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Defending against potential collusion by your suppliers—26th Colin Clark Memorial Lecture[☆]



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1. Introduction

This article reflects the comments that I made at the 26th Colin Clark Memorial Lecture in Brisbane. I am grateful for the opportunity to honor the distinguished economist Colin Clark in this way.

An important component of almost any manufacturing process is the procurement of inputs for use in that manufacturing process. When inputs are available from more than one rival supplier, manufacturers may be able to use that rivalry to police the prices they must pay for the inputs. For example, a manufacturer might solicit competing bids from rival suppliers, perhaps using a formal auction process, or perhaps through less structured negotiations that allow the manufacturer to play suppliers off against one another. An individual is using competition to police prices when he or she gets price quotes from alternative providers of services, such as home repair services or lawn services.

This process can work well when the alternative suppliers pursue their unilateral self-interest by being willing to undercut the prices of their rivals in order to win business as long as they prefer to win the business rather than not at those prices. Not only does this process help buyers to secure good prices, but it also leads to an efficient allocation of resources because the suppliers who win the business are the most efficient ones.

While the competitive process is good for buyers and for overall economic efficiency, suppliers may be able to increase their profits if they work together to suppress rivalry. For example, if suppliers divide up customers among themselves and agree not to bid aggressively for the customers allocated to their rivals, then all suppliers may be able to achieve higher profits. The suppression of rivalry using communication and/or transfers is referred to as collusion, and the firms engaged in collusion are referred to as a cartel. Collusion is typically prohibited by antitrust laws. However, the profitability of collusion means that it occurs despite its illegality.

For example, beverage manufacturer Coca-Cola purchases many inputs, including high-fructose corn syrup, citric acid, vitamin C, cardboard boxes, and freight shipping. All of these inputs have been the focus of antitrust action related to collusion among the suppliers. As another example, computer manufacturers Dell and Hewlett Packard purchase components and peripherals for the computers they manufacture, including CRT displays, LCD displays, DRAM, optical disk drives, and rechargeable batteries. Again, all of these inputs have been the focus of antitrust actions alleging collusion.

It appears that collusion has been pervasive among suppliers of auto parts, with a long list of auto parts being subject to prosecution, as shown in Fig. 1.

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Air conditioning systems	Electronic control units	Power steering assemblies
Air flow meters	Electronic throttle bodies	Power window motors
Air fuel ratio sensors	Fan motors	Radiators
Airbags	Fuel injection systems	Seatbelts
Alternators	Fuel senders	Spark plugs
Anti-vibration rubber products	Heater control panels	Speed sensor wire assemblies
Automatic transmission fluid warmers	HID ballasts	Standard oxygen sensors
Automotive hoses	High intensity discharge ballasts	Starter motors
Bearings	Ignition coils	Steering angle sensors and switches
Brake hoses	Instrument panel clusters	Steering wheels
Catalytic converter substrates	Inverters	Valve timing control devices
Compressors	Lighting fixtures	Windshield washer components
Condensers	Manual steering columns	Windshield washer systems
Constantvelocity-joint boot products	Motor generators	Wire harnesses

Fig. 1. Auto parts cartels with fines imposed.

Source: DOJ Auto Parts Cartel Investigation Chart, *Practical Law Antitrust*, Thomson Reuters, 2015.

Specific to Australia, the Australian Competition & Consumer Commission provides information on a number of cartels that it has prosecuted.¹ As a result of collusion involving two Australian suppliers of cardboard boxes, Visy and Amcor: “Thousands of firms (and ultimately millions of consumers) were significantly overcharged by the cartel. The Federal Court ordered Visy and Amcor to pay \$95 million in damages to a customer class action involving more than 4500 businesses”.² Collusion among suppliers of air cargo services on routes to and from Australia involved Qantas, British Airways, Japan Airlines, and Korean Airlines. In Queensland, suppliers of pre-mixed concrete, Pioneer, Boral, and CSR, colluded: “Market shares were maintained by the companies recognizing certain customers (referred to as ‘pets’) as belonging to certain suppliers and agreeing not to compete for their business. The participants even engaged an accountant to monitor market shares so they could enforce compliance with the agreement”.³ Collusion in ocean shipping involving Nippon Yusen Kaisha and others resulted in Australia’s first criminal cartel charge against a corporation.⁴

Thus, despite being illegal, collusion happens, even in Australia. The threat of collusion among input suppliers puts buyers in a position of needing to adjust their procurement practices and level of vigilance over their suppliers—costs that they would not have to incur if they could rely on competition to police prices. With this background, it is useful to ask what manufacturers can do to defend against collusion among their input suppliers.

