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CORPORATE GOVERNANCE AND CARTEL FORMATION**Abstract:**

This paper examines the relationship between corporate governance and cartel formation, A firm's participation in cartel depends upon the potential problems that may arise due to price fixing and the incentives provided to the management. The top levels of management such as the board of directors and the CEO are responsible for deciding if the firm will participate in the cartel and manage the corporate governance activities of collusive price fixing agreements. The study is focused on UK cartel firms which has the highest representation in the sample. A total number of 150 cartel firms in 52 cases from all around the world between the years 1990 to 2008 are involved in this study, of which 114 are UK firms. Therefore, this study is dominated by UK firms. The study concludes that UK-based cartel firms characterised by having larger board size compared to non-cartel firms; lower percentage of independent directors (non-executive); higher average of board remuneration; less likely that cartel is formed by family-owned and controlled firm (large shareholders); having older CEOs represented on the board; having CEO who served a less number of years as a director; less likely to have a female CEO represented; more likely to have CEOs who's combined CEO-chairman position; and a higher average of CEOs bonuses and compensation packages.

Keywords:

Cartels; Antitrust agreements; Corporate governance; Competition; Agency theory.

JEL Classification: G34, L40

1. Introduction

Cartel is a phenomenon, which have been extensively researched upon to understand their workings and their effects on society and economy. Many different kinds of theoretical models and empirical studies have been brought after extensive economic analysis in relation to cartel. It is found that a firm forms a cartel when it intends to purposely raise prices for the customers and eventually harm them due to an increasing expense.

Nearly all discovered cartel are operated and formed by managers (CEO/executives) whose motivation may not be fully aligned with those of the profit-motivated owners (shareholders). Even though participating in cartel may benefit executives and shareholders during their period in operation, once caught and sentenced, the effects of such behaviour can result in high fines and reputational losses on the part of the firm and its management (Agrawal and Mandelker, 1990). This research contributes to the theoretical basis by shedding some light on the characteristics of the boards and executives of firms involved in cartel formation.

Two issues have been found requiring attention in a cartel situation: The entry of new firms and the cheating possibility (Levenstein and Suslow, 2006). The financial statement of the organisation consists of all kinds of deviations that the firm may carry out as part of the collusive agreement. The partners in the cartel may start a price war if they find exceptional earnings, and this activity may result in lower earnings overall. The antitrust authorities may also be alerted and the collusive agreement would be considered weak. Defection from collusive behaviour may not be attractive since the future costs are very high. Some of the firms may also enter the market and distort the existing collusive equilibrium. Concentrated industries are commonly found to have successful cartel that facilitate collusive activities (Bolotova, Connor, and Miller, 2008).

The management of the organisation is required to enforce cartel agreements (Spagnolo, 2005) and the decision to actually form the cartel is taken by the top management (Harrington, 2006c). The CEO, Board of directors and top management are all involved in the collusive price fixing agreements, which are

formed by their firms as part of the corporate governance discussions. Hence, it is necessary to understand whether the corporate governance within a firm helps determine if a cartel should be formed. Many organisations may not want to carry out this hard-core activity and establish collusive agreements. Cartel participation increases if the board of directors is weak; if most power is exercised by the top management level (concentrated power); and if the incentives provided to the management depend on their performance levels (Spagnolo, 2005). The empirical literature has not yet established a link between cartel and firms' corporate governance characteristics.

This study links two literatures by studying the relationship between corporate governance and cartel formation. Prior studies have examined the economic consequences of cartel formation. Various criteria have been applied to evaluate cartel performance (e.g. Levenstein and Valerie, 2006) including longevity (e.g. Dick, 1996; Simmerman and Connor, 2005; Levenstein and Suslow, 2010), stability (e.g. Porter and Zona, 1993; Villar, 1983, 1973 and 1999), social welfare (e.g. Bos and Pot 2012; Mott, 2003), and efficiency (e.g. Burhop and Luebbers, 2008; Dick, 1998; Günster, Carree and Dijk, 2011). However, only few papers have discussed cartel formation in relation to corporate governance. Specifically, previous studies focus on cartel formation in connection with compensation, CEO tenure and board characteristics (Han (2010); Spagnolo (2005); Burhop and Lubbers (2008); and Gonzalez and Schmid (2012)).

However, this thesis offers contributions to the literature by complement the empirical findings of Spagnolo's (2005) which are connected to this research. As Spagnolo documented that collusive agreements are managed at lower discount factors through smoother paths for profits. He has specified that price fixing and management incentives encourage firms to join cartel, which provide enlightenment to this research as it discusses corporate governance and cartel formation. The focus of his study is similar to this current study since both of them discuss compensation schemes (remuneration) as one of the characteristics of corporate governance. Spagnolo reinforces the influence of corporate governance on cartel formation as stated in his paper that to enforce cartel agreements is to require the

management of organisations. Therefore, the current research is complementing the empirical finding of Spagnolo's (2005)

Furthermore, this thesis offers contributions to the literature by complement the empirical findings of Han (2010). Han examines short-term and long-term employment contracts and their effects on cartel stability. The study shows that firms are more likely to be involved in cartel agreement when CEO tenure (short-term employment contract) is low or when CEO turnover is high. The author also shows that a short-term contract provides stability to a cartel formation more than a long-term contract. Therefore, the current research is complementing the empirical finding of Han's (2010).

