Collusive industrial networks: inside the black box of the cartel

Andrew Pressey, Markus Vanharanta, Alan Gilchrist (a.gilchrist@lancaster.ac.uk)
Department of Marketing, D Floor, Charles Carter Building, Lancaster University Management School, Lancaster, LA1 4YX

Abstract

The prevailing understanding of collusive B2B networks is primarily based on the theories of industrial economists and organizational criminologists. "Successful" collusive industrial networks (such as price-fixing cartels) have been seen to endure due to formal managerial structures of coordination and control. In this paper, we seek to transcend and challenge this understanding by drawing evidence from an in-depth examination of four price-fixing cartels that were facilitated chiefly by marketers. Our contribution introduces the notion of "shadow networks" and "dark networks" to illustrate the continua of collusive network forms. In addition, this allows us to build a deeper understanding of collusive network forms and related inter-firm interaction for an industrial marketing audience. We provide implications for marketing practice, theory, and policy.

Key words: Collusive Networks; Network Structure; Cartels.

COLLUSIVE INDUSTRIAL NETWORKS: INSIDE THE BLACK BOX OF THE CARTEL

Introduction

> *In 2004, German memory chip maker Infineon Technologies is fined $160 million by US DoJ for breaching US antitrust law by secretly engaging in price-fixing in its DRAM chip market through colluding with other manufacturers in the industry.*
>
> *Samsung Electronics Co. Ltd and Samsung Semiconductor Inc (US) agrees to plead guilty and pay fines of $300 million by US Department of Justice (DoJ), for an international price-fixing conspiracy in the dynamic random access memory market (DRAM) in 2005.*

According to US Attorney General Alberto R. Gonzales (2005) price fixing activities – such as those of Infineon and Samsung highlighted above – "...threatens our free market system, stifles innovation, and robs American consumers of the benefit of competitive prices… [the US Government has an] on-going commitment to protect consumers from corporations that engage in illegal conduct." B2B cartel networks have been documented to operate across diverse markets, effecting inter-firm interaction in a broad range of industries. Past investigations have documented price fixing in metals, vitamins, chemicals, air transportation, textiles, graphite electrodes (used in the manufacture of steel), synthetic rubber and semiconductor industries, among others. In addition, it is widely accepted that this illicit inter-firm interaction has caused considerable damage to consumer welfare and to other businesses.

Our current understanding of collusion in industrial networks is dominated by industrial economists and organizational criminologists. This we argue has led to a particular theoretical emphasis where it has been argued that successful and stable cartels involve a small number of firms seeking to create mechanisms to control the cartel and its information processing, organized in a hierarchical and highly centralized fashion (Levenstein and Suslow, 2006; Baker and Faulkner, 1993). While studies in these fields are not without their merits, such views are,

however, problematic as the nature of collusion amongst industrial organizations is a "black box" about which we know very little empirically (Clinard and Yeager, 2006; Shapiro, 1980). In addition, despite their prevalence, collusive industrial networks have attracted limited attention in the industrial marketing management literature, where the primary focus has been on legitimate ("legal") networks and inter-firm interaction. Yet, we maintain that this does not reflect the true reality of industrial networks as a whole. Therefore our research questions are as follows:

> *What network forms do collusive industrial networks adopt, and how do they organize themselves in order to evade detection?*
>
> *How can the properties of collusive networks inform our contemporary understanding of industrial networks as a whole, which has up-to-date had an understandable – but limiting – emphasis on legitimate network arrangements?*

Our contribution introduces the concept of *shadow networks* and *dark networks*. We argue that this more accurately captures the characteristics of industrial cartels. Shadow networks are collusive networks organized through multilateral agreements and operate in a similar fashion to legitimate corporate projects where firms co-operate (for example, joint ventures) and are more managerial in their network structure. In contrast, dark networks are organized bilaterally. They operate akin to terrorist or criminal networks (such as is the case for illegal drug gangs or arms traffickers), where collusion is decentralized, fragmented and opaque. By evoking this metaphor we are able to illustrate the extent to which collusive industrial networks are structured and visible. This new understanding of the "dark side" of industrial networks complements our

understanding of legitimate networks. We will exemplify this new understanding by examining the network structures and inter-firm interaction in four international price-fixing cartels in detail from their inception to termination.

This study is timely for a number of reasons. Although the existence of industrial cartels is well known (Jones, 1900; Newman, 1948; Elliott et al. 1937), our understanding of how they operate is limited with only a handful of cross-sectional studies having been undertaken (Connor, 2004; Levenstein and Suslow, 2006). Marketing managers may play a central role (as we will demonstrate) in collusive practices, or else unwittingly may be involved in such practices in meeting legitimate corporate goals and objectives. The present study provides managers with a better understanding of collusive practices as well how these practices function, are controlled, and ultimately uncovered. Such an understanding would seem valuable particularly as since 1990 there were approximately 495 formal investigations of suspected cartels by antitrust agencies around the world (Connor, 2008). At least 373 individual and named executives were penalised – hundreds more were found guilty but received immunity, while thousands more were found guilty but not prosecuted. Cartels have been thought to have affected sales globally by $16.6 trillion. Despite their pervasive impact on markets, however, cartels have rarely been the subject of investigation, particularly from the viewpoint of industrial marketers. We remedy this and provide implications for managers.

This paper is structured the following way. We first examine the literature concerning collusion in industrial markets. Next, we outline the methodology underpinning our investigation of four industrial cartels. The remainder of the study examines the practices and structure of the four industrial cartels studied. We conclude by providing implications for marketing theory, practice, and policy.

Illegal Network Collusion in Industrial Markets: Price-Fixing Cartels

Definition and magnitude of cartels

Companies co-operate for a number of legitimate reasons including joint ventures, sharing technology, distribution, marketing and so on, as well as illegitimate purposes such as bid-rigging, or forming price-fixing cartels. A cartel refers to agreements between two or more independent firms who collude to control the terms of business in a particular market (Dick, 1996). Collusion may take many forms that are not necessarily illegal – such as such as De Beers' control of the world diamond market (Gupta, et al. 2010) and OPEC's supply chain control (Evenett et al. 2001) – as well as *per se* illegal forms, such as Infineon and Samsung's control of the DRAM market. Such practices are deemed to be illegal by most countries' antitrust agencies. The rationale for cartelisation can be attributed to firms' reluctance to allow market forces to control prices, slow the rate of technological change, and as a means for buyers to control upstream supply and create stability in highly volatile markets (Kenwood and Lougheed, 1984: 88), particularly in situations where suppliers demand high prices for scarce goods (Neumann, 2001: 26), and in response to increasing competition and market integration (Evenett et al. 2001).

Cartels are viewed as having a significant detrimental impact on consumers (due to artificially high prices) than domestic abuses (Connor, 2004). For example, the 'mark up' (the amount in excess of the competitive price) commanded by some European-based cartels is generally 15-20% and as high as 50% in some instances. The 'classic' cartel is thought to comprise a US organisation and three to four competitors that are market leaders in Europe and Asia, as well as dominant firms throughout the world (Spratling, 1999). In contrast, modern international cartels are characterised by the growing inclusion of East Asian companies (due to their growing manufacturing strength) in an attempt to seek control within the triad nations

(Connor, 2004); other characteristics of modern cartels are the greater awareness of the antitrust risks on the part of firms, increased detection and leniency mechanisms, harsher penalties (including custodial sentences), and greater cross-jurisdictional co-ordination in the pursuit of cartelists (Connor, 2004).

Two recent trends have been the increase in cartel fines and the increased co-operation of antitrust agencies. For example, the average cartel fine increased from $28 million per year in the period 1990-94 to $560 million in 2005-07, while the average size of fines paid by companies has also increased (Connor, 2008: 7). In excess of 100 countries have introduced antitrust or competition laws and agencies (Djelic 2002: 234), and these agencies are increasingly co-operating in the recognition that cartels are pervasive and damaging to markets globally (Spratling, 1999). For example, in the DoJ's investigation of a suspected air transportation cartel in 2007, the DoJ and FBI co-operated with antitrust agencies on five continents in order to execute search warrants.

Theories of collusive practices in industrial markets

Despite their prevalence, collusive practices such as price-fixing networks between organizations have received limited attention by industrial marketers. The fields of Industrial economics and organizational criminology are replete with studies of industrial collusion and price-fixing cartels. These contributions are now briefly summarized.

