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Summary

We simultaneously analyze two mechanisms of the managerial labor market: CEO turnover and monetary remuneration schemes. Sample selection models and hazard analyses are applied to a random sample of 250 firms listed on the London Stock Exchange. Both the CEOs' monetary compensation and CEO replacement are strongly performance-sensitive. There is little evidence of outside shareholder monitoring whereas CEOs with strong voting power successfully resist replacement irrespective of corporate performance. With regard to CEO remuneration, we sketch a nuanced picture as we find evidence supporting alignment of interests hypothesis but also supporting the managerial power or skimming model for managerial remuneration practices in the UK. In particular, we show that CEOs with strong voting power choose their own benchmark (accounting performance) whereas in firms with strong outside blockholders, remuneration is related to shareholder value creation. Equity-owning CEOs compensate disappointing stock performance by augmenting their cash-based compensation package (salary and bonus). Finally, we also show that internal governance mechanisms (e.g. the presence of a remuneration committee) have little impact on remuneration.

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1 Introduction *

Executive compensation remains one of the most widely discussed governance issues in the UK where it continues to attract the attention of the business community, academics, and the popular press. For instance, numerous calls for improving the code of good practice for managerial remuneration contracting and for stronger shareholder involvement in the pay-setting process followed the dispute over the pay of the GlaxoSmithKline's CEO Jean-Paul Garnier in 2003. This shareholder revolt against corporate 'fat cats' and the concerns of the investment community were voiced as follows:

Companies must be free to run themselves as they think best and to pay their executives appropriately. But they must also act responsibly when company performance is poor. Shareholders must hold them to that responsibility, and ensure that the days of the overfed felines are numbered (The Times, May 20, 2003).

Never has executive pay been more in the limelight than it is now. While share prices languish deep in the doldrums after one of the worst bear markets on record, executive pay, pensions and perks are still apparently continuing to soar. It seems that barely a day passes without another company and another leading business figure featuring in newspaper headlines in a controversy over remuneration. Inevitably, the beneficiaries have been dubbed fat cats, and the real anger is over those with the most handsome remuneration packages who are presiding over companies which are hardly enjoying soaraway success (The Independent, May 20, 2003).

Apparently, the recommendations of the British governance committees did not have sufficient clout to curb the excesses in managerial compensation. One of the main deficiencies of widely-held public corporations – 'strong managers, weak owners', in the words of Roe (1994, 2002) – has led to a situation where the mechanisms meant to improve the governance standards like performance-related pay are misused by powerful directors to extract substantial rents from the companies they work for (Bebchuk and Fried, 2004):

One of the really alarming aspects of global capitalism during the 1990s was the increasing disconnect between the managerial cadres who ran companies and shareholders who owned them. Managers and the boards that appointed them stopped seeing themselves as custodians of other people's money and became a self-serving interest group, dedicated to grabbing more of the cake (The Independent, May 21, 2003).

The early agency literature stipulates that shareholders' interests can be protected because managerial incentives can be (re)structured. As such, managers attempt to avoid poor performance due to the threat of dismissal and are stimulated to reach strong corporate perform-

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ance as a result of the rewarding and incentive effects of compensation contracts (Holmström, 1982a; Murphy, 1986). However, the recent US empirical literature casts doubt on the hypothesis of alignment of interests which may be brought about by pay-for-(stock price) performance contracts and performance-related dismissals. For instance, Bebchuk and Fried's (2003) 'managerial power model' points out that executive compensation should be seen as a manifestation of agency problems rather than a solution if remuneration contracting is not embedded in a proper governance system. Likewise, Bertrand and Mullainathan (2000, 2001) give evidence that the performance-related contracts in the US do not correct for windfall profits which are not related to managerial efforts or skill, and that CEOs are hence paid for luck. Furthermore, they propose a model whereby 'agents without principals' (managers without a proper governance mechanisms like a monitoring blockholder) are skimming corporate profits. Our results give a nuanced picture for the UK. We show evidence of contractual alignment, but we also detect circumstances which point at the danger of managerial self-dealing. The latter will be especially the case in firms where CEOs have a lot of discretion in decision making, which may result from a lack of monitoring by outside shareholders or the board of directors. Some of our results show indeed that powerful CEOs are shielded from forced departures and seem able to chose their preferred remuneration-related performance benchmark. This study thus contributes to recent literature on the alignment versus skimming hypotheses, but focuses on the UK.