Moreover, the most closely related study in this literature is perhaps the study by Gonzalez and Schmid (2012). Their research was conducted by using a sample of 1,148 observations from 1987 to 2009, in 182 various U.S. cartels. Overall, the research studied the link between possibility of being part of a cartel and financial controls, product market competition and several corporate governance variables. The corporate governance variables that they use in their study are; board size, CEO shares, block ownership, % outsiders, combined CEO-chairman, busy board and finally CEO centrality. The study found that there is direct involvement posed by the board of directors and the CEO in the potential collusive price fixing agreements of their firms, leading to an assumption of a significant relationship between corporate governance and cartel formation. However, in this research the focus on different board and CEO characteristics in addition to the one used by Gonzalez and Schmid, also this study uses to test the hypothesis dataset contain mainly UK-based cartel firms. Therefore, the current research is complementing the empirical finding of Gonzalez and Schmid (2012).

In an experiment conducted by Hamaguchi *et al.* (2009), gender was included as an individual or social background variable, in an experiment mostly designed to look for group size effects on cartel dissolution, along with leniency programme characteristics. The design of the research (which also proceeds by logistic regression), is very much alike the research pursued here in this study. There is certainly more attention being given to individual characteristics than ever before in

the non-econometric analyses. The coefficient for gender in the logistic regression was significantly negative in showing that women have a positive impact on cartel dissolution ($p < 0.05$), since “fewer men dissolved their cartels than women” (Hamaguchi, *et al.* 2009). Therefore, the current research is complementing the empirical finding of Hamaguchi, *et al.* (2009).

In many ways, this study is also complementing the work of Grillo (2002). Instead of focus on competition law and how market strategies are nullified by the “straightforward co-ordination on market strategies”, the focus of this research describes how multiple firms design and practice an organisational culture in a cartel arrangement, or what Grillo calls “*an anticompetitive object*”. This anti-competitive object can more easily be reproduced amongst certain kinds of boards and with certain types of CEO – this is the conclusion of this research. Therefore, the current research is complementing the empirical finding Grillo (2002).

This study concludes that UK-based cartel firms characterised by having older CEOs represented on the board; having CEO who served a less number of years as a director; less likely to have a female CEO represented; more likely to have CEOs who’s combined CEO-chairman position; and a higher average of CEOs bonuses and compensation packages.

The remainder of the paper is organized as follows. Section 2 describes the sample and variables. Section 3 reports the results from the empirical analysis. Section 4 concludes.

2. Data and variables

2.1 Sample selection

This section gives a description of the data and variables used in this study. Several databases are used in the cartel sample selection and cartel data collection phases of this study. The first set of sources are the DoJ, the EC and CC/OFT. The second is the LexisNexis database. The third set includes the academic working papers by Levenstein and Suslow (2006 and 2002), Levenstein, Suslow, and Oswald (2003)

and Connor and Helmers (2006). The forth source includes data obtained from Prof. John Connor of Purdue University. A screening process was conducted, which eventually led to the acquisition of a full list of 150 cartel firms, which are divided into single abusers and multiple abusers (Recidivism).

A total number of 150 cartel firms in 52 cases from all around the world between the years 1990 to 2008 are involved in this study, of which 114 are UK firms. Therefore, this study is dominated by UK firms. Cartel cases are described according to the country of origin, industry, and cartel duration. Cartel firms, on the other hand, are described according to the country of origin, industry, and type of ownership

Using data records from the period 1990 to 2008 of cartel activity and sanctions on firms from European Commission (EC), the UK Competition Commission (CC) / Office of Fair Trading (OFT) and U.S Department of Justice (DoJ) the discrete variable Convictions (CONV) are created to imply the formation and discovery of cartel. Hence, the dependent variable separates those firms that formed cartels that were detected from all other firms some of which were not in cartels and other which were in cartel but were not discovered. The dependent variable Conviction (CONV) counts the number of episodes of sanctions in connection with proven cartel activity. CONV takes a value of 1 if the firm has been sanctioned in connection with cartel formation and discovery on a single occasion, 2 if the firm was involved in cartel activity on two occasions (*multiple abusers*), etc. The value of 0 is assigned to CONV for the benchmark comparison with firms without any involvement in cartel activity, referred to here as "*non-cartel firms*", which means that the firm has not formed any cartel, nor had been discovered for any cartel activity. However, it must be noted that some non-cartel firms might also be in cartel but have not been discovered, which cannot qualify them to be called "*cartel firms*" in this study.

2.2 The control group of matched firms

This study utilises a matched sample approach to create a comparison group. This non-probability approach limits variations that might cause bias to the study (Macnee and McCabe, 2008). The use of matched sampling implies that the samples are in some way related (or *correlated*). A significant relationship exists between the matching variable and the dependent variable (Leong and Austin, 2006). The

purpose of a matched sample design is therefore to ascertain that some characteristics are identical (Wood and Ross-Kerr, 2011).

