td>
<td>-</td>
<td>1.09</td>
</tr>
<tr>
<td></td>
<td>(1.21)</td>
<td>-</td>
<td>(2.99)</td>
</tr>
<tr>
<td><strong>(R^2)</strong></td>
<td>0.59</td>
<td>0.55</td>
<td>0.59</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td><strong>DW</strong></td>
<td>0.87</td>
<td>1.06</td>
<td>0.86</td>
</tr>
</tbody>
</table>

The low values of the Durbin-Watson d statistic (DW) indicate likely serial correlation in each of equations EJ-1 and EJ-3. The corrective procedures described above, however, do little to alter the picture painted by the results in the previous exhibit. Moreover, the additional data points increase the robustness of the results, which are shown in Exhibit A2. The industrial
production variable was, in each case, not statistically different from zero (note the low t statistics). There was a somewhat stronger and significant exchange-rate effect present in the lagged variable, but the results generally confirm expectations that European OCTG exports to Japan do not respond strongly to changes in Japanese demand.

Exhibit A.2
Results of Regressions Testing the Response of Japan’s OCTG Imports from Europe Japan Club Members

(t statistics in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>EJ-4</th>
<th>EJ-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Production</td>
<td>0.79</td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td>(0.81)</td>
<td>(0.84)</td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>-0.15</td>
<td>-0.14</td>
</tr>
<tr>
<td></td>
<td>(-0.26)</td>
<td>(-0.24)</td>
</tr>
<tr>
<td>Exchange Rate (lagged)</td>
<td>1.39</td>
<td>1.43</td>
</tr>
<tr>
<td></td>
<td>(2.31)</td>
<td>(2.88)</td>
</tr>
<tr>
<td>Germany</td>
<td>2.14</td>
<td>2.01</td>
</tr>
<tr>
<td></td>
<td>(6.10)</td>
<td>(3.69)</td>
</tr>
<tr>
<td>Italy</td>
<td>-6.92</td>
<td>-9.78</td>
</tr>
<tr>
<td></td>
<td>(-4.83)</td>
<td>(-2.25)</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>3.05</td>
<td>1.31</td>
</tr>
<tr>
<td></td>
<td>(4.87)</td>
<td>(0.75)</td>
</tr>
<tr>
<td>R²</td>
<td>0.56</td>
<td>0.68</td>
</tr>
<tr>
<td>N</td>
<td>72</td>
<td>68</td>
</tr>
<tr>
<td>DW</td>
<td>1.00</td>
<td>1.84</td>
</tr>
</tbody>
</table>

Exhibit A3 below depicts results for Japan’s imports from the rest of the world. In each regression, the coefficient for industrial production is statistically significant at the five percent level and roughly equal to three. In other words, a one percent increase in industrial production translates into a three percent increase in steel imports from the rest of the world. In ROW-2 and ROW-3, the coefficient for the exchange rate at time t is more than one and is statistically significant. Serial correlation is likely in equation ROW-3, but pooling the data, as was done with the EJ-1 through EJ-3, is not an option. Furthermore, the small size of the sample argues against using the generalized least squares procedure.
Cross-Border Cartels and the Steel Trade

Exhibit A.3
Results of Regressions Testing the Response of Japan’s OCTG Imports from the Rest of the World

(t statistics in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>ROW-1</th>
<th>ROW-2</th>
<th>ROW-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Production</td>
<td>2.94</td>
<td>3.34</td>
<td>2.83</td>
</tr>
<tr>
<td></td>
<td>(4.16)</td>
<td>(4.95)</td>
<td>(3.92)</td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>0.57</td>
<td>1.13</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(1.37)</td>
<td>(6.09)</td>
<td>-</td>
</tr>
<tr>
<td>Exchange Rate (lagged)</td>
<td>0.65</td>
<td>-</td>
<td>1.20</td>
</tr>
<tr>
<td></td>
<td>(1.45)</td>
<td>-</td>
<td>(6.20)</td>
</tr>
<tr>
<td>R²</td>
<td>0.92</td>
<td>0.91</td>
<td>0.91</td>
</tr>
<tr>
<td>N</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>DW</td>
<td>1.06</td>
<td>1.23</td>
<td>1.00</td>
</tr>
</tbody>
</table>

These results strongly support the hypothesis that OCTG exports to Japan from France, Germany, Italy, and the United Kingdom were influenced by a cooperative arrangement. The response of Japanese imports from these countries to a rise in steel demand in Japan was not statistically different from zero, while the response of imports from other countries was strong and statistically significant. On the other hand, imports from both groups of countries experienced an exchange-rate effect.

Results for European Members

The equation presented above was modified and used to test the responsiveness of French, German, Italian, and UK imports of OCTGs from Japan and the rest of the world. Imports of SITC 678, converted into the appropriate currency, served as the dependent variable. As for the independent variables, nominal industrial production for each country was calculated from data in IMF’s International Financial Statistics Yearbook. The exchange rates used were the inverse of those used in the regressions testing Japan’s imports in section 4.1 (i.e., the yen per franc rate was used instead of the franc per yen rate). For the equations testing rest-of-world imports, the inverse of the home country exchange rate per dollar was used.

