CORPORATE BOARDS AND INCENTIVES: EMPIRICAL EVIDENCE FROM THE UK IN 1935

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Abstract

We investigate boardroom governance using UK historical data for 1935. We demonstrate that there is a negative relationship between risk and incentives in this year. Prior research has produced anomalous results (Prendergast, 2002). Second, we show that average (median) board ownership of ordinary shares is about 7.95% (2.88%). Heuristically this figure is less than previously reported estimates for the US also using 1935 data. Finally, we show the phenomenon of multiple board membership. UK directors in 1935 hold many directorships – sometimes exceeding 10 concurrent memberships.

Keywords: board membership, board ownership, board incentives

1. Introduction

We investigate boardroom corporate governance using UK historical data for 1935. Relatively little is known about the structure of UK boards or the ownership of stock by board members at this time.[1] Our contribution to the corporate governance literature is three-fold.

First, we test for the existence of a negative association between incentives and risk. Principal-agent theory predicts that equilibrium risk and incentives are negatively correlated. However, empirical studies have often failed to detect this hypothesised relationship (Prendergast, 2002, page 1077). We isolate a robust negative relationship in our data set. We find that managerial ownership (incentives) and the volatility of returns (risk) are inversely related (demonstrated using OLS and quantile regression procedures).

Second, we provide historical evidence on UK boardroom ownership in 1935. We find aggregate director ownership of ordinary equity shares on UK corporate boards in 1935 is about 7.95% of the total issued equity of their company. We compare our estimates to the results published by Holderness, Kroszner and Sheehan (1999) for 1935. We conclude that

ownership levels in the United Kingdom are lower than in the United States for similar time periods.

Third, we investigate the multiple board directorship phenomena for UK companies in the mid-1930s. Co-directorships exist when a director at company A is contemporaneously a board member of company B. The simultaneous membership of two or more boards creates a link between two firms and potentially interlocks the enterprises involved (Newman, Strogatz and Watts, 2001).

2. Theoretical foundations

First, we investigate the relationship between risk and incentives. Economic theory predicts they are negatively correlated. The firm's value function is $V = P(e) + \varepsilon$, where $P(e)$ is performance, e is agent effort and ε is stochastic noise $\varepsilon \sim N(0, \sigma_\varepsilon^2)$. The agent's wage contract is $W = \alpha + \beta_v V$ where α is a constant and β_v is the sharing rate (or incentives). A risk-averse agent chooses e to maximize expected utility. That is, $\max_e E[U] = \max_e \left\{ E[W] - c(e) - \frac{r}{2}\beta_v^2\sigma_\varepsilon^2 \right\}$ where $c(e)$ is cost of effort, r is the coefficient of absolute risk aversion, and σ_ε^2 is the variance of firm value (uncertainty). The employees optimal effort is $e^* = \beta_v$. The firm maximizes the surplus, S: $\max_{\alpha,\beta_v} E[S] = \max_{\alpha,\beta_v} \left\{ E[V] - E[W] \right\}$ subject to the agent's participation and incentive compatibility constraints. Optimal equilibrium incentives are $\beta_v^* = \dfrac{P'(e)}{1 + c''(e)r\sigma_\varepsilon^2}$. This illustrates, as required, the theorised negative correlation between incentives and risk.[2]

However, this hypothesised trade-off has failed to garner a large body of empirical support – especially in managerial labor markets. Prendergast (2002) cites eleven empirical studies, mainly using US data, of which only three isolate a negative correlation between risk and incentives. Three of the eleven papers cited find a positive relation and the remaining five find no statistical relationship. The failure to identify a robust empirical regularity clearly warrants further investigation.