One component of a defensive strategy against collusion is to identify collusive agreements early by recognizing the “tells” that can be associated with collusion. A second component is to target defensive resources wisely on inputs most likely to be of concern. And a third component is to review procurement practices to ensure that they are not contributing to the problem.

In addition, the legal environment may suggest certain strategies related to such things as document retention, contract design, or certifications by suppliers that they have complied with antitrust laws. I will not focus on these strategies in this article, but rather focus on economic issues. However, these legal strategies may be important, depending on the environment, and so deserve attention. For example, a failure to document past purchases may prevent a manufacturer from being able to recover damages should an antitrust violation be identified. Certifications by suppliers that they have complied with antitrust laws may enhance the ability to prosecute illegal conduct if, for example, claims of fraudulent concealment allow an extension of the statute of limitation. I leave these types of issues for legal counsel.

In Section 2, I describe the structures that a cartel would need to put in place to be effective and what traces those structures can leave in the economic evidence, information that can potentially put manufacturers in a position to detect collusion early. In Section 3, I discuss how a manufacturer might identify which of its inputs are most susceptible to collusion so that defensive resources can be focused on those. In Section 4, I describe attributes of a procurement process that can be disruptive to attempts by suppliers to collude effectively. Finally, in Section 5, I conclude.

¹ <https://www.accc.gov.au/business/anti-competitive-behaviour/cartels/cartels-case-studies-legal-cases#price-fixing>.

² *Id.*

³ *Id.*

⁴ <https://www.accc.gov.au/media-release/australia%E2%80%99s-first-criminal-cartel-charge-laid-against-nyk>.

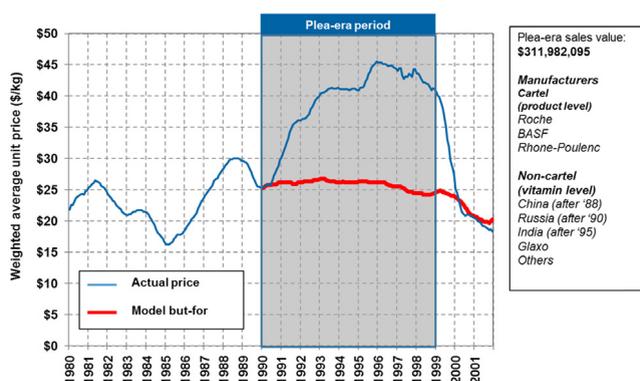


Fig. 2. Actual and but-for prices of Vitamin A acetate 650 feed grade.

Source: Robert C. Marshall and Leslie M. Marx, *The Economics of Collusion: Cartels and Bidding Rings*, MIT Press, 2012, Fig. 1.1. Original Source: Expert Report of B. Douglas Bernheim, *In re Vitamins Antitrust Litigation*, MDL No. 1285.

2. Identify collusive agreements early

Effective collusion must overcome a number of hurdles. Because colluding firms cannot rely on the usual contract enforcement mechanisms that support legal contracts, a cartel must address compliance itself. Firms being asked to suppress bids or forego opportunities to win new business may have an incentive to deviate from the cartel agreement. They may try to secretly steal business in defiance of the cartel agreement. The problem of cartel members having an incentive to cheat on collusive agreements poses challenges for colluding firms. In order to meet these challenges, colluding firms must typically put in place structures that can produce “tells” in the economic data.

Let us begin by considering the prices associated with a cartelized product. The major manufacturers of vitamins pleaded guilty to collusive conduct affecting global markets for much of the 1990s. One of the vitamin products whose prices were affected by collusion is vitamin A acetate 650 feed grade. The prices (in \$/kg) for this vitamin product from 1980 through 2001 are shown in Fig. 2. The shaded years (essentially the 1990s) correspond to the time period for which firms pleaded guilty to collusion. As indicated in the figure, the manufacturers of vitamin A acetate 650 feed grade that participated in the cartel were Hoffman la Roche, BASF, and Rhône-Poulenc. Other vitamin products involved additional firms, with the EC Decision in *Vitamins* identifying 11 firms as participating in the cartel.⁵

The line in Fig. 2 labeled “model but-for” shows the prices that an economic expert estimated as the prices that would have prevailed during the 1990s in the absence of collusion. As the figure shows, the actual prices during the 1990s were significantly elevated relative to the but-for prices.