Worthy of special mention are two studies of price-fixing cartels. The first is a meta-study by industrial economists Levenstein and Suslow (2006). Based on twenty-one data sets of cross-sectional studies of cartels spanning 1880-1997, they found that (i.) the more members in a cartel, the shorter its duration, (ii.) successful cartels create mechanisms to share information, decision-making, and incentives "through self-imposed carrots and sticks" (Levenstein and

Suslow, 2006: 86), (iii.) concentration aids cartel stability (i.e. "successful" cartels are conceived and maintained by a small number of dominant actors), and (iv.) cartel co-ordination among multiple actors is inherently complex. In the second study, sociologists Baker and Faulkner (1993) draw on a typology of two types of communication networks: centralized and decentralized. In centralized networks a single actor (or a small number of actors) acts as a "hub" in a hierarchical fashion. Decentralized networks in contrast characterize networks where no central actor dominates and all actors may be more or less all linked. Based on an examination of illegal networks in the Heavy Electrical Equipment industry in the US in the 1950s, the authors conclude that due to a need for concealment actors will form networks that are centralized and led by a small number of actors in a hierarchical manner. Based on these contributions it has been argued that successful and stable cartels involve a small number of firms seeking to create mechanisms to control the cartel and its information processing, organized in a hierarchical and highly centralized fashion.

In addition, Industrial economists assert that cartels are more likely to be formed in industries with few sellers (often by ten or fewer firms), and intermediate or high industry concentration (most sales are accounted for by a small number of sellers), due to the "low costs of planning and enforcing a conspiracy and the smaller likelihood of being caught" (Hay and Kelley, 1974: 24). Co-ordination is thought to increase exponentially as the number of conspirators increases owing to greater communication flows between participants (Scherer, 1980). Hence large numbers of firms with low industry concentration are considered as "natural barriers to coordination" (Hay and Kelley, 1974: 25).

Although collusive practices such as price-fixing have been extensively studied by industrial organization economists, "the internal social organization of conspiracies is treated as a "black box"" (Baker and Faulkner, 1993: 841). Scherer (1980: 225) elaborates further,

concluding that "the relationship between an industry's informal and formal social structure and its ability to coordinate pricing behaviour … lies beyond the reach of conventional economic analysis". In support, Hay and Kelley (1974: 25) note that the social structure of price-fixing cartels "cannot be quantified". Studies that do not confirm to these "principles" of cartel formation (for example, Sonnenfeld and Lawrence, 1978; Posner, 1970) have been categorized as "puzzling anomalies" by industrial economists and has compelled them "to make assumptions that oversimplify the social organization of price-fixing conspiracies" (Baker and Faulkner, 1993: 842).

The organizational crime literature recognises that organizational crimes are committed by individuals for the benefit of the organization rather than the individual (although they may hope to benefit through pay rises, promotion and so on), whether in the form of bribery, pollution, antitrust violations, or other criminal activities (Shapiro, 1976: 14). Both organizational criminologists and industrial economists have attempted to understand the illegal practices of firms through macro-level forces (such as industry structure, state of the economy, business cycle), where declining firm performance and market share have (rather unsurprisingly) been observed as common catalysts for corporate wrongdoings (Shapiro, 1980; Clinard and Yeager, 1980; Staw and Szwajkowski, 1975). Organizational criminologists accept that social structures and mechanisms support antitrust practices (Simpson, 1986), but also oversimplifies the social organization of collusion, where small numbers of actors working closely together are regarded as the archetype of collusion (see, for example, Siegel, 1989; Malz and Pollack, 1980). Participants in collusive networks seek to maximize their concealment to form "secret societies" (Simmel, 1950) by limiting face-to-face meetings and channels of communication or the introduction of "buffers" (Goffman, 1970) between senior and middle and lower level managers.

In summary, Shapiro (1980: 29) maintains that "the study of crime and deviant behaviour has been negligent … in its lack of attention to the form and social organization of criminal activity. We know a great deal about criminals … but very little about the activity itself." In the intervening period, little research appears to have been undertaken to assuage Shapiro's (1980) criticisms. Indeed, Clinard and Yeager (2006: 279) note that "The complex structural relationships in large corporations make it difficult, if not impossible, to disentangle delegated authority, managerial discretion, and ultimate responsibility." Though not without their merit, our understanding of collusive industrial practices and their structure would appear to be limited to a handful of cross-sectional studies of cartels operating in the 1990s and earlier. We now critically examine the assumptions of these studies and illustrate our argument by drawing on four contemporary industrial cartels operating in diverse industries.

Research Method and Data Collection

A qualitative archival method was adopted in order to provide a rich understanding of the four cartels examined. Such approaches have yielded interesting results for the examination of structural changes in networks. For example, in their study of the De Beers/Rio Tinto diamond cartel, Gupta et al. (2010) base their analysis on archival data to provide a valuable understanding of network change in the face of external forces within an industry. In a similar fashion we draw on multiple resources in order to gain a deep understanding of a phenomenon occurring over time. Direct contact with the companies and individuals involved in the cartels studied in the hope of an interview is clearly problematic and fraught with potential bias. As a consequence we base our case studies on industry magazines, newspaper reports, press releases, and the detailed reports and documentation provided by the European Union's thorough

investigations of the firms participating in the cartels examined. This approach affords triangulation through the numerous data sources drawn on and reduces the possible bias inherent in personal accounts.

The European Union is a useful context in which to examine collusive practices. In addition to being a major and attractive market to investors, its antitrust authority and competition systems have become increasingly stringent. Indeed "… for large enterprises 'antitrust risk' – the risk of violating some competition law provision – is substantially higher in the European Union than anywhere else" (Hylton and Deng, 2007: 314-315). In addition, the European Union is now the biggest antitrust prosecutor and has been since 2000 (Connor, 2008).

The four cartels were selected on the basis that (i.) marketing managers played a central role in their formation and maintenance, (ii.) they involved both firms from the European Union and also outside of its borders, and (iii.) that they organized themselves in either chiefly a multilateral or bilateral manner. The characteristics of these cases are presented in Figure I (see below). All four cartels studied were undertaken by major organizations in significant markets. In addition, the four cartels were observed to be operating either multilaterally (Flat Glass and Choline Chloride) or bilaterally (Vitamins and Butadiene Rubber).

FIGURE I
CHARACTERISTICS OF FOUR PRICE-FIXING CARTELS

Market	**Flat glass**	**Choline Chloride**	**Vitamins**	**Butadiene Rubber**
Concluding year of investigation	2007	2004	2001	2006
Structure	Multilateral	Multilateral	Bilateral	Bilateral
Number of participants in the cartel	Four	Six	Thirteen	Six
Nationality of parent	Japan, U.S., UK, France	the Netherlands, Germany, Belgium, U.S., Canada	Switzerland, Germany, France, the Netherlands, Japan	Germany, U.S., Italy, the Netherlands, Czech Republic, Poland
Duration of cartel	Two years (2003-2005)	Six years (1992-98)	Ten years (1989-99)	Six years (1996-2002)
Markets affected	European Economic Area	Global	Global	European Economic Area
Fine	EUR 486.9 million	EUR 66.3 million	EUR 855.22 million	EUR 519 million

These four cases were selected on a theoretical sampling basis and are used to illustrate the variance that exists in industrial cartel organization. Further, their rich explanatory properties afford a useful understanding of the mechanics and management of industrial cartels.

Case Studies: Collusive Price-Fixing Practices in Four Industries

The cases presented describe recent collusive practices in the industries for flat glass, choline chloride (both operating predominantly in a multilateral fashion), and for the markets for vitamins and butadiene rubber (organized chiefly bilaterally). We illustrate the network structures of these four cartels and the principles behind their organization.

Multilateral Collusion

Flat Glass (2007)

Flat (float) glass manufacturing is highly capital intensive, with a history of commercial relationships including cross-supply agreements and joint-ventures between industry players. Flat glass is chiefly used in buildings, and in 2004 the annual market value was estimated at 8000 million Euros. The cartel in the market for flat glass lasted from 9th January 2004 to 22nd February 2005, with the four principals involved: Asahi Glass Company Limited (parent company of the Asahi Group based in Tokyo, Japan), Glaverbel Group (Brussels, Belgium) (a sub-group within the Asahi Group), Guardian Europe (Luxembourg), (part of The Guardian Group, Michigan, USA), The Pilkington Group Ltd (Merseyside, UK), and The Saint-Gobain Group (Courbevoie, France). Collectively, the four firms involved had an estimated combined market share in Europe of 80% in 2004.