To create a comparison group, matching firms are selected which have not been discovered/detected as operating cartel and referred to here as "*non-cartel firms*", this means the firm has not formed any cartel, nor had been discovered for any cartel activity. However, it must be noted that some non-cartel firms might also be in cartel but have not been discovered/detected, which cannot qualify them to be called "*cartel firms*" in this study.

Cartel firms are matched to non-cartel firms via a specific matching process. This process includes matching a cartel firm with a non-cartel firm's benchmark within the same industry, based on a *three-digit SIC code*, and takes into account the timing of the starting year of the cartel cases to ensure that the data for each pair came from the same period. This is an example of twinning or ensuring the identical characteristics of the samples being matched (Leong and Austin, 2006; Wood and Ross-Kerr, 2011). *Firm size based on net sales* is also taken into consideration along with their position in the stock exchange. The firms with similar size and position in the stock exchange are matched together. It is proposed that matching via this comprehensive set of criteria would improve the quality of matched pairs and hence the quality and precision of test results.

For the purposes of this matching process, the industry selection is based on a three-digit Standard Industry Code (SIC) assigned to each firm based on the industry they operate in. This code could be sourced from FAME database, DataStream, and firms' databases depending on the availability of data for each firm. The matching process has utilised these databases to search for appropriate matches based on the criterion data (i.e. SIC code, time and size) of each cartel firm. This variable is also used as a control variable in the regression model to control for firm's the industry.

Moreover, *one year prior to the year when the cartel case started* to be used for matching purposes ensures the financial data and governance data for both the cartel firms and benchmark groups from the same time period. This additionally

enables the actual performance of cartel firms - prior to cartel formation - to be used to match the pairs. Exact matches of the time criterion are sought, while acceptable limits established within which the SIC coding and size criteria are permitted to deviate. These limits are set to emulate earlier studies, such as that of Beasley (1996), which permitted industry matches to two digits SIC code and a $\pm 25\%$ margin of fraud firms for matching by size.

The size criterion is determined by the net sales specified in the annual financial report issued on the fiscal year preceding the cartel incident. Matching the pair on a size criterion is deemed important to ensure that both cartel firms and non-cartel firms share relatively similar availability of resources and are therefore capable of implementing comparable corporate governance structures. Therefore, non-cartel firms are considered similar in size to cartel firms if the net sales are within $\pm 25\%$ of the cartel firms' sales for the year before the cartel cases started. Possible matches for cartel firms are identified through customised search. Excel spreadsheets are used to collate the data furnished from each search, which are then sorted and assessed to identify the closest possible matches. This variable is also used as a control variable in the regression model to control for firm profitability.

However, the classification of non-cartel firms will result in some misclassifications if a firm classified as non-cartel had an incidence of collusion or financial fraud. To reduce this possibility, the annual reports for the selected firms are reviewed, as well as data from Department of Justice, European Commission and Competition Commission (three years pre-cartel detection); to verify that there are no documented reports of cartel for any non-cartel firms. The financial statements filed with the U.S Securities and Exchange Commission (SEC) are also reviewed to identify whether the firms committed any financial fraud during the same window period for each cartel case. In the case that fraud was committed; the matched firm is excluded from the sample. From this step most excluded firms were identified in the 1901 initial cartel firms sample; in other words, they have been in a cartel before.

Finally, after firms had been identified and checked; each cartel firm is matched with one or more non-cartel firms depending on the availability of data. The total

benchmark after the matching process completed is 178 non-cartel firms, taking into account all possible matches for each cartel firm.

2.3 Variable definition

The governance data and the financial data originated from proxy statements with filing dates three years prior to the start of the cartel agreements. The sources used to collect the data also include Fame, DataStream, UK Firms House, Annual Reports by respective firms, BoardsEx, and ExecuComp. In order to test whether certain characteristics of the boards and CEOs are associated with cartel formation, the following variables are constructed to test the propositions: **CEOAGE**, CEO age. This variable is computed as the age of the CEO at the starting year of the cartel formation. In the case of non-cartel firms, the CEO age is taken over the period corresponding in time to the window on the cartel firm with which the non-cartel firm is matched.

CEOTEN, CEO tenure. This variable is computed as uninterrupted years on the board of directors up to the year when the cartel started. In the case of non-cartel firms, the CEO tenure is taken over the three-year period corresponding in time to the window on the cartel firm with which the non-cartel firm is matched.

CEOGEN, CEO gender. This variable is a dummy variable for both cartel firms and non-cartel firms with value of 1 if CEO was female and 0 if otherwise. In the case of non-cartel firms, the CEO gender dummy is taken over the three-year period corresponding in time to the window on the cartel firm with which the non-cartel firm is matched.

BOSS, power concentration. This variable is a dummy variable for cartel firms created with a value of 1 if the chair of the board held concentration power of CEO or president and 0 if otherwise. In the case of non-cartel firms we take the BOSS dummy is taken over the three year period corresponding in time to the window on the cartel firm with which the non-cartel firm is matched.