Second, investigating boardroom ownership of equity is important *per se*. Conyon and Murphy (2000) argue that agency costs arise when agents receive less than 100% of the value of output so that a director's share of ownership is a natural measure of the severity of the agency problem. Conyon and Murphy (2000) report that in 1997 the average and median shareholdings for UK CEOs (expressed as a percentage of outstanding shares) are 2.13% and 0.05%, respectively, significantly smaller than the average and median holdings among US CEOs of 3.10% and 0.29%, respectively. Consequently, they conclude that share ownership mitigates more of the agency problem in the US than it does in the UK. Studies relating to earlier time periods are sparse. Holderness, Kroszner and Sheehan (1999), using data from US companies in 1935, show that average board ownership is 12.9%. We can investigate what UK board ownership of equity looks like in 1935. [3]

Third, contemporary studies of managerial labor markets are interested in the phenomenon of multiple board membership and collaboration networks (see Davis and Greve, 1997,

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[2] The relevant literature on optimal contracting is considered by Core et al (2003), and Milgrom and Roberts (1992). The analysis of moral hazard is contained in Holmstrom (1979). The discussion of linear compensation schedules is discussed in Holmstrom and Milgrom (1987). The application to executive labor markets is reviewed by Murphy (1999).

[3] Himmelberg et al (1999) consider the determinants of managerial ownership. The structure of corporate ownership is analysed by Demsetz and Lehn (1985)

Newman, 2003, Newman et al, 2001). Our central questions are what is the size of the board? And how many other boards do directors sit on? Techniques from mathematical graph are increasingly used to probe such issues. For example, the board of directors might be thought of as the vertex in the graph with edges connecting the boards to their members. Newman et al (2001) investigate demonstrate that the typical Fortune 1000 is of size 10 and a director holds only one directorship. (the frequency distribution on multiple board membership is exponential). We analyse this phenomenon for 1935 UK boards.

3. Data

3.1 Context

In this paper we use data on the constituents of the Financial Times 30 index. Its history is worth remarking upon. The FT30 index was started by the 'Financial News' – a precursor to the modern Financial Times in 1935 and is the oldest continuous index covering UK equities. It was originally calibrated to evaluate the "feel" and "changing moods" of stock markets as reflected in the prices of the leading and most actively traded shares. The number of publicly traded shares grew rapidly in the 1930s (the number of manufacturing and distribution companies quoted in London more than doubled to 1700 between 1924 and the late 1930s). The FT30 index was thus designed to be representative of British industry rather than a simple index of the largest 30 companies at the time.

The FT30 index contrasts with contemporary FTSE indexes in a number of ways. First, it gives equal weighting to the 30 constituents rather than weighting by market capitalization. Second, constituents change irregularly and are usually forced, for example due to a merger or corporate failure. The FT30 thus offers stability in its composition. It is perhaps remarkable that three of the original constituents – GKN (Guest Keen & Nettlefolds), ICI (Imperial Chemical Industries) and Tate & Lyle – still remain in the index to this date.[4]

3.2 Disclosure[5]

In this paper we require data on director ownership. The requirements for directors to notify their companies of interests in shares and debentures was introduced in the Companies Act 1947 (section 41), which then became the Companies Act 1948 section 198.[6] In fact, there was no requirement in the Companies Act 1929 for any disclosure of directors' holdings to the company or the public. However, directors' holdings have been collected from the Annual Return as a result of the Joint Stock Companies Act 1844, which forced companies to list all shareholders and their holdings at a particular date once a year, as well as a list of all directors. We should stress therefore that our data are compiled from Annual Returns before the

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[4] The FT30 index was designed to test the "feel" of the equity market, and especially to detect changes in the mood of the market as reflected in prices of the leading, and most actively traded shares. The size of a company is not of major importance, an overriding consideration in choosing the replacement constituent being the maintenance of the principle that the shares are actively traded and of a company which is a leader in its own field, without any undue influence on the share price from overseas sources. The number of constituents is confined to thirty to produce a sensitive index. The number is large enough to absorb any abnormal price movement in an individual share except on rare occasions, while the addition of more stocks to smooth out exceptional fluctuations would deprive it of some of its sensitivity.

[5] We are very grateful to Professor Christopher Napier for his time and expertise when we were compiling this sub-section.