The investigation was instigated after complaints by customers in the face of parallel price increases and levy of an energy surcharge by the manufacturers. On 22nd and 23rd February and 15th March 2005, the European Commission undertook unannounced inspections of the premises of the principals finding evidence of agreements to create and maintain a price-fixing cartel due to steadily declining prices in the European market for flat glass.

The Commission found evidence of a series of multilateral meetings (with a small number of bilateral meetings) between the firms held in hotels and restaurants across Europe as well as on the fringes of meetings of the GEPVP (Groupement Européen des Producteurs de Verre Plat – the European association of flat glass manufacturers based in Brussels). These meetings were convened in order to:

i. Implement collective price increases and price freezes, and agree non-compete clauses;

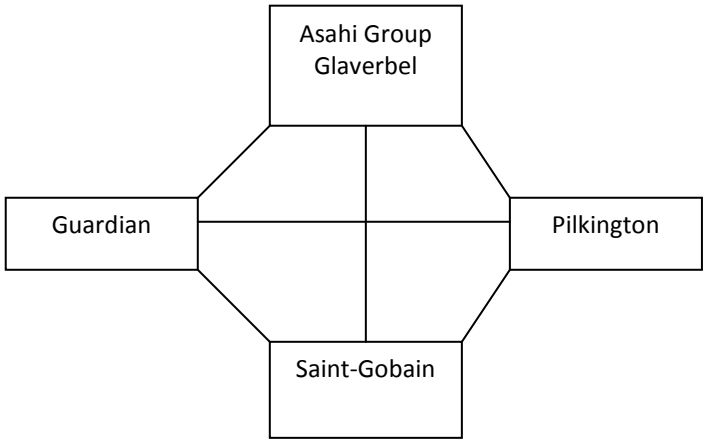
ii. Decide on their timing; and

iii. Determine which company would lead with price increases for specific countries and customers.

Germany was generally the lead market for price increases, and, if successful, would be extended to other markets beginning with Belgium, the Netherlands, Luxemburg, France, and Italy (normally in that sequence), and then to other countries without any regular sequence. These price increases were announced by letter from producers to customers. After an email exchange (17th October 2003) to arrange a meeting between the four firms, meetings were regularly held in 2003 (4th December) 2004 (9th January, 2nd March, 20th April, 15th June, 2nd December), with the last meeting in 2005 (11th February).

The Commission obtained documentary evidence including internal and external email exchanges, written-up minutes of meetings, travel expenses, personal notebook entries, and handwritten notes by participants at the meetings. In summing up the cartel, The Commission described highly organized practices between the four firms, with "…notes [that] are detailed, structured (sometimes with tables, bullets or numbered items) with a relatively high level of precision" [para. 357]. Based on the documentary evidence obtained the network structure of the flat glass cartel is illustrated in Figure II (see below). The manufacturers were fined EUR 486.9 million for their participation in the cartel.

Figure II
Multilateral Network Structure for the Flat Glass Cartel



Choline Chloride (2004)

Choline Chloride is chiefly used in the animal feed industry as a feed additive, as well as for the preparation of vitamins, infant formulae and nutrient supplements. The major players involved in the cartel included: Akzo Nobel (Arnhem, the Netherlands), BASF (Ludwigshafen, Germany), UCB (Brussels, Belgium), Bioproducts (Fairlawn, USA), Chinook (Toronto, Canada), and DuCoa (Highland, USA). In 1997 (the last year of the infringement), the market for choline chloride in Europe was estimated to be worth 150 million Euros, with the six firms having an estimated 82% market share.

In meetings conducted in 1998 and 1999 Chinook and Bioproducts in return for leniency informed the Commission of their participation in the Choline chloride cartel. The cartel operated at two closely related levels, European and Global for two years. The global cartel lasted between June 1992 and April 1994, while the European cartel operated between March 1994 and October 1998. The objective of the cartel was to set and increase worldwide prices, allocate markets, control distributors, and exchange commercially sensitive information.

The first meeting between the firms took place in Mexico City in 1992 and constituted a "clear anti-competitive agreement" [para. 66] to the Commission, where the cartel was carefully designed to improve the profitability of the industry and "to bring discipline to the worldwide pricing of Choline chloride" [para. 68].

A series of global level meetings were organized: 1992, 8-10th June (Mexico City), 15-17th July (Mexico City), 12-13th October (Mexico City), 16th and 23rd November (Ludwigshafen, Germany), 1993, 18-21st (Atlanta, Georgia, USA), 10-13th May (Amsterdam), 17th June (Toronto), 7-8th November (Bruges, Belgium), 1994, 14-20th April (Johor Baru, Malaysia).

The North American manufacturers (Bioproducts, Chinook and DuCoa) ceased their participation in the cartel in 1994. At that point the European manufacturers (BASF, Akzo Nobel and UCB) decided to continue their price-fixing agreement at a European level. Regular contact was maintained between the three firms, with meetings held every three months to discuss actors' performance in that period. These meetings took place in 1994, 14th March (Schoten, Belgium), 29th November (Amersfoort, the Netherlands), 1995, 15th February (Kerpen, Germany), 8th June (Amersfoort, the Netherlands), 11th June (Sindorf, Germany), 1996, 3rd June (Brussels, Gent or Herentals, Belgium), 19th July (Düren, Germany), 2nd September (Düren, Germany), 1997, 27th February (Breda, the Netherlands), 3rd June (Brouwershaven, the Netherlands), 10-12th September (the Ardennes, Belgium), end of 1997 (location unknown), 1998, 10th February (Brussels, Belgium), 15th July (Maastricht, the Netherlands), October (Brussels, Belgium or Aachen, Germany).

Documentary evidence was obtained which outlined the meetings held, participants, meeting reports, client lists, and price lists. Based on these artefacts the network structure for the Choline Chloride cartels is illustrated in Figures III and IV (see below). At the time of investigation by The Commission (1999), the North American producers had ceased being

involved in the global cartel since 1994 and hence were not fined. The three European manufacturers were fined the following amounts: Akzo Nobel (20.99 million Euros), BASF (34.97 million Euros), and UCB (10.38 million Euros).

Figure III
Multilateral Network Structure for the Global Choline Chloride Cartel (1992-1994)

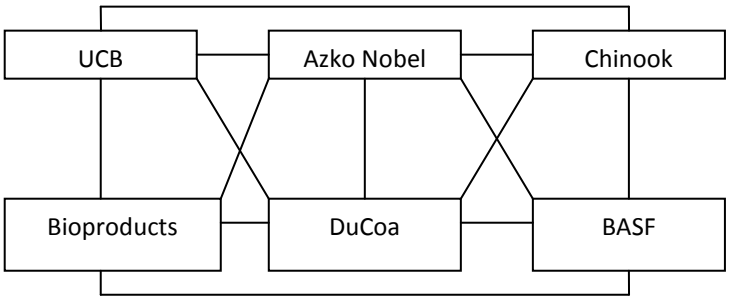
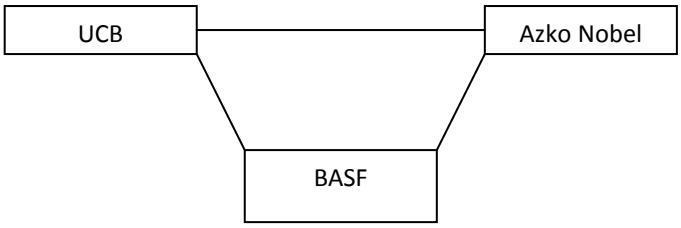


Figure IV
Multilateral Network Structure for the European Choline Chloride Cartel (1994-1998)



Bilateral Collusion

Vitamins (2001)