Multidir, multiple-directorships. This variable is calculated as the total number of directorship assigned to the CEO on other boards. In the case of non-cartel firms, the total number of multiple directorships is taken over the three-year period corresponding in time to the window on the cartel firm with which the non-cartel firm is matched.

In the empirical analysis of price fluctuations, Connor *et al.*, (2008) suggest that the success of collusion depends on three key factors: market environment, legal environment, and internal enforcement. Since this study examines the governance structure of firms involved in cartel, this study will examine independent governance variables (CEO and board characteristics) in respect to cartel formation and discovery (**CONV** scores), and therefore, following Connor *et al.* (2008) will establish some measures for control factors that describe the market and legal environments of cartel and non-cartel firms, as well as the firm control variables.

HHI, i.e., the Herfindahl-Hirschman Index, commonly accepted measure of the market concentration is used in this study. It is calculated by squaring the market share of each firm competing in the market and then summing up the resulting numbers.

$$H = \sum_{i=1}^N s_i^2$$

Where s_i is the market share of the firm; i is the market, and N is the number of firms. In a market with two firms each with 50 percent market share, the HHI equals $0.50^2 + 0.50^2 = 1/2$. Markets in which the HHI is between 0.15 and 0.25 point are considered moderately concentrated by the U.S DoJ, whilst those in which the HHI is in excess of 0.25 are considered to be concentrated. Transactions that increase the HHI by more than 0.1 in already concentrated markets will automatically attract antitrust concerns under the Horizontal Merger Guidelines, issued by the U.S DoJ and the Federal Trade Commission (FTC) (See Merger Guidelines (1.5)). In the case of non-cartel firms, we take the HHI over the same time window, which corresponds in time with the window of the cartel firm with which the non-cartel firm is matched.

The legal environment variable describes the jurisdictional zone where the conviction case was set. The variable is broken out into an array of four jurisdictions, covering the U.S Department of Justice (DoJ), the Competition Commission/ Office of Fair Trading (OFT), the European Commission (EC), and all other territories. A value of 1 is assigned when the firm is found to have committed a cartel criminal infringement in the jurisdiction, and 0 if otherwise. However, as these variables are highly correlated with one another only the DoJ variable is used in the regression since it is the oldest jurisdiction between all and it is not highly correlated with the other variables.

Firm Control Variables Saleb, i.e., the average sales pre-cartel formation; this variable is calculated for cartel firms as the average size of the board for three years before the cartel agreement started. In the case of non-cartel firms, we take the average sales over the three -year period corresponding in time to the window on the cartel firm with which the non-cartel firm is matched. It must be noted that the firms, having the most number of firms amongst the sample firms, are highlighted in the sample.

CurrRatioB, i.e., the average of current ratio pre-cartel formation. This variable is calculated as the average of current asset divided by current liabilities for three years before the cartel started. In the case of non-cartel firms, the average current ratio is taken over the three-year period corresponding in time to the window on the cartel firm with which the non-cartel firm is matched.

PPER, i.e., the average poor financial performance pre-cartel formation. Bell, Szykowny, and Willingham (1993) noted that poor financial performance increases the likelihood of general financial fraud. Therefore, the variable **PPER** (poor performance) is included as a metric to control for differences in financial performance between cartel and non-cartel firms. The metric is measured in a manner similar to that of DeAngelo and DeAngelo (1990), DeAngelo, DeAngelo, and Skinner (1994), and Beasley (1996). However, the studies above have used a poor performance measure as a dummy variable, whereas here, the actual value of 'poor performance' is used to indicate the firms' actual financial performance. The variable

is calculated for cartel firms as the average profit and loss for three years before the cartel started. In the case of non-cartel firms, the average is taken over the three-year period corresponding in time to the window on the cartel firm with which the non-cartel firm is matched. **COSTA**, i.e., the firm's ownership status to control for private firms and public firms. This variable takes the value of 1 if the firm is public and 0 if the firm is private.

1.4 Descriptive statistics

Mean and pairwise comparisons (cartel vs. non-cartel firms) for various characteristics of the CEOs are in the table above. The matched pairs of the pairwise comparison varied from 46 to 178 depending on the availability of data.

The table 1 provides a statistical description of CEO characteristics: cartel firms vs. non-cartel firms, from the period 1990 to 2008. The pairwise differences in CEO characteristics shows on one hand, that cartel firms had significantly lower CEO tenure, CEO gender (lower female CEO on the board), and lower multiple-directorships. On the other hand, cartel firms had higher CEO age, and more CEO concentration power.

Overall, the pairwise comparisons suggest that systematic differences between cartel firms and non-cartel matching firms are apparent in certain characteristics of the CEO characteristics. However, these univariate comparisons should be viewed with caution when making inferences about the connection between governance attributes and cartel formation. The pairwise tests implicitly assume that other potentially relevant firm characteristics are fixed, which may not be the case. Therefore, the ordered logit model was used to test the propositions in multivariate framework.