Although a large body of academic literature exists (especially for the US) on both managerial disciplining and managerial compensation, these two aspects of the managerial labor market are usually –with the notable exception of Coughlan and Schmidt (1985)– treated separately. However, the two governance mechanisms in question are likely to be intertwined such that the results of studies of executive turnover and of managerial remuneration in isolation are likely to be biased. Furthermore, each of these governance mechanisms only addresses the agency problems at specific ranges of corporate performance. For instance, performance-sensitive managerial compensation contracts are only designed for average or high levels of performance because management may not be induced to generate further efforts when they realize that the minimal performance thresholds triggering bonuses are out of reach. Likewise, Jensen and Murphy (1990) argue that the probability of CEO dismissal is too low to align effectively the interests of managers and owners. Consequently, in order to cover a more complete spectrum of incentives, the carrot (performance-related compensation) and the stick (dismissal) need to be studied simultaneously. A simultaneous treatment of both governance mechanisms econometrically translates into a Heckman sample selection model (type-2 Tobit). This technique mitigates the sample selection biases induced by sample endogeneity affecting many of the studies analyzing managerial compensation. We document that our estimation technique yields unbiased results as opposed to fixed-effects panel data regressions. Our paper contributes to the literature by correcting the findings of earlier UK research which fell short of finding a relation between managerial remuneration and corporate performance (or documented a very weak relation). The lack of performance sensitivity in earlier UK studies may result from the biases induced by inappropriate estimation methodologies or may be due to benchmarking problems (we study a wide set of industry-adjusted performance measures).

We analyze a randomly drawn sample of listed UK firms and – in a nutshell – obtain the following results for our analysis of CEO compensation: First, the CEOs' industry-adjusted monetary compensation is strongly performance-sensitive: monetary compensation rewards both past good accounting and stock price performance. Second, we cannot unambiguously show that remuneration contracts align the interests of managers and shareholders, nor can we demonstrate that the skimming/managerial power model dominates in all cases. The fact that

the levels of monetary remuneration are lower when executive directors are powerful (in terms of voting rights) supports the alignment of interest-hypothesis. However, when CEOs derive substantial wealth from the equity investment in their firms and negative abnormal returns are incurred, these CEOs seem to compensate the disappointing stock performance by augmenting their monetary compensation package. This suggests self-dealing and hence provides some support for an alternative theory, namely the skimming or managerial power hypothesis. Additional support for this hypothesis is found: (a) CEO remuneration is sensitive to stock price performance in firms with strong outside blockholders, whereas in firms where insiders (management) control share blocks remuneration is only sensitive to measures of accounting performance. Thus, managers with strong control concentration seem to prefer accounting standards as an evaluation criterion presumably because they have more discretion over this benchmark and hence over their monetary compensation. In contrast, in firms with strong outsider (monitoring) shareholder, management cannot pick its preferred performance benchmark as it is required to focus on the creation of shareholder value. (b) CEOs who also exert the function of chairman of the board also earn more when accounting performance is high (but not when share price performance has increased). Likewise, this suggests that powerful CEOs choose their own benchmark. (c) In monitored firms (in particular in firms where non-executive directors and outside shareholders control large share blocks), the CEO's remuneration is lower.

Third, there are few characteristics of the board structure (apart from the separation of CEO and chairman) which have an impact on the pay-for-performance sensitivity. The number of non-executive directors on the board does not seem to have an impact on the remuneration policy of the firm. Furthermore, the presence of a remuneration committee has no impact either. Our results in this respect appear consistent with the widely perceived failure of this mechanism in tackling governance problems.