The Vitamins cartel of 2001 illustrates a shift within a collusive network from multilateral organization to bilateral organization in order to evade detection. The Vitamins cartel was particularly complex involving thirteen firms operating eight distinct but overlapping cartels between 1989 and 1999 in the markets for vitamins A, E, B1, B2, B5, B6, C, D3, H, folic acid, beta-carotene (a pro-vitamin of vitamin A) and carotinoids (pigments for foods and cosmetics). In the last year of the cartel the world market for vitamins was estimated to be worth EUR 3.25

billion. The thirteen firms involved were: Hoffmann-La Roche (Basel, Switzerland), BASF (Ludwigshafen, Germany), Aventis (formerly Rhône-Poulenc) (Courbevoie), Lonza (Zurich, Switzerland), Solvay Pharmaceuticals (Weesp, the Netherlands), Merck (Darmstadt, Germany), Daiichi Pharmaceutical Company Ltd (Tokyo, Japan), Eisai Company Ltd (Tokyo, Japan), Kongo Chemical Company Ltd (Toyama, Japan), Sumitomo Chemical Company Ltd (Osaka and Tokyo, Japan), Sumika Fine Chemicals Ltd (Osaka, Japan), Takeda Chemical Industries Ltd (Osaka, Japan), and Tanabe Seiyaku Company Ltd (Osaka, Japan). The three largest producers at the time of the cartel had the following market share estimates: Roche (40-50%), BASF (20-30%) and Aventis (5-15%). The existence of the cartel came to light on 12th May 1999, when Rhône-Poulenc informed the Commission of its involvement in a cartel as well as other manufacturers involved in the cartel through a written summary of activities. In addition, Roche and BASF were charged with price-fixing and allocating sales in the US and elsewhere under Section 1 of the Sherman Act (1890) on 20th May 1999, while Roche, BASF, Rhône-Poulenc, Daiichi and Eisai pleaded guilty in the Federal Court of Canada (Trial Division) to indictments charging conspiracy to prevent or unduly lesser competition in violation of Section 45 of the Competition Act 1985.

Prices of vitamins dropped in the face of competition and aggressive price cutting in the late 1980s and early 1990s in the face of competition from Chinese and Russian manufacturers. Against this, the purpose of the cartel was to fix-prices for the different products, allocated sales quotas, agreed on and implemented price increases, issued price announcements in accordance with their agreements, sold the products at the agreed prices, set up a machinery to monitor and enforce adherence to their agreements, to ultimately stabilize the vitamins market.

For the first nine years of the existence of the cartel (1989-1997) it operated at four levels, which each convened from two to four times per year:

i. Top level (attended by most senior corporate officers and occasionally heads of marketing);
ii. Heads of marketing;
iii. Regional product marketing; and
iv. Global product marketing.

The Commission observed that during this time period: "As the implementation of the cartel developed, a complex structure of regular meetings evolved" [para.172]. These meetings took place in a number of European cities including Basel, Zurich, Paris, and Frankfurt as well as in Japan with the Japanese manufacturers. Across the eight cartels, various agreements were formed with the manufacturers participating to different degrees in the various cartels, but meetings during this period were chiefly multilateral. Interestingly, however, during the period 1997-1999 the structure of the cartel changed dramatically in response to an announcement in 1997 by the DoJ that it was to conduct an investigation of the vitamins industry due to allegations of a price-fixing conspiracy operating. As The Commission notes in its investigation:

> *"The participants in the* [cartel] *meetings had already become aware of the interest of the antitrust authorities in their secret arrangements and sought to minimize the number and frequency of their contacts. The last trilateral meeting was held in Basel in November 1997, when it was decided that in future meetings would only occur on a bilateral basis"* [para. 228].

The cartel was then conducting in a much more discreet manner, The Commission investigation recognizes: “It was decided that there would be no further group meetings but only one-on-one contacts as necessary” [para. 231]. Contact was reduced to a small number of senior managers in each firm (e.g. heads of marketing and commercial directors). The multilateral structure was duly disbanded and replaced with a bilateral structure whereby Roche acted as the “hub” and line of communication for participants, with only very occasional meetings between Roche, BASF and Rhône-Poulenc.

Documentary evidence outlined the minutes of the meetings held; this was supported by company statements and letters to the Commission, and spreadsheets for calculating, reviewing and agreeing sales quotas. Based on the documentary evidence the network structures of the eight inter-related Vitamin cartels are illustrated in Figures V and VI (see below). These two figures capture six of the eight cartels for Vitamins. Two cartels operated somewhat outside of these structures and comprised: multilateral and bilateral meetings between Solvay, BASF, Roche, and Rhône-Poulenc (between 1994 and 1998 to fix prices for vitamin D3), and also multilateral and bilateral meetings between Lonza, Tanabe, Roche, Merck, Sumitomo and BASF (between 1991 and 1994 to fix prices for vitamin H).

Five manufacturers received leniency in return for their co-operation and commensurate with the strength and centrality of their role in the cartels. The final fines were set at the following levels: Roche (EUR 462 million), BASF (EUR 296.16 million), Aventis (EUR 5.04 million), Takeda (EUR 37.06 million), Solvay (EUR 9.1 million), Merck (EUR 9.24 million), Daiichi (EUR 23.4 million), and Eisai (EUR 13.23 million).

Figure V
Multilateral Network Structure for the Vitamins Cartel (1989-1997)

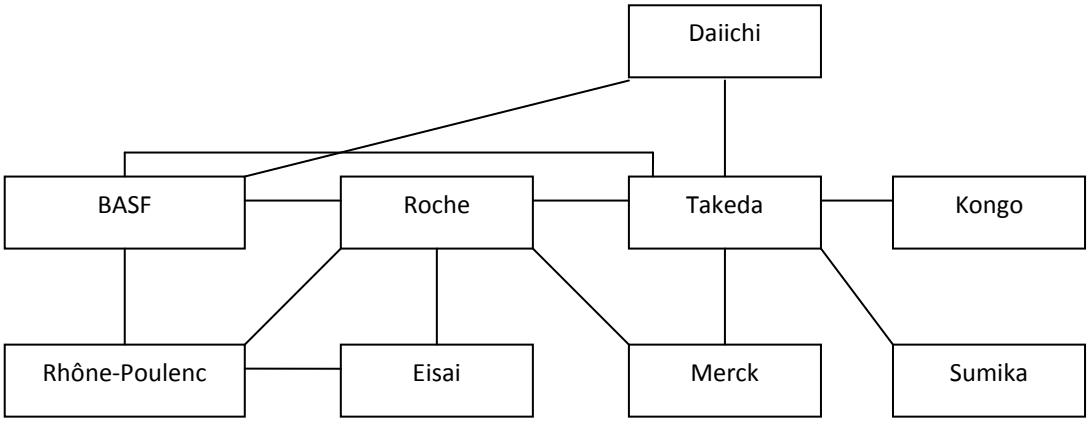
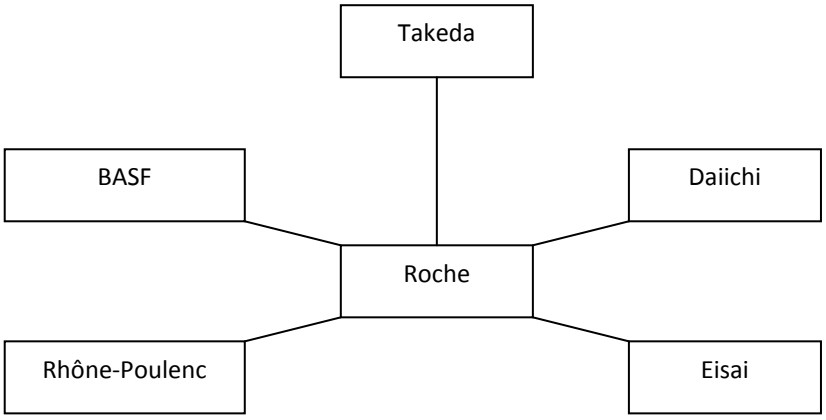


Figure VI
Bilateral Network Structure for the Vitamins Cartel (1997-1999)



Butadiene Rubber (2006)

Butadiene rubber is a synthetic rubber used chiefly in the manufacture of tyre production. The cartel existed from 20th May 1996 to 28th November 2002. Although The Commission held the view that the cartel probably existed prior to 1996, no evidence was available to confirm this. Six firms were involved in the cartel: Bayer AG (Leverkusen, Germany), The Dow Group

(Delaware, USA), The Eni Group (Rome, Italy), The Shell Group (The Hague, the Netherlands), Kaucuk a.s. (Prague, Czech Republic), and Trade-Stomil Ltd. (Lodz, Poland). The European market for butadiene rubber was estimated to be worth EUR 550 million in 2001.