[6] This was amended in the Companies Act 1967, section 27, and is now section 324 of the Companies Act 1985. The register of directors' interests was required by CA1947 s.37, becoming CA1948, s.195, amended by CA1967, s.29 and ending up as CA1985, s.325. The original law followed a recommendation of the Cohen Committee of 1945 (Cmd. 6659, para. 87).

requirement was introduced for directors to notify companies of their interests (including those of spouses and children and interests under trusts), and might underestimate the total number of shares in which directors were financially interested. However, they are likely to include shares that directors controlled even though they did not own beneficially, so the data do give a reasonable view of shares controlled by directors but a somewhat less reliable view of directors' full economic interests.

3.3 Data collection

We selected the constituent firms of the Financial Times ordinary share index in 1935. The 30 original constituents are provided in the data appendix. We excluded Callenders Cables & Construction; Coats (J & P) and Distillers since it was not possible to collect data from the firm's annual return. We added three matched (by sector and scale) substitute firms: English Sewing Cotton Co. Ltd; Associated Electrical Industries; Guinness (Arthur) Son & Co. The 30 constituent firms have a combined total of 328 board members. Average (median) board size is 10.9 (9.5). The use of historical data allows comparisons with the US work produced by Holderness, Kroszner and Sheehan (1999) – henceforth HKS. Moreover, it provides an interesting benchmark to evaluate contemporary UK managerial ownership structures.

The historical context of UK corporate governance (e.g. Joint Stock Companies Act 1844) required firms to maintain a register of all shareholders (which by implication includes the holdings of shares and debentures by directors). Managerial ownership[7] (incentives) for board member i is defined as the percentage firm ownership $(E_i/M) \times 100$ where E_i is ordinary equity held by i, and M is aggregate common equity of the firm (299 from 328 have $E_i>0$). There are no stock options in this period. A log transformation is performed to produce the dependent variable (with mean=-2.28 and median=-2.53). The primary independent variable is log total risk (uncertainty) defined as the annualised standard deviation of stock returns from weekly share price data over the calendar year (with mean=-1.65 and median=-1.74). Controls include firm size measured as log of market capitalization (with mean=2.34 and median=2.36) and industry dummy variables.

To investigate director collaboration networks we collected data from the Directory of Directors. The first edition of this Directory was published in 1879 and it provided the Victorian investor community with a unique view of their business leaders.[8] For each director of our FT30 data set we could then identify all other corporate boards that they served upon.[9]

4. Empirical results

First, we examined the statistical association between incentives and risk which is documented in Table 1. Column 1 is an OLS regression and Column 2 provides a quantile (median) regression. The main result is that after controlling for firm size and industry factors,

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[7] We want to stress that we only collected information on ordinary shares because these were actively traded and we could measure their risk and return. There were many and various types of share in 1935 (e.g. founder, preference, deferred). Some director may have zero ordinary equity but finite preference shares for example.

[8] There is a time lag in identifying board members. We selected the 1936 directory in order to identify those directors on the board in 1935.

[9] The number is now 329 since we used the 1936 Directory of Directors to compile the 1935 board list. In that small time interval a few directors left their boards and a few entered. The net effect was one extra director, hence a sample of 329. We should also stress the importance of this exercise. We did not just collect data on the FT30 firms. Contingent upon being one of the 329 directors in the sample of 30 firms we then checked for all other firms that the director was a member of.

managerial ownership and the volatility of stock returns are negatively correlated.[10] The result contrasts with studies cited by Prendergast (2002). These new UK results are, however, consistent with HKS (1999) who show that managerial ownership and stock returns are negatively correlated in a sample of 571 US NYSE-listed firms in 1935.

Table 1. Incentives and Risk: Boardroom ownership in 1935

	(1)	(2)
	Dependent variable = Log (Managerial owner-ship): OLS regression	Dependent variable = Log (Managerial owner-ship): Quantile regression
Constant	-1.614 (0.708)	-2.015 (0.873)
Log (Standard deviation of stock returns)	-1.155 (0.520)	-1.298 (0.324)
Log (Market capitalization)	-0.479 (0.196)	-0.406 (0.146)
Industry dummies	Yes	Yes
Observations	299	299

Notes: (i) Asymptotic heteroskedastic robust standard errors in parentheses. (ii) Column 1 is estimated using OLS & Column 2 uses quantile regression procedures (iii) The OLS estimates cluster by firm identifier and assume observations are independent across but not necessarily within groups.