The tests on the import patterns of European members of the Europe Japan Club suggest that the cartel had less of an impact on European
imports from Japan than on Japanese imports from Europe. The coefficients for industrial production in the French and Italian equations differed by only one-tenth of one percent and were both significant at the five percent level, implying similar treatment between imports from Japan and those from other countries. For the UK, this coefficient was even larger for Japan than for the rest of the world, but was not statistically significant. Only for Germany was there strong evidence for a cooperative agreement limiting Japanese imports – the industrial production coefficient was actually negative. This result is rather striking because Germany is the world’s fourth largest consumer of steel. One would expect one of the largest consumers of steel to purchase a substantial amount of a product from one of the world’s main exporters.

For the exchange-rate coefficients, imports from Japan were generally more responsive, but most results were not statistically significant.
### Exhibit A.4
Results of Regressions Testing the Response of Europe Japan Club OCTG Imports from Japan and the Rest of the World

(t statistics in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>French Imports</th>
<th></th>
<th>Italian Imports</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Japan</td>
<td>ROW</td>
<td>Japan</td>
<td>ROW</td>
</tr>
<tr>
<td>Industrial Production</td>
<td>1.91</td>
<td>1.81</td>
<td>1.72</td>
<td>1.81</td>
</tr>
<tr>
<td></td>
<td>(2.53)</td>
<td>(20.44)</td>
<td>(3.03)</td>
<td>(18.04)</td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>-0.17</td>
<td>0.15</td>
<td>0.58</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td>(-0.39)</td>
<td>(1.07)</td>
<td>(1.43)</td>
<td>(2.05)</td>
</tr>
<tr>
<td>Exchange Rate (lagged)</td>
<td>1.70</td>
<td>0.33</td>
<td>0.67</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>(3.28)</td>
<td>(2.50)</td>
<td>(1.41)</td>
<td>(-0.08)</td>
</tr>
<tr>
<td>R²</td>
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<td>0.44</td>
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<tr>
<td>DW</td>
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<td>2.13</td>
<td>2.18</td>
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<table>
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<th></th>
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<td>Japan</td>
<td>ROW</td>
<td>Japan</td>
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<td>2.69</td>
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<td></td>
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<td>(15.48)</td>
<td>(1.64)</td>
<td>(14.67)</td>
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<td></td>
<td>(0.17)</td>
<td>(0.83)</td>
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<tr>
<td></td>
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<td>(0.79)</td>
<td>(2.27)</td>
<td>(2.56)</td>
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<tr>
<td>R²</td>
<td>0.13</td>
<td>0.98</td>
<td>0.60</td>
<td>0.94</td>
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<tr>
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<td>1.45</td>
<td>2.71</td>
<td>2.30</td>
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The independent variables for France, Italy, and the United Kingdom exhibit severe multicollinearity in the equations for trade with Japan. No corrective procedure was performed because multicollinearity does not bias the coefficients. Moreover, the theoretical basis for keeping both the exchange rate and industrial production variables is sound.

The negative coefficient for some of the exchange-rate coefficients is not surprising, given that the full impact of a currency fluctuation on imports occurs gradually. In fact, a currency appreciation in the importing country
initially leads to a decrease in the value of imports because the home currency price of imports declines immediately, but volume adjusts over time. This pattern leads to the so-called J-curve effect. At first, the impact of a lower import price overwhelms rising trade volume, so the value of imports declines. As economic actors process and react to the new price environment, volumes rise and the value of trade rises.

The divergence of the demand and price coefficients was the only unexpected result of this study. As expected, the demand coefficients among member countries were not statistically significant, while coefficients for trade between members and nonmembers were statistically significant. However, there was no appreciable difference in the response to changes in the exchange rate. In fact, some equations showed greater sensitivity to currency fluctuations in intra-club trade. As noted elsewhere in the study, the equations for European imports from rest-of-world used the dollar exchange rate as the price variable, a choice that perhaps inaccurately represents the geographical composition of European trade. Another possibility is that the club targeted values denominated in the home currency rather than targeting quantities. An appreciation of the yen would thus enable European members to trade with the market and increase quantities exported to Japan. Japanese exporters, on the other hand, would reduce their exports to Europe. This type of an arrangement would favor the exporters from countries with the depreciating exchange rate. It is almost inconceivable that Japanese firms would favor such a scheme, but it does explain why trade flows among members respond to price but not to changes in demand.
Appendix B:  

Data on Bilateral Trade Flows in Steel

The source of the data on bilateral steel trade appearing in this paper is *World Trade Flows, 1980-1997* (WTF), by Robert Feenstra of the University of California, Davis. The machine-readable data files in WTF are United Nations trade data recompiled by Statistics Canada, using a version of the Standard Industrial Classification (SITC) Revision 2, into a dataset known as the *World Trade Analyzer* (WTA).\(^{31}\) The database contains bilateral trade flows (specifically imports) for all countries and all products, down to the fourth-digiteration level of the SITC, from 1980 to 1997.