The purpose of the cartel was to attempt to eliminate competition in Europe through agreements to fix-prices, sharing customers via non-aggression agreements, and exchanging commercially sensitive information related to sales, ultimately to stabilize prices in the face of weakening demand. The cartel was exposed when Bayer approached The Commission and informed them of their participation in the cartel.

Executives responsible for marketing in their respective firms discussed the cartel on the fringes of meetings of the European Synthetic Rubber Association (ESRA) approximately four times a year. Discussions were held over dinner, in bars, on the way to dinner, hotel rooms, and in telephone conversations and by email outside official ESRA meetings. Based on the testimony of some of the participants, meetings were held in Milan (at the company offices of Eni), Düsseldorf (Arabella Airport Hotel), Vienna (Crowne Plaza Hotel), Amsterdam (Memphis Hotel), Brussels (CEFIC offices, European Chemical Industry Council), Richmond-on-Thames (ESRA offices), Frankfurt (Meridien Hotel), Wermelskirchen (Grosse Leder), Prague (Hotel U Pave), Frankfurt (Meridien Parkhotel), Frankfurt (Meridien Hotel), Hamburg (Madison Hotel), and Prague (Hotel Pariz).

The cartel operated bilaterally, and, with the exception of some handwritten notes, very little documentary evidence of the cartel exists. The choice of operating a bilateral structure was a deliberate one by the cartelists and in addition to the meetings held during ESRA meetings, The Commission noted: "Bilateral telephone contacts between the competitors between cartel meetings played an important role in assuring the efficient running of the cartel. They were particularly important in assuring that cartel agreements were being complied with" [para. 136].

Regular bilateral meetings (and very occasional trilateral meetings) were held between the manufacturers leading to "the conclusion of bilateral agreements" [para. 292].

The Commission acknowledged the difficulties of unravelling the cartel structure noting that: "Concerning the proof of bilateral contacts … it should be added that although, by their very nature, direct corroboration of one party's allegation could only occur through admission by the other party of the same contacts. On that basis it can be concluded that the existence of such patterns of communications is sufficiently established" [para. 322]. It further notes that given the penalties that anti-competitive agreements attract: "…it is normal for the activities which those practices and those agreements entail to take place in a clandestine fashion, for meetings to be held in secret, most frequently in a non-member country, and for the associated documentation to be reduced to a minimum" [para. 323]. The Commission also notes that there were discrepancies between the information supplied to them in testimony by some of the manufacturers for a number of the finer points of the cartel (including prices, clients, plants utilisation ratio, quantities supplied to customers). Given that there was proof that the manufacturers met in order to co-ordinate practices, the collusive practices were sufficiently established.

The fines received each firm were the following: Dow (EUR 64.575 million), Eni (EUR 272.25 million), Shell (EUR 160.875 million), Kaucuk (EUR 17.55 million), Trade-Stomil (EUR 3.8 million), Bayer received full immunity under the corporate leniency programme. Given the frequent (and often undocumented) bilateral agreements formed between the manufacturers an illustrative network structure is not possible.

Discussion: Industrial Organizations and Collusive Network Forms

The four cases examined share many common characteristics: high industry concentration levels, decreasing margins, cheaper foreign competition, pressure to reduce prices and presence of a powerful trade association. The difference between the cartels examined lies principally in their choice of collusive network structure and governance, and these network structures differ markedly. In the case of both the Flat Glass and Choline Chloride cartels we observed cartels that were multilateral in nature and created large amounts of artefacts (such as paperwork) which outlined the "rules" of the cartel. In contrast, the firms organizing the Vitamins and Butadiene Rubber cartels created network structures that were designed to be secretive, thus rendering these cartels relatively opaque, enduring, and more difficult to detect and unravel. In both cases the investigating authority (The Commission) raises doubts and uncertainties as to specific dates and meetings, and, at times, even the actors involved – an investigatory caveat not found in the investigations of the Flat Glass and Choline Chloride cartels.

Based on our earlier discussion (and four illustrative case studies), we can tentatively assert that the two forms of cartel structure (multilateral versus bilateral) have very different defining features. To help explain the differences between these two forms of collusive industrial networks we introduce the concept of *shadow networks* and *dark networks* (see Figure VII). By evoking this metaphor we are able to illustrate the extent to which a collusive industrial network is visible.

FIGURE VII
The Characteristics of Two Forms of Collusive Industrial Practices

SHADOW NETWORKS		DARK NETWORKS
More multilateral	*Network Structure*	More bilateral
More characteristic of a managerial project	*Network Ordering Rationale*	More characteristic of criminal/terrorist organizations
Greater homogeneity	*Observable Effect*	Greater heterogeneity
More bureaucratic means of ordering	*Network Control*	Less bureaucratic means of ordering
Greater visibility	*Network Horizon*	Lesser visibility
Tight coupling	*Actor Connections*	Loose coupling

Shadows (depending on the strength and relative position of a light-source to an object) will, to varying degrees, represent the image that casts the shadow. In some circumstances it may be utterly impossible to identify an object from its shadow; nevertheless, a shadow may still be observed however weak or poorly representative of the source object it may be. In contrast, in conditions of total darkness (such as a full eclipse, or a room with no windows or light source), will render all objects effectively invisible. If we extend this metaphor to collusive industrial networks we can make the following distinctions:

Shadow networks.

These collusive networks are organized through multilateral agreements and operate in a similar fashion to legitimate corporate projects where firms co-operate (for example, joint ventures) and hence are more managerial in their network structure. Such forms of organization have greater homogeneity (and symmetry) which renders them fairly visible (in this case, to

customers, competitors, regulators, and so forth). Control in shadow networks is exercised through greater bureaucracy. Even though they clearly do not have the option of legal redress if one party does not follow agreed behaviour and rules, shadow networks function with a focus on sanctions and penalties for transgressors, are often hierarchically controlled, and have clear and multiple channels of communication between actors. These more formalized structures have an extensive network horizon and links between actors is tightly coupled. Ultimately, these bureaucratic network forms unravel under their own structural weight.

Dark networks. In contrast to shadow networks, dark networks are organized bilaterally. They operate akin to terrorist or criminal networks (such as is the case for illegal drug gangs or arms traffickers). Collusion is decentralized, fragmented and opaque. These networks exist due to legitimate (and readily observable) networks, but differ as the network is heterogeneous, has limited bureaucracy, and has loosely coupled actors. Hence these network forms lack transparency, and have a limited network horizon. These structures have greater flexibility to respond to changing external conditions and circumstances, and are more difficult to detect and unravel than shadow network forms with their hierarchical and highly centralized network structures.

We view both foregoing network forms as a series of continua (as demonstrated in Figure VII). This recognizes that in addition to demonstrating that collusive industrial networks adopt many structural forms, these structures are not static (something not acknowledged by the previous literature); they exist in a state of flux and respond to external forces (for example, the need for concealment in the face of scrutiny by antitrust agencies), and to factors such as allegiances between organizations and information processing requirements.

Problematically, the current academic understanding of industrial cartels is by-and-large focussed upon the stereotypical hierarchical and highly centralized cartel (cf. Levenstein and

Suslow, 2006; Baker and Faulkner, 1993). Such hierarchical control and centralization is likely to stifle innovation and flexibility and may lead to the destruction of a network (Waluszewski, 2004; Krackhardt, 1994). In addition, no company is likely to be the "hub" in any network or have total control over it, despite what it may think (Håkansson and Ford, 2002). The cartels literature assumes that successful inter-firm collaboration requires frequent multilateral face-to-face meetings between a small number of actors that create "artefacts" such as agreements concerning behaviour, channels of communication, and penalties for transgression from the "contract", and so on; a form of governance that is familiar in other management projects such as joint ventures or joint marketing agreements.