2. Empirical Results

The main objective of this model is to determine whether or not CEO characteristics affect cartel formation.

CEO Tenure

The multivariate test results emphasize the univariate comparisons that were presented in Table 2. The ordered logit model shows that the CEO tenure coefficient, **CEOTEN** used in models is negative and significantly different from zero in estimating cartel formation and discovery (**CONV**). It gives light to the assumption about whether CEO tenure, along with overlap of CEO and board chair roles (**BOSS**), help carry out the monitoring process of corruption activities for cartel firms (Mace 1986; Patton and Baker 1987; Vancil 1987).

Hence, the result is in contrast with some studies investigating CEO tenure and firm fraud. Loebbecke *et al.*'s (1989) study found a positive relationship between the two variables, but the fraud was often very specifically in connection with 'income smoothing' behaviour after a pronounced growth period which is then followed by much poorer financial performance in a subsequent downturn. Longer serving CEOs wished to smooth income, and likely had the depth of knowledge and intra-firm connections to make this form of fraud more plausible and likely. The controls used in this study in fact minimise the role of poor financial performance as a predictor for cartel activity. Even if many aspects are similar, a direct comparison between the studies is not altogether appropriate for every variable.

The finding is however in line with researchers who conducted another logit analysis between fraud and non-fraud firms, using CEO tenure as an independent variable (Beasley, 1996). The basis of Beasley's study is much closer to the study conducted here, and in fact Beasley's study used similar variables CEO tenure (**CEOTen**) and overlap of the CEO and board chair roles (**BOSS**) in the logit analysis. The variable **BOSS** was also found to be positively correlated with the likelihood of financial fraud misstatements. The finding also agrees with how long-tenured CEOs are less likely to have appropriate strategies (Wiersema and Bantel, 1992). This is of interest if cartel activity is accepted as a measure of a lack of strategic change ability, i.e. opting for the status quo amongst cartel firms. The results are also consistent with evidence suggesting that firms are more likely to be involved in cartel crime when CEO tenure is low, or equivalently, when CEO turnover is high (Han, 2010). Hence, it is possible to say that this research extends previous research on fraudulent

financial misstatements and board composition, and finds comparable results for how board composition and CEO tenure are likely to affect the probability of cartel formation and discovery.

If CEO entrenchment has in fact been found to have various negative consequences, especially in terms of excess remuneration and the stacking of outside directorships (Vafeas 2003), one benefit is to make cartel formation relatively less likely. The effect is not, however, large. Based on the figures above, the null hypothesis that the coefficient is not significantly different from zero can be rejected at 5% level of significance. The effect is not large in quantity but still has a strong signature in the data.

CEO Age

Consistent with expectations, the results of all the models show a positive and significant relationship between CEO age (**CEOAGE**) and the likelihood of cartel formation in UK-based firms. The parameter is significant at 5% level of significance, suggesting that the null hypothesis that the factor loading on CEO age is not significantly different from zero can be rejected. The evidence suggests that the older the CEO, the higher is the incentive to engage in cartel formation. Firms engaging in strategic change often have top management teams (defined to include the CEO as well as second executive levels) characterised by a lower average age (Han, 2010). Older executive teams (on average in the first and sector tier management hierarchy), are in their study more conservative in terms of strategy development.

Older CEOs are likely to be more conservative and this has a positive impact on firm performance, but also less likelihood of fraud (and increased CEO tenure means less fraud) (Stevens *et al.*, 1978). However, fraud happens amongst single firms – it is a singular activity by one firm. Cartel formation on the other hand has different and more social dynamics. Older CEOs may have strong established social networks that enable the communication necessary to cartel formation. Older CEOs may have worked for many organisations and established a number of strong networks. As a result, engaging in collusion with other firms will be less difficult (Beasley, 1996).

Older CEOs established in certain industries can also understand how those market structures perhaps make the formation of a cartel agreement a 'rational decision'.

On average, the probability that a CEO will leave the firm falls up to the age of 52 but begins to rise beyond that. CEO turnover therefore does increase with age. However, those CEOs that approach retirement age but whose firm has a superior corporate performance are less likely to leave the firm, than those that have nearly reached retirement age and whose firms are performing poorly. The latter are more likely to retire early, and thus increase CEO turnover and lower CEO tenure. Older CEOs may use the shorter career time remaining to at least ensure maintaining their personal benefits. Engaging in cartel activity could be seen as a means of retaining and insuring continued levels of expected remuneration (and status) before eventually retiring and leaving the firm (Bebchuck and Grinstein, 2005).

On the contrary, younger CEOs should expect in comparison to have a longer tenure with the firm. Younger CEOs in the early stages of corporate careers are yet to establish strong networks, and may not wish to suffer the reputational consequences of discovered cartel activity so early in their careers. Consequently engaging in cartel activity may be more difficult and higher risk for younger CEOs, and so less expected of younger CEOs in the organisational culture. Younger CEOs may therefore be more interested in maintaining a good reputation by maximising shareholder wealth through competitive means and building competitive advantage. In addition then, younger CEOs have a longer time in their career path and thus would be more interested in protecting their long-term careers from reputational damage.