For this study, a database of bilateral steel imports (SITC 67 Revision 2) covering the 1980 to 1997 period was created. This was accomplished by splicing annual steel data from each WTF file into a new file of steel-only data.\(^{32}\) Each line of data includes the year, the importing country, the four-digit SITC Revision 2 number, the exporting country, and the value of imports. The resulting database includes 369,304 lines of data.

The analysis in this study focused on SITC 678 Revision 2: tubes, pipes, and fittings of iron and steel. This category includes tubes and pipes of cast iron (6781); seamless tubes and pipes and blanks for tubes and pipes (6782); other tubes and pipes, of iron and steel (6783); high pressure, hydroelectric conduits of steel (6784); and tube and pipe fittings (joints, elbows) of iron or steel (6785).\(^{33}\) There are 112,507 lines of data with the year, importer, product category, exporter, and import value represented on each line. This dataset served as the basis for the statistical analysis presented in this study.


\(^{32}\) Each year of the *WTF*’s WTDB*.ASC files is organized into three files, one of which contains bilateral import data at the four-digit level for SITC 67.

\(^{33}\) Feenstra, 31.
Appendix C

Press Release Announcing the Cartel Finding by the European Commission

iP/99/957

Brussels, 8 December 1999

Commission fines cartel of seamless steel tube producers for market sharing

The European Commission today adopted a decision under Article 81 EC which imposed fines totalling EUR 99 million on eight producers of seamless steel tubes [British Steel Limited (United Kingdom), Dalmine S.p.A. (Italy), Mannesmannröhren-Werke A.G. (Germany), Vallourec S.A (France), Kawasaki Steel Corporation, NKK Corporation, Nippon Steel Corporation and Sumitomo Metal Industries Limited (Japan)]. The producers colluded until 1995 over the observance of their respective domestic markets for certain seamless tubes used in oil and gas prospecting and transportation. "The decision concerns the straightforward sharing of markets in basic products," said Mario Monti, the Commissioner for Competition. "The infringement, which is the first cross-border cartel case I have handled, is a very serious breach of the principles of competition and calls for a really dissuasive penalty. It must remain an example of what should be studiously avoided."

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Background

Products
The products in which there was a cartel are "standard" steel borehole pipes (commonly known as "oil country tubular goods", or OCTG) and "project" transportation pipes (commonly known as "line pipe"); both varieties are used in the exploration and transport of oil and gas.

The seamless steel tube producers concerned
Community firms: British Steel (United Kingdom), Dalmine (Italy), Mannesmannrohren-Werke (Germany) and Vallourec (France).


The firms are among the largest producers of seamless tubes in the world.

Operation of the cartel
To coordinate their behaviour on the standard OCTG and project line pipe markets, the European and Japanese producers set up a cartel, which they called the «Europe - Japan club».

The cartel restricted competition in the common market by requiring that the domestic markets of the different producers (i.e. the German, French, Italian, UK and Japanese markets) should be respected: the supply of seamless tubes to Member States of the Community where a national producer was established was limited by the other producers party to the agreement refraining from delivering tubes to those markets. Other parts of the cartel agreement, which related to certain third markets, were not covered by the decision, since the Commission could not provide evidence of a restrictive effect within the EU.

As regards duration, the Commission decided that the infringement lasted from 1990 to 1995 (except in the case of British Steel, which ceased producing the pipes in 1994).
**Fines**

In fixing the amounts of the fines, the Commission took account of the fact that, by definition, an agreement aimed at the observance of the domestic markets of the participating firms constitutes a very serious infringement of Community law, since it undermines the proper functioning of the single market. Moreover, the four Member States in question account for most of the consumption of seamless OCTG and line pipe in the EC and hence constitute an extensive geographic market.

However, the Commission also considered that the standard OCTG and project line pipe sold in the Community by the firms to which the decision is addressed account for only about 19% of Community consumption of seamless OCTG and line pipe. Lastly, the sales of these products in the four Member States in question by the firms to which the decision is addressed were only about EUR 73 million a year during the period 1990-95. As a result, in practice, the infringement has had only a limited impact on the market.

As attenuating circumstances, the Commission noted that the sector was in a long-term crisis and that its position had deteriorated since 1991; coupled with the increasing flow of imports, these factors have resulted in capacity reductions and plant closures.

Pursuant to the Notice on the non-imposition or reduction of fines in cartel cases,* the fines on Vallourec and Dalmene were reduced, since the firms had cooperated with the Commission in the establishment of the facts.

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Seamless steel tubes case

Fines imposed

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<tr>
<th>Company</th>
<th>EUR</th>
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<tbody>
<tr>
<td>Mannesmannröhren-Werke</td>
<td>13.500.000</td>
</tr>
<tr>
<td>Vallourec</td>
<td>8.100.000</td>
</tr>
<tr>
<td>British Steel</td>
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<td>Dalmine</td>
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<td>Kawasaki Steel Corporation</td>
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<tr>
<td>NKK Corporation</td>
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Bibliography


Cross-Border Cartels and the Steel Trade