Second, we described the structure of board ownership in UK publicly traded firms in 1935. For a given firm, aggregate board ownership is the sum of the common shares held by board members divided by the number of common shares outstanding (i.e. Σ (E_i/M)×100). Analysis of the distribution of aggregate 1935 board ownership, reveals an average of 7.95% of the company's stock was held by the directors. The 25th percentile is 0.93%, the median is 2.88% and the 75th percentile is 8.87%. These results can be heuristically compared with 1935 US estimates produced by HKS (1999). Their full sample average is 12.9%. The 25th percentile is 1.3%, the median is 6.5% and the 75th percentile is 18.5%. Clearly commensurability issues between the US and UK can be raised, but the evidence suggests that UK managerial ownership was less than the US in 1935. The result also complements Conyon and Murphy (2000) who show that UK CEO stock ownership is less than US CEO stock ownership in 1997. Potential explanations can be derived from the agency model. Incentives in the UK could be lower relative to the US if there is greater risk aversion (r), greater volatility (σ_ε^2) or if agent marginal productivity of effort (P'(e)) is lower. These issues are worth pursuing in future research.

Third, we investigated director collaboration networks in 1935. In the data there are 329 unique directors who hold an aggregate of 1536 separate director seats. An FT30 director on average has 4.67 directorships. The median is 3. The directors of the FT30 hold directorships at 906 separate companies. We report the frequency distributions for the board of directors of the FT30 companies in 1935. Table 2 provides the frequency distribution of the number of boards on which each director is a member.

A minority of directors in the sample, that is 126 of the 329 directors (38.3%) hold just one directorship. The remainder hold two or more. Approximately 15% of the sample holds in

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[10] Further quantile regressions at the 25th and 75th percentiles yield similar results. Also, we estimated a kernel Nadaraya-Watson nonparametric regression and again established the negative correlation.

excess of 10 board positions. Indeed one director (an outlier) records 44 directorships[11]. In Figure 1 we detail graphically the frequency distributions of the number of boards on which each member sits and the number of members of each board. Figure 1 (i) replicates Table 1, showing a positive skew, but with the majority of directors sitting on 3 boards.

Table 2. Frequency distribution for FT30 Board of Directors in 1935

| Number of Boards	Dir.	%	Cum. %
1	126	38.30	38.30
2	32	9.73	48.02
3	36	10.94	58.97
4	26	7.90	66.87
5	16	4.86	71.73
6	10	3.04	74.77
7	9	2.74	77.51
8	20	6.08	83.59
9	7	2.13	85.71
10	6	1.82	87.54
11	5	1.52	89.06
12	6	1.82	90.88
13	7	2.13	93.01
14	3	0.91	93.92
15	2	0.61	94.53
16	3	0.91	95.44
17	4	1.22	96.66
18	3	0.91	97.57
19	2	0.61	98.18
20	2	0.61	98.78
21	2	0.61	99.39
24	1	0.30	99.70
44	1	0.30	100.00
Total	329		

Notes:
  i) The table is based on the population of 329 separate directors at the FT30 index companies in 1935. They extend to 906 separate companies in total.
  ii) Number of boards is the count of each director's distinct board memberships.
  iii) Dir. is the number of directors who sit on "x" boards. So, there are 126 directors from the 329 who hold only one directorship (i.e. the one in their FT30 company).

This result contrasts with contemporary US results of this distribution function[12]. Newman, Strogatz and Watts (2001) using 914 firms from the 1999 US Fortune 1000 show the majority of US directors sit on only 1 board. Figure 1 (ii) illustrates the distribution of board size for the FT30 companies. The distribution peaks at about 10 board members. The result is strikingly similar to Newman, Strogatz and Watts (2001) who show in their sample of firms that the average board size is also 10 members.