One possible implication would be to combine the two propositions, that an older CEO with a shorter expected tenure may well use wide corporate social network connections, perhaps pressured by poorer corporate performance and the avoidance of forced early retirement, to resort to cartel formation as a pseudo-strategic response to market conditions. However, the relationship between CEO tenure and CEO age is difficult to model but generally, the risk of termination does increase for thirteen years, to only then decrease (Brookman and Thistle, 2009). Brookman and Thistle (2009) concluded that corporate governance does function as reasonably

expected, and that CEO age, tenure, retirement and corporate performance do act in tandem, as described above.

CEO Gender

Several studies suggest that compared with men, women are less likely to participate in corrupt practices (Cheung and Hernandez-Julian, 1999; Swamy *et al.*, 1999). Byrnes, *et al.*, (1999) observed that in different activities men were more willing to take risk than women. Sundén and Surette (1998) and Bernasek and Shwiff (2001), documented that women are considerably more risk averse than men. In a study on betting behaviour of men and women by Bruce and Johnson (1994) and Johnson and Powell (1994), it was observed that women show a lesser inclination towards risk-taking than men.

Consistent with this previous research, the results here show a very significant negative coefficient for **CEOGEN**, this shows that the CEO gender of the UK-based cartel firms has a very significant negative impact on the number of convictions on cartel formation.

Multiple-Directorship

The result suggests that the number of cartel formation and discovery in UK-based firms reduces as multiple directorship increases. These results are consistent with prior research where illicit activity is being modelled alongside corporate governance variables (Gilson, 1990; Kaplan and Reishus, 1990; Brickley *et al.*, 1999; Shivdasani, 1993; Ferris *et al.*, 2003). The results of these authors show that boards of directors of firms committing fraud are less likely to have directors who work on other boards, compared with boards of directors amongst non-fraud firms. Although multiple directorships as a variable appear to reduce the formation of cartel as evidenced by its negative impact on the number of convictions for cartel formation, its impact appears to be only a minimal one.

CEO Concentration Power

The coefficient for the concentration power variable (**BOSS**) was found to be positive and statistically different from zero in estimating its influence on cartel formation and discovery. This positive figure shows that concentration power increases incentives

to commit cartel crime given that the number of cartel formation and discovery increases with an increase in power concentration. Therefore, we reject the null hypothesis that the coefficient is not significantly different from zero at the 5% level of significance. This is consistent with prior studies, which discuss the case of fraud in general (Loebbecke *et al.*, 1989; Jensen, 1993).

Both **CEOCASE** and **CEONUM** variables are significant for how they both made very noteworthy contributions to explaining the variability in the data. For all models without the inclusion of the number of cartel cases or cases of misconduct, the pseudo-R² is under 0.3. Although the value of pseudo-R² is not to be compared with R² in ordinary logistical regression, the values of pseudo-R² do have a comparative value used in the same data set for comparing the effects of individual variables on data variance. Hence, only by including CEO cases and CEO misconduct cases, on the part of the CEO, does the pseudo-R² value reach towards or exceed 0.5, and in fact, the number of cases of CEO misconduct shows more ability to describe variance than cartel cases. This is to be expected when generally the number of misconduct cases will be greater than the number of cartel cases – the average number of CEO misconduct cases was in fact 1.75, and for CEO cartel involvement, 0.82.

Firm Sale

Surprisingly however, the average sales of firms three years pre-cartel (**SALEBA**) has an opposite sign to previous models. The **SALEBA** coefficient is negative but statistically insignificant. The robust standard error of the parameter is 0.008 and the p-value is 0.00. The negative coefficient suggests that the lower the average sales figure three years prior to the cartel formation, the higher the incentive to engage in cartel activity. These findings suggest that UK-based firms with healthy sales and income flow would find it less relevant to engage in collusive behaviour, such as price fixing and other cartel activities. However, although sale as a control variable appears to have a negative impact on the number of convictions for cartel crime, its impact appears to be negligible.

Current Ratio

The average current ratio (**CURRRATIOB**) has a negative coefficient but statistically not significant. This finding shows that as the current ratio increases, the incentive to form a cartel reduces, and vice versa. The results are consistent with how financially constrained or distressed firms (with higher debt ratios) are more likely to engage in cartel activity so as to stabilise or even improve their performance.

Poor Financial Performance

The poor performance of a firm (**PPER**) has also a negative and significant coefficient ($\beta=-0.30$, $z=-2.50$, $p<0.05$). This result is in contrast with that of DeAngelo and DeAngelo (1990) DeAngelo *et al.* (1994), and Beasley and Hermanson *et al.* (2006). Their results suggest a positive and significant relationship between poor performance and firm fraud, but since firms collude together not only to maximise profits but also to maintain their price, this result suggests that the UK-based cartel firms are more likely to have a good financial performance, which also supports our previous results that more UK-based public firms are likely to collude than private firms.