We propose that this view has dominated the literature owing to our understanding of successful *legal* collaborations between firms. Even when the need for secrecy in collusive practices is acknowledged (for example, Baker and Faulkner, 1993), some form of hierarchical control or multilateral structure is advocated. Where secrecy is desired we find networks that are decentralized and decisions are taken bilaterally, where the need for concealment seeks to reduce the number of associated "artefacts" such as meetings and documentary evidence – hence our label "dark networks". We read and hear about these dark networks almost on a daily basis due to their ubiquity in the media, but do not readily see their link to business practices. For example, although terrorist acts by Al Qaeda are regularly reported in the media we do not currently have a particularly definitive understanding of their organization. Although there is some form of centralization in terms of leadership, attacks perpetrated by Al Qaeda are undertaken in a highly decentralized way by operating units that have considerable autonomy and often act bilaterally to conceal the identities of members (Raab and Milward, 2003). We are familiar with these structures in other terrorist organizations as well in the illegal trade of drugs such as in heroin and arms trafficking. These networks typically have bilateral structures which

render the network relatively opaque and subsequently difficult to detect and unravel, as Brzezinski (2002: 26) observes:

> *"…the narcotics industry has adapted what might be called the Osama bin Laden approach to management: base your operation in remote safe havens, the more war-torn and chaotic the better; stay small and shifty, use specialized subcontractors or freelancers on a need-to-know basis; vary your routes and routines whenever possible; and most important, always insulate yourself with plenty of expendable intermediaries in case someone gets caught and talks".*

Griffith (1997) makes similar observations in Caribbean drug smuggling gangs, which have little vertical integration or hierarchical forms of control so as to evade detection and operate through kinship links and friendship networks. The same network structures are evident in the market for heroin exported from Southeast Asia and South America to countries in North America and Europe. These networks "…must be covert, and consolidation and vertical integration are extremely risky because one broken link can destroy a tightly coupled network as police roll up the network by moving from one link to the next" (Raab and Milward, 2003: 421). Hence we are left with a picture of highly concealed networks where decisions and channels of communication are bilateral, power is dispersed among actors, networks are decentralized and heterogeneous, and actors are loosely coupled; these bilateral structures are in marked contrast to the multilateral and highly centralized industrial collusion for price-fixing described in the cartels literature.

Conclusion and Implications

In this study we proposed that illicit collusive industrial networks would seek to form bilateral and decentralized network structures (so called dark networks), in order to conceal the identity of participants and to evade detection. Our reconstruction of four industrial cartels demonstrates the variance in network structure firms can adopt in order to undertake collusive agreements. Further, this contribution serves as one of the first attempts to examine what has been termed the "black box" by industrial economists and organizational criminologists, and offers real insight into collusive network structure by revealing that bilateral networks, which have some of the properties of terrorist organizations as well as drug gangs and arms trafficking, offer participants greater concealment to the authorities. We now briefly outline the theoretical, managerial and policy implications of the study and propose directions for future research.

Theoretical implications

Through our examination of the industrial economics and organizational crime literatures, and the study of four collusive network structures, our modest contribution casts significant doubt on many earlier studies and assumptions concerning collusive firm structures (Levenstein and Suslow, 2006; Baker and Faulkner, 1993). The study of collusive networks is significant because it reveals central fallacies in our current understanding of illegal cartels, and the largely unrecognized significance of the chiefly hidden bilateral network cartels, which we argue can better remain hidden over longer durations of time and can often be more innovative and responsive to new industry circumstances. This shifts the emphasis of the current cartel theory away from the hierarchical and centralized control of networks to more subtle and less detectable bilateral – or dark – network forms. This understanding also affords industrial marketers an insight into collusive network practices.

Based on one of the few extant longitudinal analyses of cartel networks, we discovered a continuum of network structures. At one end of the continuum we found the stereotype of highly organized hierarchical cartels which sought to systemically impose planned social order upon their industry network. Specifically, these cartels were governed by corporate executives who held regular multilateral meetings and delegated implementation of cartel tasks to lower level working groups. With limited effort these shadow networks are rendered visible. At the other end of the continuum we identified cartels which operated solely based on bilateral network linkages, without centralized leadership or multi-party cartel meetings. This type of bilateral network structure is commonly used by criminal enterprises, including terrorist groups, as noted, because their characteristics render them difficult to detect and unravel. Based on the foregoing we offer five propositions:

1. More criminally "successful" collusive industrial networks will adopt less transparent bilateral structures with low levels of actor integration (i.e. dark networks);
2. Less criminally successful collusive industrial networks will adopt more transparent and highly integrated multilateral structures (i.e. shadow networks);
3. The greater the use of controlling mechanisms to police cartels and creation of "cartel bureaucracy" will hasten its demise due to increased visibility and detection; and
4. Hierarchically controlled collusive networks will be less successful than non-hierarchical collusive networks.

Managerial implications

Rather than remaining static or decreasing, cartels are being investigated and discovered at a faster rate than has ever previously been the case, with anti-cartel enforcement now

constituting the main priority of antitrust agencies such as the DOJ (Connor, 2008: 4-6). Despite calls for studies in international marketing with a policy basis – such as antitrust – (LeClair, 2000; Czinkota, 2000) they remain largely absent. Firms operating across multiple markets, however, need to be mindful of important policy issues such as antitrust laws in a number of jurisdictions when framing their marketing objectives (Ashton and Pressey, 2008).

Given the foregoing, being cognisant of government policies and laws in areas such as antitrust is a key business task. If a marketer is uninformed they may unwittingly and unknowingly fall foul of such laws. When operating in international markets the potential for undertaking anticompetitive actions is likely to be higher due to the greater scope of such laws and variation in antitrust laws between countries. This position is compounded as marketing by its nature has developed a 'boundary-spanning role' in many organisations, as marketing managers become increasingly involved in a diversity of company functions (Wilkie and Moore, 1999: 200). This position provides marketing managers with "ample opportunity to engage in guideline-relevant offences such as price fixing, bribery, fraud and discrimination" (LeClair *et al.* 1997: 29). Consequently, marketing objectives should be created that are cognisant of the rules for competitive behaviour (LeClair, 2000: 207) to both reduce risks for individuals and risks within the marketing planning process.

In addition to not being cognisant of antitrust laws, some marketers may even eschew policy matters on the premise that this is an issue for lawyers and as legal considerations may not be an important aspect of marketing planning and strategy (LeClair, 2000). This cannot be regarded as a valid perspective particularly as antitrust agencies are pursuing individuals as well as companies. As marketers may be central protagonists to anticompetitive practices – which the four cases studies of collusive cartels studied, demonstrate – such practices should be understood.

In terms of multi-national enterprises, under European case law, if a parent company owns the totality (or near totality) of shares of a subsidiary then it is presumed that the subsidiary is following the commercial policy and conduct of the parent. Hence a parent and a subsidiary are regarded as a single undertaking under European competition law. In addition, even the presence of an antitrust compliance programme at parent level would not distance the parent from any anticompetitive action on behalf of a subsidiary, further; the compliance programme itself would be regarded as ineffectual.

Our notion of dark and shadow networks also has implications for practice. We posited that dark networks – in contrast to shadow networks – have loose coupling between actors due to the bilateral network forms that governs them. Theorists in sociology (e.g. Granovetter, 1983; 1973; Friedkin, 1980), have argued and provided empirical evidence to suggest that individuals or entities with strong ties (close, tight linkages) might stifle innovation and lead to inertia due to homogenous subcultures with few, if any, linkages to the wider social system in which the group operates. In contrast, individuals with weak ties have access to a wider network of actors, which helps facilitate the diffusion of innovations or information, among other functions. Granovetter (1973: 1364-1365) proposed the notion of *local bridges* – individuals who provide connections between otherwise unconnected actors – in order to explain this phenomenon. These local bridges were more likely to be through weak ties as networks with strong ties are almost hermetically sealed units with limited contact with the wider social system. The strong homogeneity of group membership means that everyone in the group has very similar contacts, hence the network may be limited in its broader connections as a result. In an industrial marketing context, organizations that have greater numbers of weak ties are more likely to have "bridges" to other organizations (e.g. suppliers, customers) who can be a useful source of contact (e.g. providing a scouting function (Möller and Svahn, 2009) or access to knowledgeable actors

in the broader network such as industrial mavens (Nataraajan and Angur, 1997)). Companies that cultivate weak ties will ultimately be exposed to a broader network than will organizations with strong ties.