To achieve these elevated prices, the cartel had to work hard. The cartel participants held discussions regarding offers to make to customers who were procuring vitamins. They discussed their individual bids to determine among themselves the ultimate winner and the price the winner would be paid for the relevant vitamin product. They engaged in regular communication and information sharing.

Even large and seemingly powerful buyers of vitamins were affected by the cartel. Coca-Cola was one of the largest customers worldwide of vitamin C, which is added to some of the beverages that Coca-Cola produces. “For this major account, which received special treatment, Coca-Cola negotiated a worldwide supply contract with its suppliers, the vitamin producers agreed between themselves how the business would be shared between them and the prices quoted.”⁶

The vitamins cartel faced the problem of cheating among its members. The cartel would make adjustments over time or across products to address the problem of one cartel member “getting ahead” of the others relative to target sales and market shares. For example, Rhône-Poulenc was allowed to expand its share of feed grade vitamin E products (designed for consumption by livestock) in compensation for growth in demand for vitamin E for human consumption, which benefited other participants in the conspiracy.⁷

Stigler (1964) identified “secret deviations” as the key problem facing cartels and argued that to control secret deviations, a cartel must put in place three collusive structures: pricing structures, allocation structures, and enforcement structures.⁸ Fig. 3 summarizes these three collusive structures.

Pricing structures allow the colluding firms to elevate prices above what they would otherwise have been. In the case of the vitamins cartel, pricing structures included coordinated price increase announcements and coordinated artificial justifications to explain to buyers why prices were increasing. Pricing targets and their implementation were discussed

⁵ COMP/E-1/37.512—*Vitamins*, Comm’n Decision (Nov 21, 2001), [hereinafter EC Decision in *Vitamins*], ¶ 1.

⁶ EC Decision in *Vitamins*, ¶ 407.

⁷ EC Decision in *Vitamins*, ¶ 225.

⁸ George J. Stigler, “A Theory of Oligopoly”, *Journal of Political Economy* 71, no. 1 (1964): 44–61.

Pricing Structures	Allocation Structures	Enforcement Structures
<ul style="list-style-type: none"> • Implement price increases and quantity reductions • Modify within-firm incentives 	<ul style="list-style-type: none"> • Implement the division of surplus • Establish redistribution mechanisms 	<ul style="list-style-type: none"> • Implement monitoring mechanisms • Establish threat of punishment

Fig. 3. Collusive structures to address secret deviations.

and agreed upon at meetings that included (i) top-level meetings involving senior executives, (ii) meetings of the heads of marketing two or three times a year, (iii) quarterly meetings of managers with product marketing responsibility at the global level, and (iv) and meetings of the heads of marketing for each region.⁹ As indicated in Fig. 3, pricing structures may also include modifications to within-firm incentives so that a colluding firm's sales force does not unknowingly undo the efforts of others in the firm to suppress rivalry.

There are a number of ways that pricing structures may be evident in the economic data. For example, one might observe rising prices and profits in an industry with excess capacity, in which case, in the absence of collusion, one would expect rival firms to take advantage of the opportunity to expand the quantity that they supply.

As another tell, one might observe changes in price announcement patterns, including potentially a shift to announcing price increases in advance of the effective date of the price increase. Such advance price increase announcements can be useful to a cartel because they help it to confirm that all members of the cartel are participating in an agreed price increase prior to that price increase taking effect. Failures of firms to follow the price increase can then be responded to by withdrawing price increases before they go into effect.

Finally, one might observe changes in firms' sales force incentives to emphasize "price before tonnage". Such a focus can facilitate a cartel's ability to achieve price targets without having members of a sales force, who might not be aware of the collusive agreement, pursue increases in market shares by lowering prices. In contrast, in an environment with rivalry, a policy by one firm of rewarding the maintenance of high prices without respect to the quantity sold provides an opportunity for other firms to reduce prices and steal their business.

Allocation structures ensure that all members of a cartel receive some benefit from their participation. The vitamins cartel agreed to a market share allocation whereby the colluding firms were supposed to achieve specified market shares. If target market shares were not achieved, either through random fluctuations or deliberate deviations on the part of the firms, then the firms that were over or under their target shares would transact product to "true up" the firms' market shares.