We also analyze the termination of a CEO employment contract. First, we find CEO replacement is strongly performance-sensitive. Second, outside shareholders (institutions, families or individuals, other corporations) do not seem to be involved in general in disciplining the CEO even in the wake of poor performance. In line with earlier research, we find that non-executive directors owning share blocks seem to protect the incumbent CEO in poorly performing companies. Third, CEOs with strong voting power successfully impede replacement irrespective of corporate performance. This case of strong managerial entrenchment is even exacerbated when the CEO also holds the position of chairman of the board. Fourth, large boards, boards with a high proportion of non-executive directors and boards with separate persons fulfilling the tasks of CEO and chairman, replace the CEO more frequently, although these boards are not more apt to replace underperforming management.

The remainder of the paper is organized as follows. In the next section, the research hypotheses are motivated. Section 3 discusses the sample selection procedure, describes the variables and reveals the data sources. In the same section, the different estimation techniques are explained. Section 4 presents the results, while Section 5 discusses detailed robustness tests. The conclusions are presented in Section 6.

2. Determinants of CEO compensation and of managerial turnover

2.1. Background agency literature

Coughlan and Schmidt (1985) were the first to document that the likelihood of forced turnover is a decreasing function of corporate performance; a finding further corroborated by a.o. Warner et al. (1988), Weisbach (1988), Denis and Denis (1995), and Franks et al. (2001). The

disciplinary character of managerial turnover is influenced by board size (Yermack, 1996), board composition (Weisbach, 1988), ownership structure (Kang and Shivdasani, 1995; Denis et al., 1997), and is industry-dependent (Parrino, 1997). Forced executive resignations in the US are accompanied by positive and statistically significant abnormal stock performance (Denis and Denis, 1995), provided that an outsider is appointed as the CEO (Borokhovich et al., 1996; Rosenstein and Wyatt, 1997). Finally, CEO turnover is the ultimate element of an 'error-correcting process', for it affects firms' investment decisions, and gives a stimulus to divest poorly performing acquisitions (Weisbach, 1995).

The theoretical blueprint of pay-for-performance remuneration was laid by the principal-agent models of Jensen and Meckling (1976), Holmström (1979), and Grossman and Hart (1983). A multi-period setting has enabled the analysis of career concerns that also affect executive compensation contracts (Gibbons and Murphy, 1992).¹ Following Holmström (1982b), it is relative rather than absolute performance that is shown to be a valid determinant of CEO remuneration (Gibbons and Murphy, 1990).² Performance-sensitivity of managerial compensation is empirically well documented for US firms (e.g. Coughlan and Schmidt, 1985; Jensen and Murphy, 1990): executive pay depends on both past stock returns and past accounting measures (Sloan, 1993) as well as on relative measures of performance (Gibbons and Murphy, 1990). Still, the level of executive compensation depends not only on past performance; also important are company size (Murphy, 1985) and CEO age and tenure (Conyon and Murphy, 2000; Murphy, 1986). Furthermore, the following characteristics also explain part of the changes in remuneration: ownership structure (Core et al., 1999), board composition (Halllock, 1997), the threat of a takeover (Agrawal and Knoeber, 1998), merger and acquisition policy (Girma et al., 2002), company risk, growth opportunities, dividend policy (Lewellen et al., 1987), and the country where the company is operating (Conyon and Murphy, 2000). The optimal balance of stock- and cash-based compensation solves a trade-off between short- and long-term incentives (Dechow and Sloan, 1991; Narayanan, 1996). Finally, Kole (1997) argues that the question whether or not a given compensation structure is optimal crucially depends on the characteristics of the assets managed by a given CEO.

The recent literature criticizes the agency approach that considers managerial compensation as the optimal outcome of the contracting problem (Bertrand and Mullainathan, 2000; Bebchuk and Fried, 2003). According to the 'skimming model' of the executive remuneration, directors are able to set their own (excessive) pay in firms with inferior governance standards (Bertrand and Mullainathan, 2001). Apart from the availability of funds, the only constraint deemed to curb such a managerial discretion is the fear of causing 'outrage' among shareholders potentially angered by excessive pay of the company's executives (Bebchuk et al., 2002).