Herfindahl-Hirschman Index

The Herfindahl-Hirschman Index (**HHI**) has a significant and positive coefficient ($\beta=1.77$, $z= 2.02$, $p<0.05$). This result indicates that the null hypothesis that the coefficient is not significantly different from 0 can be rejected. This finding is unsurprising since high market concentrations, measured by the Herfindahl-Hirschman Index, indicate an industry that is dominated by few, oligopolistic firms. Such firms can more easily engage in cartel activity such as price fixing, and create artificial supply shortages, since problems of cartel co-ordination are much reduced.

Legal Environment

Chapter two discussed previously that the U.S Department of Justice (**DoJ**) is the first to impose fines and prison sentences on individuals involved in cartel agreements. Therefore, in order to control for the legal environment, we added the variable (**DoJ**). This variable describes the jurisdictional zone where the conviction case was set (cartel formation and discovery). The variable took a value of 1 when

the firm is found to have committed a cartel criminal infringement by the **DoJ**, and 0 if otherwise. The commission of a cartel criminal infringement is essentially cartel formation and discovery, which is the dependent variable. As can be observed there is a strong positive relationship between the number of incidences of cartel formation and discovery (**CONV**) and the number of UK-based firms convicted by the DoJ. This implies that the higher the number of UK-based cartel firms, the higher the number of cartel convictions by the DoJ, and vice versa.

Conclusion

This study utilises cartel firms from an original data set of 1,901, with highest representation from UK firms, thereby supporting the decision to use UK firms as the focus of the study. There are a total number of 150 cartel firms involved, of which 114 are from the UK. The study purports to determine which characteristics of the participating firms' boards of directors are associated with cartel formation and discovery. The results confirm that there is likelihood amongst public firms to engage in cartel agreements than private firms. This study identifies the attributes of corporate governance.

The challenge of this study is that the personal attributes of CEOs can make a significant contribution to the risk profile of a cartel being formed. This indeed would be to 'diagnose' organisational culture in a quite radical direction. The study suggests and finds that some corporate governance attributes are associated with cartel formation. The results reveal consistency with prior researches, that cartel firms have different corporate governance relative to a control sample in the three years prior to cartel formation. Specifically, the study concludes that cartel firms characterised by having older CEOs represented on the board; having CEO who served a less number of years as a director; less likely to have a female CEO represented; and more likely to have CEOs who's combined CEO-chairman position.

The main contribution of this research is to fill-in the existing gap in the literature on the relationship between corporate governance attributes and cartel formation. This study provides a contribution to understand how, and in what comparative measure

CEO characteristics do contribute to cartel formation likelihood. By providing an empirical instrument, this study may also contribute to monitoring the risks of collusion. The findings also consider the requirements for disclosure of corporate governance practices.

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Appendix

Table 1: Descriptive statistics

Statistical Description of Board and CEO Characteristics: Cartel Firms vs. Non-Cartel Firms, 1990-2008

The table reports a descriptive statistics of 150 cartel firms and 178 non-cartel firms. For every cartel firm, a control group of non-cartel firms was created, which share the first three digits of the SIC code and similar firm size based on net sale within $\pm 25\%$ of the cartel firm's sales at the end of the year before the collusive agreement started. Firm-years, in which cartel firms, i.e., firms that at one point in time during our sample period are part of a cartel agreement, are not participating in a cartel, are excluded from this analysis. *CEOAGE* is computed as the age of the CEO at the starting year of the cartel formation. *CEOTEN* is computed as uninterrupted years on the board of directors up to the year when the cartel started. *CEOGEN* is a dummy variable for both cartel firms and non-cartel firms with value of 1 if CEO was female and 0 if otherwise. *BOSS* is a dummy variable for cartel firms created with a value of 1 if the chair of the board held concentration power of CEO or president and 0 if otherwise. *Multidir* is calculated as the total number of directorship assigned to the CEO on other boards. *HHI* is the Herfindahl-Hirschman Index. *DoJ* is a dummy variable with value of 1 is assigned when the firm is found to have committed a cartel criminal infringement in the jurisdiction. *Saleb* is the average sales pre-cartel formation. *CurrRatioB* is the average of current ratio pre-cartel formation. *PPER* is the average poor financial performance pre-cartel formation. *COSTA* is the firm's ownership status to control for private firms and public firms. *UK* is a dummy variable took value of 1 if the firm based in the UK, 0 otherwise. *JOIN* is the number of member joined the board during that period. The variables on board and CEO characteristics were obtained from proxy statements with filing dates three years prior to the cartel agreements started. The equality of means is tested using a standard *t*-test and the equality of medians using a Wilcoxon signed rank test. ***, **, * indicates statistical significance at the 1%, 5%, 10% level.