Policy implications

Our examination of collusive industrial practices also has policy implications. Initially, they point to how we may better detect and deter firms from engaging in criminal cartel practices, and to both internal corporate governance and external governmental supervision and persecution of criminal cartels. The two forms of collusive networks examined (multilateral and bilateral) represent vary different challenges to antitrust authorities attempting to unravel them. Bilateral network forms with limited documentation and control mechanisms will prove difficult to detect, particularly if organized electronically using encryption devices. It may be that many of these collusive networks are actively operating in numerous markets, and we may be ill-equipped to unravel them, particularly as the field of cartel research is based on failed cartel structures.

Our findings also have implications for legitimate, legal, networks. We find that excessive control and inter-linkages stifles flexibility and innovation, and the ability for a network to respond more successfully to external stimuli (i.e. weak ties versus strong ties). For example, government initiatives to create highly interlinked scientific and commercial communities may lead to network bureaucracy and ultimately failure.

Limitations and directions for future research

No study is without its limitations and this study is no exception. We can draw no statistical generalizations from our cases. The four collusive networks used for illustrative

purposes, however, indicate that there is considerable merit in longitudinal studies of cartels. This said we must temper our propositions in light of future studies which may draw different (and possibly contrasting) conclusions. We would thus welcome studies that test our propositions with larger (and more generalizable) samples, even if they provide counter-arguments. What our results do suggest is that when one examines the black box of industrial cartels in any depth then our current thinking of them may be transformed.

More fundamentally, future studies of collusive industrial networks may be weakened by employing the analytical tools we have at our disposal in business and organizational research. This calls for studies that look beyond current management theories and taxonomies. Studying deviant networks (such as for terrorism, arms trafficking, or heroin distribution) may afford us a better understanding of successful deviant industrial networks. This need to rethink the measures adopted to examine cartels should be important as current views offer a rather jaundiced account of cartel structures and practices. Finally, as collusive industry networks are perduring and more common than was first thought, there is a need for marketers to understand them better. Complementing this would be studies that attempt to better understand the "dark side" of industrial networks and organizations, where "secret societies" (such as networks that engage in industrial espionage, price-fixing, bribery, employee fraud, and so forth) are rarely acknowledged currently.

"*The fact that secrets do not remain guarded forever is the weakness of the secret society*"

(Georg Simmel, 1950).

References

Ashton J. K. and Pressey, A. D. (2008). Regulatory Perception of Marketing: Interpreting UK Competition Authority Investigations from 1950 to 2005, *Journal of Public Policy and Marketing*, **27**(2): 156-164.

Baker, W. E., and Faulkner, R. R., (1993). The social organization of conspiracy: illegal networks in the heavy electrical equipment industry, *American Sociological Review*, **58**(6): 837-859.

Brzezinski, M., (2002). Re-engineering the drug business, *New York Times Magazine*, 23rd June: 24-29, 46, 54-55.

Clinard. M. B., and Yeager, P., (1980). *Corporate Crime*, New York: Free Press.

Clinard, M. B., and Yeager, P., (2006). *Corporate Crime*, New York: Free Press.

Connor, J. M., (2004). Global antitrust prosecutions of modern international cartels, *Journal of Industry, Competition and Trade*, **4**(3): 239-264.

Connor, J. M., (2008). *Global price fixing*, Second Edition, Berlin, Germany: Springer-Verlag.

Czinkota, M. R. (2000). The Policy Gap in International Marketing, *Journal of International Marketing*, **8**(1): 99-111.

Dick, A. R., (1996). When are cartels stable contracts? *Journal of Law and Economics*, **34**: 241-283.

Djelic. M. L. (2002). Does Europe mean Americanization? The Case of Competition, *Competition and Change*, **6**(3): 223-250.

Elliott, W. Y., May, E. S., Rowe, J. W. F., Skelton, A., and Wallace, D. H., (1937). *International control in the non-ferrous metals*, New York: Macmillan.

Evenett, S. J., Levenstein, M. C., and Suslow, V. Y., (2001). International cartel enforcement: lessons from the 1990s, *World Economy*, **24**(9): 1221-1245.

Friedkin, N. (1980). A test of the structural features of Granovetter's 'Strength of ties' theory, *Social Networks*, **2**: 411-422.

Goffman, E., (1970). *Strategic Interaction*, Oxford, England: Basil Blackwell.

Gonzales, A. R. United States Department of Justice (2005). Samsung agrees to plead guilty and to pay $300 criminal fine for role in price fixing conspiracy, Thursday, October 13, 2005, www.USDOJ.GOV.

Granovetter, M. S. (1973). The strength of weak ties, *American Journal of Sociology*, **78**(6): 1360-1380.

Granovetter, M. S. (1983). The strength of weak ties: A network theory revisited, *Sociological Theory*, **1**: 201-233.

Griffith, I. L., (1997). Drugs and security in the Caribbean: sovereignty under siege. College Park: Pennsylvania State University Press.

Gupta, S., Polonsky, M., Woodside, A., and Webster, C. M., (2010). The impact of external forces on cartel network dynamics: Direct research in the diamond industry *Industrial Marketing Management*, **39**(2): 202-210.

Jones, E., (1900). *The trust problem in the United States*, New York: Macmillan

Håkansson, H., and Ford, D., (2002). How should companies interact in business networks? *Journal of Business Research*, **55**: 133-139.

Hay, G. A., and Kelley, D., (1974). An empirical survey of price fixing conspiracies, *Journal of Law and Economics*, **17**: 13-38.

Hylton, K. N. and Deng, F. (2007). Antitrust Around the World: An Empirical Analysis of the Scope of Competition Laws and their Effects, *Antitrust Law Journal*, **74**(2): 271-341.

Kenwood, A. G., and Lougheed A. L., (1984). *The Growth of the International Economy, 1820-1980*, London: George Allen & Unwin.

Krackhardt, D., (1994). Constraints on the interactive organization as an ideal type, In C. Heckscher & A. Donnellan (Eds.), *The post-bureaucratic organization*, (pp. 211-222), Beverly Hills, CA: Sage Publications.

LeClair, D. T., Ferrell, O. C. and Ferrell, L. (1997). Federal Sentencing Guidelines for Organizations: Legal, Ethical and Public Policy Issues for International Marketing, *Journal of Public Policy and Marketing*, **16**(1): 26-37.

LeClair, D. T., (2000). Marketing planning and the policy environment in the European Union, *International Marketing Review*, **17**(3): 193-215.

Levenstein, M. C., and Suslow, V. Y., (2006). What determines cartel success? *Journal of Economic Literature*, XLIV, March: 43-95.

Malz, M., and Pollack, S., (1980). Suspected collusion among bidders, In *White collar crime: theory and research*, G. Geis and E. Scotland (pp.174-198), Beverly Hills, CA: Sage.

Möller, K. And Svahn, S. (2009). How to influence the birth of new business fields – Network perspective, *Industrial Marketing Management*, **38**(4): 450-458.

Nataraajan, R. and Angur, M. G. (1997). A quest for the "industrial maven", *Industrial Marketing Management*, **26**(4): 353-362.

Newman, P. C., (1948). Key German cartels under the Nazi regime, *Quarterly Journal of Economics*, **62**: 576-595.

Neumann, M., (2001). *Competition policy: history, theory and practice*, Cheltenham, United Kingdom: Edward Elgar Publishing.

Posner, R. A. (1970). A Statistical Study of Antitrust Enforcement, *Journal of Law and Economics*, **13**: 365-419.

Raab, J., and Milward, H. B., (2003). Dark networks as problems, *Journal of Public Administration Research and Theory*, **13**(4): 413-439.

Scherer, F. M., (1980). *Industrial markets and economic performance*, Second Edition, Boston, MA: Houghton Mifflin.

Shapiro, S. P., (1976). A background paper on white collar crime, paper presented at the faculty seminar on white collar crime, February, Yale Law School, New Haven, CT.

Shapiro, S. P., (1980). Thinking about white collar crime, research report, December, Washington, DC: U.S. Department of Justice, National Institute of Justice.

Siegel, L. J., (1989). *Criminology*, Third Edition, St. Paul, MN: West Publishing.

Simmel, G., (1950). *The sociology of Georg Simmel*, Translated and edited by Kurt H. Wolff. New York: The Free Press.