(i) Number of directorships held

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[11] This is Sir E. Davis of Turner & Newall. We have provided the list of companies for which he is a director in the data appendix.
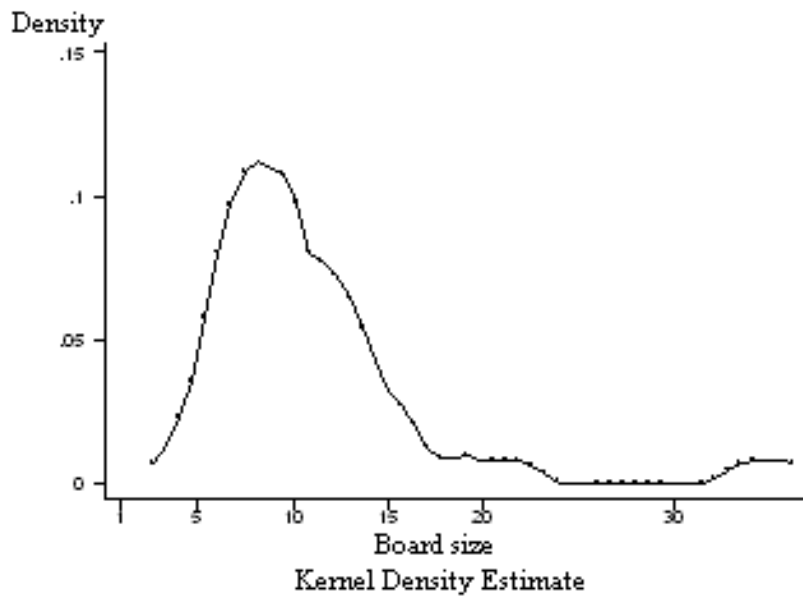[12] Current research is investigating multiple board membership in UK firms. Results will appear at http://www-management.wharton.upenn.edu/conyon/
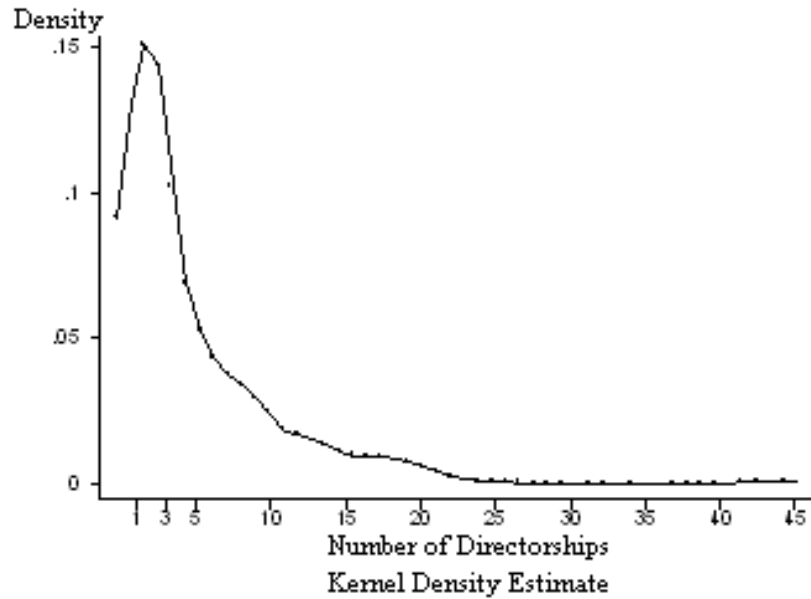
(i) Number of directorships held

Figure 1. Frequency distributions for FT30 Board of Directors in 1935

Note: Based on 329 separate directors. The number of directorships is the count of all seats held by each of the 329.

(ii) Number of members (board size)

Figure 1. Frequency distributions for FT30 Board of Directors in 1935

Note: based on the 30 FT30 companies defined in the text.

5. Conclusions

Our objective in this paper has been to investigate dimensions of corporate governance as they pertain to the constituents of the FT30 in 1935 (the year the index first appeared). Our

analysis was motivated by the fact that little is known about ownership and control in this period. We collected data by hand on board membership and board ownership from the annual company return and the directory of directors.

