

Homework 2 Essay: The Lysine Cartel and Collusion Theory

This essay examines the extent to which economic models on collusion explain the features and behavior of the international lysine cartel that operated between 1992 and 1995. The essay begins with a brief sketch of the cartel, followed by a discussion on collusion theory. Next, this essay describes the ways in which economic theory is consistent and inconsistent with the actual characteristics of the cartel.

I. Background on the Lysine Cartel

Between 1992 and 1995, an international lysine cartel that included five companies illegally colluded on prices around the world. Lysine is an amino acid used as a feed additive to enhance muscle growth in livestock. Prior to the collusive agreement, worldwide sales of lysine were over \$600 million annually and this figure increased by \$200 million following the price-fixing arrangement.¹ Cartel members included the main producers of the lysine industry—Sewon (Korea), Cheil Jedung (Korea), Kyowa Hakko (Japan), Ajinomoto (Japan), and Archer Daniels Midland, ADM (USA). The Korean and Japanese firms originally colluded until 1992 when ADM entered the industry with a plant with 50% of the world production, and triggering a price war. Instead of pushing the least efficient producer out of the industry, the firms decided to collude and fix prices.

For several years, the cartel was covertly investigated by the FBI with the help of whistle-blower Mark Whitacre. According to the Department of Justice, the U.S. price for lysine doubled in the first three months of the conspiracy and yielded significant profits as a result of overcharge.² The lysine cartel and subsequent court case were significant for several reasons. First, this case was the first successful prosecution of an international cartel in over a half century. Second, this case signaled increasing attention from U.S. and overseas antitrust officials on the behavior of multinational corporations. Third, this case indicated the government's ability to use rigorous investigative techniques to what had been formerly treated as a gentle, 'white-collar' activity. Fourth, this case marked the escalation of monetary sanctions for criminal price-fixing. Indeed, ADM pleaded guilty to price-fixing in October 1996 and paid \$400 million in civil fines and \$100 million in criminal fines. Moreover, the lysine cartel held significant implications for the development of collusion models.

II. Collusion Theory

¹ Hammond, Scott. "Caught in the Act: Inside an International Cartel," OECD Competition Committee Working Party No. 3. Public Prosecutors Program, Antitrust Division, U.S. Department of Justice. 18 October, 2005.

² Garland, Susan B. and Emily Thornton. "Justice's Cartel Crackdown," *Business Week*. 27 July 1998. (3588): 50

A cartel is a union of two or more legally independent firms that explicitly agree to coordinate their prices or output in order to increase collective profits to a level as close as possible to that of a monopolist.³ In other words, a cartel is a form of oligopoly of companies that are normally competitors in the same industry.⁴ In a competitive market with homogeneous goods and identical costs, firms cannot make above-zero profit in the long run, because having positive profit leads to entry of firms and entry drives down profit. However, if firms colluded, they could behave as monopolists, produce the monopoly output, and raise industry profits. This behavior reflects the difference of treatment of industry externality: in perfect competition, the actions that each firm undertakes do not maximize welfare, since firms do not account for how their actions affect others. As a result, when a firm increases output to maximize profits, it imposes an “externality” on other firms by driving down the market price. A cartel, on the other hand, internalizes this externality and accounts for how one firm’s action affects the others.

Different industries possess characteristics that render collusion more or less feasible. Economic models hold that several factors facilitate coordination. First, the existence of fewer firms in an industry enables co-conspirators to more easily reach agreements and keep collusion secret. Second, some economists argue that higher concentration of sellers provides for market power.⁵ Third, product homogeneity of an industry facilitates collusion by simplifying negotiations over costs and price. Fourth, companies whose products have inelastic demand can ratchet up prices without losing many customers. Companies can reduce output slightly (with the added advantage that the small decrease is easier explained with reasons other than collusion) and increase a relatively large share of price.⁶ Fifth, sealed bidding provides for easier monitoring of cheating, since all prices are published. Sixth, industry social structure may facilitate collusion if a dominant firm exists to organize and maintain collusion through leadership and threats, or if an industry association collects information on firm output and thus helps overcome the information problem. Seventh, industries facing relatively stable demand can maintain cartels more easily, since cartels would not have to contend with frequent fluctuations in demand and this output and price.