Tells that can be generated by allocation structures include changes in contracts to emphasize fixed market shares or interfirm transfers. For example, firms might use swaps of product or counter-purchase agreements to reallocate collusive gains within the cartel or to remedy deviations from the collusive agreement.

A key component of a cartel's enforcement structure is typically monitoring. As stated in the EC Decision in *Vitamins*: "In order to ensure the implementation of their restrictive agreements, the participants devised and applied reporting and monitoring systems".¹⁰ A typical threat of punishment used by cartels to enforce their agreement is the threat that cheating could lead to the abandonment of collusive conduct and thus a loss to the colluding firms of the elevated profits achieved through collusion.

A key tell associated with a cartel's enforcement structure is the sharing of competitively sensitive information. We would normally not expect firms to share information related to their prices, production, capacities, or strategic plans. However, the sharing of that kind of information is useful to a cartel because it allows the cartel to monitor compliance with a collusive agreement. A cartel might employ contracts that allow audits, for example associated with most favored customer clauses, in order to facilitate monitoring.

Further economic evidence that can provide clues to the existence of collusion include: regular intervals for price increases, rising prices and profits with excess capacity, fixed relative market shares, contracts that emphasize fixed market shares, and identical bids. Exchanges of price information among supposedly competing firms and public price announcements can be suspect. Increased standardization of products or significant structural changes such as consolidation, entry/exit, or temporary shutdowns may signal collusive conduct. And, as mentioned above, changes in sales force incentives to emphasize "price before tonnage" are suspect.

Because the economic evidence potentially offers clues to the existence of collusion among input suppliers, manufacturers may want to be attentive to that evidence. They can monitor product pricing through time and identify anomalies.

⁹ EC Decision in *Vitamins*, ¶ 172 and following.

¹⁰ EC Decision in *Vitamins*, ¶ 591.

For example, they might watch for sharp price increases following a steady decline, particularly in the absence of associated changes in cost and demand factors. Manufacturers can take steps to confirm suppliers' stated justifications for price increases. And manufacturers can compare prices to the most important demand and cost factors, including performing statistical analyses when warranted to confirm suspicions.

3. Targeting defensive resources

A manufacturer that is concerned about collusion among its input suppliers will want to be smart about allocating defensive resources. This involves considering for which inputs collusion is more likely, easier, or likely to work well. This information can then be used to target defensive resources on those inputs.

Collusion is more likely among firms with a culture of collusion or history of antitrust violations. In addition, collusion may be more likely when firms are facing dire straits. According to the EC decision in *Vitamins*, "The background against which the cartel was formed, suggests Daiichi, was a steady drop in prices for vitamins of the B complex during the 1980s and the weakness of the dollar in 1989 to 1990, leading to zero profitability for Roche in these products".¹¹

Collusion is easier for firms when they have greater opportunities for communication and transfers. For example, the existence of an industry association that facilitates regular meetings among firms can make communicating easier. In recognition of this, the amino acids cartel established an industry association explicitly to serve the purposes of the cartel based on a proposal by cartel member Archer Daniels Midland (ADM):

ADM further proposed that the producers attend trade association meetings quarterly to adjust their price and sales volumes according to their agreements. It explained how forming an industry association could provide a seemingly legitimate, but artificial, reason to meet, and thus conceal the fact that purported competitors were secretly meeting to discuss prices and sales volumes. ADM described how to have 'official' and 'unofficial' meetings. ADM explained that while attending an official industry association meeting, one person would book a hotel suite and quietly notify the others, and then they would secretly meet to discuss prices and sales volumes away from the official meeting.¹²

Collusion is more likely to work well in a concentrated market. It is also more likely to work well for products for which there are few good substitutes and where demand is relatively insensitive to price, so that elevation of prices by a cartel reduces the quantity demanded by relatively little. High barriers to entry for new firms mean that collusive price increases are unlikely to be eroded by new entrants that undercut the cartel prices.

Standardized products across firms can facilitate collusion by reducing the number of prices that must be agreed by the cartel, by facilitating monitoring, and by limiting dimensions along which a firm might deviate from the cartel agreement. That said, cartels have successfully operated even when products are highly nonstandardized. For example, the carbon brushes cartel addressed the fact that a carbon brush is typically designed and manufactured to the exact specifications of a buyer, and so is a highly idiosyncratic end product, by pricing out each component of a brush through a scheme called "bareme" pricing.¹³ In this way, the cartel could confirm that prices adhered to the cartel agreement even though prices were tailored to each buyer's design specification.