Our contribution to the corporate governance literature is three-fold. Economic theory predicts that incentives and risk are negatively correlated. The empirical evidence in support of this conjecture is not overwhelming (Prendergast 2002). Using UK ownership data in 1935 we have shown that, in fact, boardroom equity ownership and the volatility of stock returns are negatively correlated – consistent with principal agency predictions.

Second, we have investigated the ownership of equity by board members in 1935. Average (median) board ownership in the constituent firms of the FT ordinary share index in 1935 is 7.95% (2.88%). Heuristically, these estimates are lower than estimates reported in the US for the same time period of 12.9% (6.5%). Moreover, it would be interesting to compares UK board ownership of equity in 1935 with UK ownership more recently.

Third, we investigated director collaboration networks. We found that the UK directors in 1935 were members of many boards. On average a director of a FT30 company holds about 4 to 5 directorships (the median is 3). Average board size is about 10 members. The reasons underlying the large number of directorships held by directors of the FT30 in 1935 clearly warrants future investigation and the effect this may have had in standardizing company policies.

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Data Appendix A:

Original constituents of the FT30

Associated Portland Cement	Hawker Siddeley
Austin Motor	Imperial Chemical Industries
Bass	Imperial Tobacco
Bolsover Colliery	International Tea Co's Stores
Callenders Cables & Construction [*]	London Brick
Coats (J & P) [*]	Murex
Courtaulds	Patons & Baldwins
Distillers [*]	Pinchin Johnson & Associates
Dorman Long	Rolls-Royce
Dunlop Rubber	Tate & Lyle
Electrical & Musical Industries	Turner & Newall
Fine Spinners and Doublers	United Steel
General Electric	Vickers
Guest Keen & Nettlefolds	Watney Combe & Reid
Harrods	Woolworth (FW)

Note: A * indicates that the company is not included in our constructed FT30 sample since key data could not be collected from the company annual returns. Namely, we excluded Callenders Cables & Construction; Coats (J & P) and Distillers. We substituted (by matching) English Sewing Cotton Co. Ltd; Associated Electrical Industries; Guinness (Arthur) Son & Co. This is the sample that we refer to as the FT30 in this paper.

Data Appendix B:

Board memberships listed for Sir E. Davis in the 1936 Directory of Directors. Turner & Newall is the relevant FT30 board on which Sir E. Davis was a member.

African Chrome Mines	Loangwa Concessions (Northern Rhodesia)
African Manganese Co.	Mufulira Copper Mines
African Smelting and Refining Co.	Northern Rhodesia Power Corporation
Anglo American Corporation of South Africa	Otavi Exploring Syndicate
Anglo-Continental Mines Co.	Otavi Mines and Railway Co.
Baluchistan Chrome Co.	Raw Asbestos Distributors
Baluchistan Mining Syndicate	Rhodesia Broken Hill Development Co.
Bechuanaland Exploration Co.	Rhodesia Chrome Mines
British South Africa Co.	Rhodesia Copper and General Exploration and Finance Co.
Charterland and General Exploration and Finace Co.	Rhodesia Railways Trust
Chinese Central Railways	Rhodesian and General Asbestos Corporation
Chinese Engineering and Mining Co.	Rhodesian Anglo American
Chinwangtao Glass Co.	Rhodesian Land Cattle and Ranching Corporation
Chrome Co.	Rhokona Corporation
Compagnie Tunisiene des Phosphates du Djebel Mines	Shabani Railway Co.
Companhia de Diamantes de Angola	Societe d' Enterprises Industrielles et Minieres
East Africa Mining Areas	South-West Africa Co.
East African Lands and Development Co.	St. Swithin's Ores and Metals
Etablissements Courmont	Turner & Newall
Fanti Consolidated Investment Co.	United Exploration Co.
Jacob Picard & Co.	Wankie Colliery Co.
Josiah Smale & Son	Yangtse Valley Co.

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