III. Analyzing the Lysine Cartel with Collusion Theory

3 Connor, John M. “Global Cartels Redux: The Amino Acid Lysine Antitrust Investigation (1996).” *The Antitrust Revolution—Economics, Competition, and Policy*. 4th ed., ed John E. Kwoka Jr. and Lawrence J. White. Oxford University Press, New York. 2004. p. 252-274

⁴ Ibid. Cartels almost always agree to raise their list prices, to lower total production, or both; they may fix market shares or allocate specific customers, impose uniform selling conditions, sharing sales information, monitoring price agreements, pooling and redistributing profits, adopting a method for punishing deviants.

⁵ According to Hay and Kelley, concentration as an industry characteristic that facilitates cartel formation is arguable. Market power can substitute for collusion, or is it the awareness that firms are interdependent on one another?

⁶ But this might lead to entry by other firms.

Economic models cannot be applied perfectly to every industry. In the case of the lysine cartel, there were significant aspects of the cartel that were consistent with economic theory and components that deviated from it. In several principal ways, the lysine cartel's features and behavior were consistent with collusion theory. The lysine industry was a classic oligopoly and its characteristics facilitated the formation and maintenance of the cartel. The lysine industry saw high seller concentration, low concentration low, perfect product homogeneity, and several barriers to entry.⁷ The fewness of firms in the industry enabled collusion to take place with low costs (fewer parties involved). In fact, these features were conducive to collusion that some economists argue that implicit coordination would have arisen even in the absence of explicit coordination.⁸

Additionally, several aspects of the cartel's behavior also followed economic theory. First, the cartel members had to meet frequently to set prices and output targets, so that they can adequately respond to changes in demand in the industry. Second, members faced incentive to cheat and leaders of the cartel led establish enforcement mechanisms. In the case of the lysine cartel, fixing prices above marginal cost created incentive to expand output beyond agreed upon values and increase profits. According to Connor, "the lysine cartel members squabbled frequently and the two smallest members [the Korean companies] were strongly inclined to cheat." As a result of disagreements, a sharp price war erupted in 1993 and lasted several months, until ADM and Ajinomoto (the larger firms in the cartel) demanded two mechanisms: tonnage quotas and a compensation scheme. To allocate quotas, the cartel calculated global demand and divided market share by buyers or geographic areas, to create "territories." It also maintained a "score sheet" to monitor output shares, projected shares, and progress to target. Since coordinating the exact market share was practically difficult, the compensation scheme remedied discrepancies to actual output by making firms that sold more than its quota to buy from under-selling firms. These two schemes helped maintain market shares and discourage cheating.⁹

Interesting, the compensation scheme was in place but never actually used, as cartel members conformed to allocated market shares. Connor points out that this was attributable to the credible threat of retaliation against cheaters—ADM had a new and efficient plant and plenty of excess capacity, and the company frequently reminded its co-conspirators of its ability to flood the market. This threat was viewed as credible, since ADM had twice driven the world price of lysine to below its own average total cost of production. Further, ADM boosted the credibility of its threat by inviting the cartel members to tour its plant.¹⁰ ADM lysine division executive Mark Whitacre told a consultant of Japanese lysine companies

⁷ Connor, 2004. p. 266

⁸ Ibid.

⁹ Eichenwald, 2004.

¹⁰ Connor, 2004. p. 252-274

that ADM had enough capacity and low enough cost to go into a price war.¹¹ Together, the claim of low production cost, the threat-making of retaliation and the credibility of the leader firm prevented cheating by smaller members of the cartel, and affirms the theory that reputation plays an important role in collusion. In this case, firm believed ADM had the intention and ability to retaliate ‘hard’ with its low cost and high capacity levels.

Five aspects of the cartel’s features and behavior deviated from the model in collusion theory. According to Cabral, there exists a disconnect between the real world lysine cartel behavior and optimal collusion theory, simple (grim-strategy) collusion models. Optimal collusion theory predicts potentially complex equilibrium patterns that often do not always match the behavior of industries. On the other hand, the restriction to grim strategies seems rather arbitrary and, again, not particularly consistent with the behavior of real world industries and cartels. These discrepancies may be attributable to the differences of the cartel from the standard cartel model.¹²

First, as the collusion model goes, the cost of forming and maintaining a collusive contract is so high that the incidence of cartels is low and their lives fleeting. The lysine cartel, however, does not fit this story. “Internal memoranda and extensive trial testimony by cartel participants confirm that the conspirators anticipated that the rewards from price fixing would far outweigh the costs of operating the cartel. ADM top officials said in 1992 that they expected collusion to generate \$200 million in joint profits in the global market, a third of the annual lysine sales. Expecting a sharp turnaround from a money-losing lysine business to significant profits, ADM projected it would and earned over \$200 million in profits from its three year participation in the cartel.¹³ Moreover the operation costs of the cartel was lower than what the theory would predict, since few firms were involved and the total number of top executives or regional managers who worked together to set prices and quotas did not exceed forty.¹⁴