4. Defensive procurement

As discussed above, a key problem for cartels is "cheating" on the collusive agreement. A manufacturer that is concerned about collusion among its input suppliers can be disruptive toward the cartel if it can facilitate cheating by colluding suppliers. While cheating is a problem for a cartel, it is part of the solution for a buyer trying to disrupt a cartel among its suppliers.

For example, suppose that suppliers A and B have formed a cartel and have agreed that supplier A will quote a buyer a price of \$10 while supplier B will quote that buyer a price of \$9.50 and presumably win the business. The buyer is harmed to the extent that the agreement resulted in inferior options for the buyer.

But now suppose that supplier A cheats on this agreement and instead offers the buyer a price of \$9.49. Or alternatively, supplier A might bid \$10, but then offer a discount to the buyer of \$0.51 per unit. This benefits the buyer. Following the principle of helping the cheater, the buyer should not reveal supplier A's lower bid or its offer of a discount. The buyer should not prevent supplier A from being able to claim to supplier B that it did not cheat, perhaps by arguing that the buyer just has a preference for, for example, companies in supplier A's location.

The "help the cheater" principle suggests that a manufacturer should not reveal which firm it has selected as its supplier (except of course to the winner). The winning supplier might have been cheating on the cartel agreement and that cheating might not be observable to the cartel. Facilitating the ability of cartel members to engage in secret price cuts is disruptive to the cartel and so can benefit the buyer.

¹¹ EC Decision in *Vitamins*, ¶ 293–95.

¹² Case COMP/36.545/F3—*Amino acids*, Comm'n Decision (Jun 7, 2000), ¶ 122.

¹³ Case C38.359—*Electrical and mechanical carbon and graphite products*, Comm'n Decision (Dec 3, 2003), ¶ 91 and following. Related to that cartel's calculation of a "converting price", see Case COMP/38354—*Industrial bags*, Comm'n Decision (Nov 30, 2005), ¶¶ 281, 287.

When supplier A in our example cheats and offers a price of \$9.49, the buyer has the option of accepting that offer. Alternatively, the buyer could attempt to use that offer to negotiate a lower price from supplier B. However, doing so comes with a cost—revealing supplier A's lower price allows supplier B to monitor cheating. If supplier B knows that it will be alerted to lower offers by supplier A and allowed to respond, then supplier B can enter higher initial bids without fear of losing the business. In the interest of being defensive, the buyer should consider whether the benefit associated with revealing information to one supplier about the offers of another outweighs the cost. In our example, the buyer might consider only using the lower offer by supplier A for negotiating purposes if it expects that supplier B will respond with a bid substantially below \$9.49. And, in that case, the buyer can potentially be strategic by not revealing supplier A's offer, but rather stating that in order to win the business, supplier B must come in with a bid substantially below \$9.50. If B cannot or will not, then it does not get the business.

There are a variety of ways that a manufacturer can be defensive in its procurement practices. Anonymous procedures and sealed bidding, where rival bids are not revealed, are generally viewed as less susceptible to collusion than open bidding. A manufacturer should be cautious about allowing suppliers to audit the buyer's purchases from other suppliers, for example as part of a requirement associated with fidelity rebates. Multi-sourcing can facilitate information flows between suppliers and market division schemes, which should be balanced against any benefits of multi-sourcing when making the choice to multi-source. Avoiding "right of last refusal" contracts can prevent suppliers from being able to make elevated offers without fear of secret deviations.

It can be disruptive to cartels when buyers vary the timing and frequency of procurements and actual procurement methods because this makes it more difficult for a cartel to fix and maintain an allocation of sales among the cartel members. Fewer procurements, each for a larger quantity, can also be disruptive because the gain to a cartel member from cheating on any one procurement is increased and the length of time before retaliation is longer. When a buyer shows a willingness to accept new suppliers, that creates addition uncertainty for a cartel and the possibility of a cartel member disguising a deviation as being related to a new supplier.

5. Summary

In summary, the possibility of collusion among a manufacturer's input suppliers is real. In defense, a buyer can potentially identify collusive agreements early by being aware of the structures that a cartel would need to put in place to be effective and what traces those structures can leave in the economic evidence. A manufacturer can target defensive resources wisely by understanding which of its inputs are most susceptible to collusion and focusing on those. And, manufacturers can make choices related to their procurement practices that make effective collusion more difficult, or that at least do not make it easy.