Category	Cartel-Firms			Non-Cartel-Firms			t-test (p-value)
	Obs	Mean	STDV	Obs	Mean	STDV	
Independent Variable							
CEO Characteristics							
CEO tenure	150	9.18	4.47	178	10.9	4.90	0.00**
CEO age	150	50.9	8.9	178	44.3	9.90	0.00**
CEO gender	150	0.01	0.08	178	0.19	0.39	0.00**
BOSS	150	0.47	0.50	178	0.20	0.40	0.00**
Multidirectorship	150	1.80	2.50	178	2.80	2.91	0.00**
Control Variables							
COSTA	150	0.59	0.49	178	0.32	0.46	0.00**
Saleba	148	0.48	4.79	173	0.14	0.44	0.35
PPER	139	-0.38	2.10	156	0.81	2.98	0.00**
CURRRATIOB	144	1.45	1.01	170	1.50	1.20	0.66
HHI	150	0.24	0.21	178	0.16	0.15	0.00**
UK	150	0.76	0.42	178	0.77	0.41	0.74
Join	150	5.48	5.92	177	5.80	5.40	0.58

Source: Author's own calculation

Table 2- CEO Characteristics- Ordered Logistic Estimation Results

The table reports the results of ordered logit regressions of a dummy variable equal to the prior incidence of cartel formation and discovery (*CONV*). Thus, the value of 0 is assigned for the benchmark comparison with firms without any involvement in cartel activity, referred to here as non-cartel firms. It means that the firm has not formed any cartel, nor had been discovered for any cartel activity, 1 if it was a first-time conviction, 2 if it represented the second conviction, and so on, in this cartel formation and discovery (*CONV*) as dependent variable on a number of financial and corporate governance variables for the sample of cartel firms and matched non-cartel firms. For every cartel firm, a control group of non-cartel firms was created, which share the first three digits of the SIC code and similar firm size based on net sale within $\pm 25\%$ of the cartel firm's sales at the end of the year before the collusive agreement started. Firm-years, in which cartel firms, i.e., firms that at one point in time during our sample period are part of a cartel agreement, are not participating in a cartel, are excluded from this analysis. *CEOAGE* is computed as the age of the CEO at the starting year of the cartel formation. *CEOTEN* is computed as uninterrupted years on the board of directors up to the year when the cartel started. *CEOGEN* is a dummy variable for both cartel firms and non-cartel firms with value of 1 if CEO was female and 0 if otherwise. *BOSS* is a dummy variable for cartel firms created with a value of 1 if the chair of the board held concentration power of CEO or president and 0 if otherwise. *Multidir* is calculated as the total number of directorship assigned to the CEO on other boards. *CEONUM* is the total number of cartel cases the CEO is involved in. *CEOCASE* dummy variable shows the total number of cartel cases the CEO was involved in before a-particular cartel case. *HHI* is the Herfindahl-Hirschman Index. *DoJ* is a dummy variable with value of 1 is assigned when the firm is found to have committed a cartel criminal infringement in the jurisdiction. *Saleb* is the average sales pre-cartel formation. *CurrRatioB* is the average of current ratio pre-cartel formation. *PPER* is the average poor financial performance pre-cartel formation. *COSTA* is the firm's ownership status to control for private firms and public firms. *UK* is a dummy variable took value of 1 if the firm based in the UK, 0 otherwise. The variables on CEO characteristics were obtained from proxy statements with filing dates three years prior to the cartel agreements started. The equality of means is tested using a standard *t*-test and the equality of medians using a Wilcoxon signed rank test. ***, **, * indicates statistical significance at the 1%, 5%, 10% level.

Dependent variable: Cartel formation and discovery (CONV)		Model 1		Model 2		Model 3		Model 4	
Independent Variable	Expected Sign	Coeff.	Z	Coeff.	Z	Coeff.	Z	Coeff.	Z
CEOTen	(-)	-0.10	-2.95**	-0.07	-2.43**	-0.02	-0.59	-0.01	-0.44
CEOage	(+)	0.05	3.59**	0.06	4.37**	0.06	4.26**	0.04	3.77**
CEOgen	(-)			-3.31	-2.99**	-3.13	-2.83**	-2.46	-2.76**
Multidir	(-)	-0.14	-1.53	-0.11	-1.52	-0.10	-1.48	-0.05	-0.58
BOSS	(+)	0.79	2.59**	0.94	3.42**	1.10	3.83**	0.76	2.50**
CEONUM	(+)							2.27	4.22**
CEOCASE	(+)					1.8	5.53**		
Control Variables									
PPER		-0.00	-3.00**						
Costa		1.25	4.46**	1.36	5.06**	1.30	4.77**	1.19	4.03**
Saleb		-0.00	-0.67	-0.00	-0.87	-0.05	-0.16	0.01	1.89
CurrRatioB		-0.11	-1.11	-0.01	-0.16	-0.04	-0.35	-0.04	-0.39
HHI		1.33	2.71**	1.79	2.58**	1.43	2.21**	1.42	1.91
DoJ		1.94	4.36**	1.67	4.18**	1.56	3.02**	0.99	1.46
UK		-0.26	-0.79	-0.41	-1.24	-0.31	-0.09	0.01	0.02
Industry effect			Yes		Yes		Yes		Yes
Year effect			Yes		Yes		Yes		Yes
Number of Obs			279		308		308		308
Pseudo R2			0.233		0.230		0.395		0.525

Source: Author's own calculation