Second, in the real world the information constraints faced by firms are different from the ones normally assumed in collusion theory. The lysine cartel did not have complete information with respect to capacity, cost levels, market shares and market growth. For example, the lysine industry faced seasonal fluctuations in demand from swine feeding practices of producers in temperate zones. While the fluctuation was predictable, member firms only had six years of data to predict market shares and growth rates. An information problem also affected the credibility of cooperation and threats: Japanese executives, suspecting ADM to be bluffing on its capacity, took up ADM’s offer of touring ADM’s

¹¹ Cabral, Luis M. “Collusion Theory: Where to Go Next?” *Journal of Industry, Competition, and Trade*, 5 (2005): 199-206.

¹² Ibid

¹³ Connor, 2004. p. 262

¹⁴ Eichenwald, 2004.

plant.¹⁵ Imperfect information influences the bargaining position of firms and the negotiation process. This is significant since firms do not just come up with a cartel equilibrium solution. There are many possible equilibria, and incomplete information hinders agreements about each firm's "cut."

Third, much of collusion theory concerns the optimal solution for a symmetric cartel. In reality, however, cartel participants are different from each other in several significant ways, such as cost, and production capacity. In the case of the lysine cartel, ADM possessed enough capacity to supply 50% of global demand and ADM had intended to use predatory pricing to put at least one of the incumbent firms out of business in order to achieve global market share parity with Ajinomoto. The lysine cartel was not symmetric, and therefore the issue of which firm gets what is at least as important as the overall plan for the cartel. Differences among firms contributed to difficulty to reach agreements, since firms sought larger shares of profits for themselves. It also meant that some members stood to gain more from collusion than others. The inefficient, small producers of the lysine industry were "saved" from being priced out of the market by ADM, because of the collusive arrangement.

Fourth, current theory holds that price wars can be an equilibrium phenomenon, as a result of trying to enforce the cooperative equilibrium. As Green and Porter (1984) argue, all firms simultaneously enter into a price war when observed demand is low. However, Cabral maintains that rather than equilibrium enforcement, price wars correspond to competitor retaliation or an attempt to improve a firm's bargaining position. In the case of the lysine cartel, price wars were initiated by one firm, not simultaneously by all firms. This contention seems to be supported by the findings of Harrington and Skrzypacz (2005), who modeled a repeated game where market shares are perfectly observable but prices are not, an assumption that seems consistent with the facts of the lysine market. They found a surprising result: no collusion could be sustained by symmetric punishments. "In fact, under symmetric punishments a firm that cut price would increase the probability that its market share would go past the punishment threshold; but it would also decrease the probability that the rival's market share would go past that trigger, so that the net change in probability of punishment is zero." Still, economic theory would still partially account for the behavior of the lysine cartel. Even though no symmetric punishment equilibrium existed, asymmetric punishments could create equilibrium by transferring from the presumed deviator to the presumed innocent firms. For the lysine cartel, the compensation scheme served this purpose.¹⁶

Lastly, the lysine cartel differed from the standard model of collusive industries in that, usually, trade associations precede cartels. The existence of a trade association tended to facilitate the formation of cartels by collecting data on market share, prices, and output, and helping the firms overcome the

¹⁵ Eichenwald, 2004.

¹⁶ Cabral, 5.

information problem. In the case of lysine, the sequence was reverse, as the cartel created the “Amino Acid Working Group” as part of the industry association. While this difference is not particularly interesting for its implications on economic theory, it illustrates the brazen nature of the lysine cartel and participants.

IV. Conclusion

The international lysine cartel presents an interesting case study of collusion theory. Features and behavior of the cartel that conformed with the prediction of economic models sprang from an industry that was originally oligopolistic and conducive to collusion. Further, the cartel operated using mechanisms such as score sheets and a compensation scheme that would facilitate monitoring and deter cheating. Nonetheless, aspects of the cartel depart from collusion theory, posing problems to reach and maintain equilibrium. These aspects include incomplete information, demand fluctuation, the lack of symmetry, and initiation of price wars. In all, the lysine cartel affirms that economy theory is useful for analysis, but no theory can completely capture the complexity of real-world phenomena.

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