Simpson, S. S., (1986). The decomposition of antitrust: testing a multi-level, longitudinal model of profit-squeeze, *American Sociological Review*, **51**: 859-875.

Sonnenfeld, J., and Lawrence, P. R., (1978). Why do companies succumb to price fixing? *Harvard Business Review*, July-August: 145-157.

Staw, B. M., and Szwajkowski, E., (1975). The scarcity-munificence component of organizational environments and the commission of illegal acts, *Administrative Science Quarterly*, 20: 345-354.

Spratling, G. R., (1999). International cartels, speech before the *American Conference Institute*'s 7th National Conference on the Foreign Corrupt Practices Act, Washington, DC, December 9th.

United States Department of Justice (2005). Samsung agrees to plead guilty and to pay $300 criminal fine for role in price fixing conspiracy, Thursday, October 13, 2005, www.USDOJ.GOV.

United States Department of Justice (2004). Infineon Technologies AG agrees to plead guilty to participating in DRAM price-fixing conspiracy, Wednesday, September 15, 2004, www.USDOG.GOV.

Waluszewski, A., (2004). If you control networks, they die, paper presented at the 20th Industrial Marketing and Purchasing Conference, Copenhagen, Denmark.

Wilkie, W. L and E. S. Moore, (1999). Marketing's Contribution to Society, *Journal of Marketing*, **63**, Special Issue: 198-218.

FIGURE I
CHARACTERISTICS OF FOUR PRICE-FIXING CARTELS

Market	**Flat glass**	**Choline Chloride**	**Vitamins**	**Butadiene Rubber**
Concluding year of investigation	2007	2004	2001	2006
Structure	Multilateral	Multilateral	Bilateral	Bilateral
Number of participants in the cartel	Four	Six	Thirteen	Six
Nationality of parent	Japan, U.S., UK, France	the Netherlands, Germany, Belgium, U.S., Canada	Switzerland, Germany, France, the Netherlands, Japan	Germany, U.S., Italy, the Netherlands, Czech Republic, Poland
Duration of cartel	Two years (2003-2005)	Six years (1992-98)	Ten years (1989-99)	Six years (1996-2002)
Markets affected	European Economic Area	Global	Global	European Economic Area
Fine	EUR 486.9 million	EUR 66.3 million	EUR 855.22 million	EUR 519 million

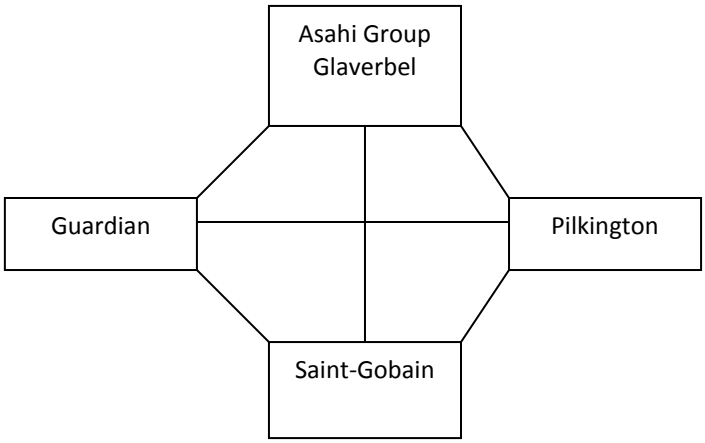


Figure II
Multilateral Network Structure for the Flat Glass Cartel

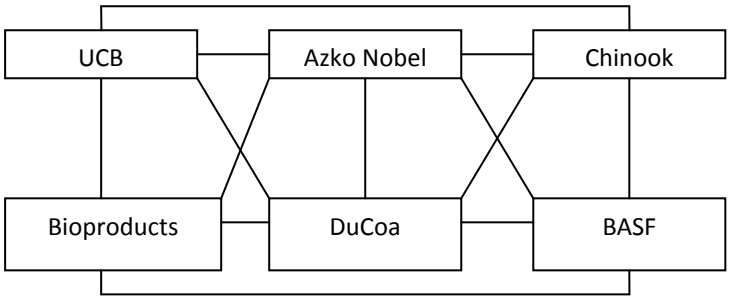


Figure III
Multilateral Network Structure for the Global Choline Chloride Cartel (1992-1994)

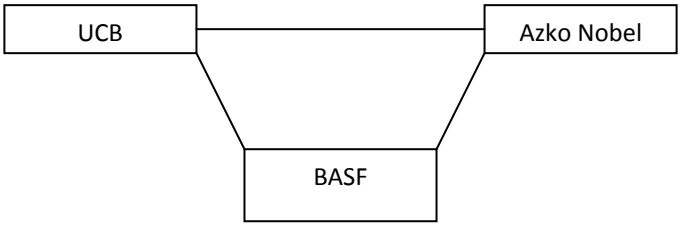


Figure IV
Multilateral Network Structure for the European Choline Chloride Cartel (1994-1998)

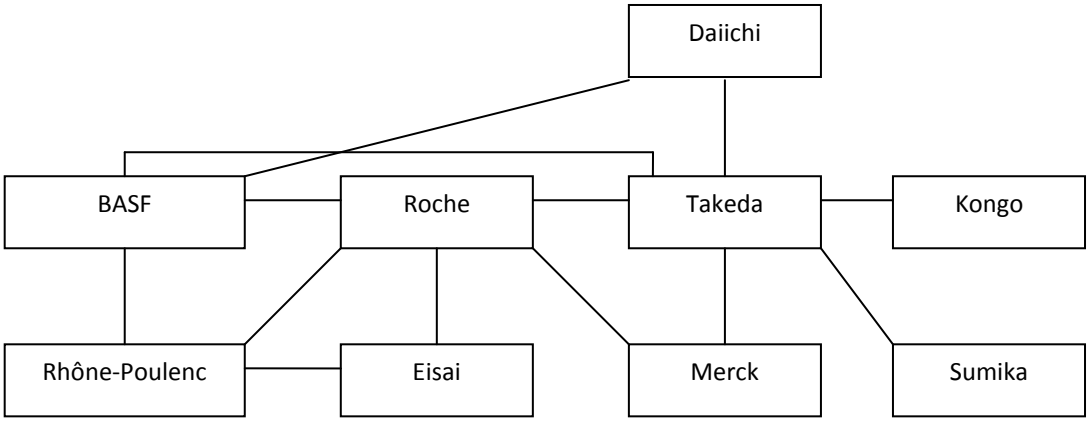


Figure V
Multilateral Network Structure for the Vitamins Cartel (1989-1997)

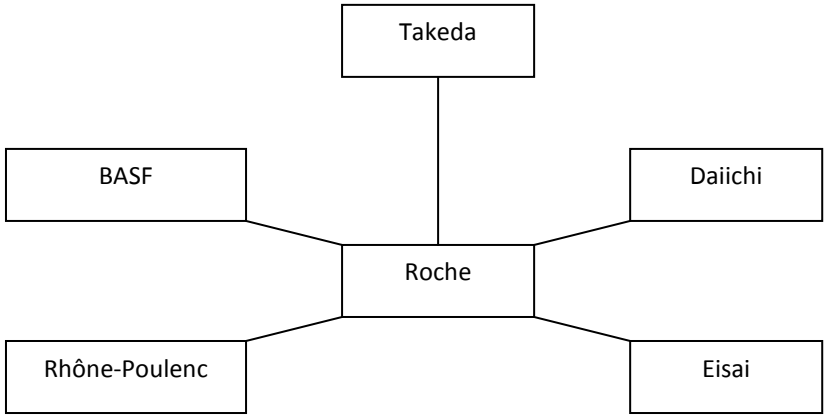


Figure VI
Bilateral Network Structure for the Vitamins Cartel (1997-1999)

FIGURE VII
The Characteristics of Two Forms of Collusive Industrial Practices

SHADOW NETWORKS		**DARK NETWORKS**
More multilateral	*Network Structure*	More bilateral
More characteristic of a managerial project	*Network Ordering Rationale*	More characteristic of criminal/terrorist organizations
Greater homogeneity	*Observable Effect*	Greater heterogeneity
More bureaucratic means of ordering	*Network Control*	Less bureaucratic means of ordering
Greater visibility	*Network Horizon*	Lesser visibility
Tight coupling	*Actor Connections*	Loose coupling