2.2. Motivation of hypotheses

The importance of the disciplining role of managerial dismissals is widely accepted. Still, setting a correct performance yardstick is problematic as both accounting and stock price performance have some deficiencies. Accounting information records only past corporate performance and can be manipulated over a period of several years by top management (see e.g. Healy, 1985; Chan et al. 2004). Stock price performance captures the firm's ability to generate value in the future and may hence already include the effects of an expected change in

¹ Brickley et al. (1999) document that career concerns provide incentives even for CEOs on the verge of retirement as the well performing CEOs are more likely to be awarded non-executive directorships after their retirement.

² Similar arguments are made in the so-called tournament models (Lazear and Rosen, 1981).

CEO. Therefore, we argue that both stock- and accounting-based measures of performance provide incremental information about executives' productivity.

Decisions about hiring and firing top management are ultimately taken by the board of directors.³ The higher the degree of independence of the board from top management, the higher the level of performance-induced turnover is likely to be. Still, the empirical US literature comes up with conflicting results. Weisbach (1988) shows that board structure affects the likelihood of disciplinary turnover: poorly performing CEOs are more frequently fired provided that the board is outsider-dominated. This conclusion is challenged by Mikkelsen and Partch (1997), and Agrawal and Knoeber (1996) who show that managerial turnover is unrelated to board composition. Instead, turnover seems to result mainly from the pressure of the takeover market (Martin and McConnell, 1991). For the UK, Franks et al. (2001) find that a high proportion of independent directors does not lead to stronger managerial disciplining in poorly performing firms. What does seem to matter is separating the functions of the CEO and the chairman of the board. Finally, Yermack (1996) finds that smaller boards operate more efficiently as they are more prone to replace underperforming CEOs of the US companies.⁴

Hypothesis 1a (Governance effects on turnover): Board independence positively affects the likelihood of managerial turnover in poorly-performing firms. An inverse relation is expected for board size.

The essence of the agency literature is that, in order to induce agents to exert (costly) effort, the principal has to provide them with appropriate incentives. Jensen and Meckling (1976) suggest (partial) equity ownership by managers as a way of mitigating this problem, but Murphy (1986) finds only little empirical support for this mechanism. Fama (1980) discounts the idea of pay-for-performance contracts for managers with short track records because, if managers believe that subsequent wage offers will depend on current levels of performance, they will work hard today to build up reputational value independent of incentive compensation. Holmström (1982a) challenges this idea and shows that although the effects of labor-market discipline can be substantial, it is not a perfect substitute for contracts.⁵ Gibbons and Murphy (1992) extend the Holmström model by introducing Fama's reputation concept and show that the best compensation contract optimizes total incentives (the combination of the implicit incentives from career concerns and the explicit incentives from the compensation contract).

Managerial compensation schemes may be an appropriate device complementing performance-related turnover for the following reasons. First, many managers can be subjected to this incentive mechanism, while performance-induced disciplinary turnover only affects a few top managers. Second, Chang (1995) argues that for industries where industry-specific skills are required, performance-based compensation is likely to be a more effective solution to agency problems than the threat of dismissal. Third, as disciplinary turnover penalizes underperformance, the mere fact of being able to avoid poor performance (and, hence dismissal) does not constitute the right incentive for well-performing managers to pursue a value-maximizing strategy. If higher managerial effort induces better corporate performance, then there is an

³ Throughout the paper we use the UK definition of a director. A UK board of directors consists of executive directors (frequently called officers in the US) and non-executive directors (called directors in the US).

⁴ An alternative interpretation of the role of board size is also possible in the context of managerial turnover. A large board may constitute an internal pool of managerial talent such that CEO replacement is facilitated.

⁵ In the absence of contracts, managers work too hard in their early years (when market is still assessing the manager's ability) and not hard enough in later years.

important rewarding role for performance-dependent bonus and option schemes.⁶ However, imperfect observability of top management's actions creates opportunities for moral hazard that adversely affect the contracting with a manager (Holmström, 1979). The efficiency of contracting can be improved by using informative signals about executives' effort. Following this argument, Bushman and Indjejikan (1993), and Kim and Sloan (1993) develop models in which the CEO's compensation depends on both accounting- and stock-based performance measures. Both indicators are considered noisy signals of managerial effort, but as long as they are incrementally informative about managerial actions, they enter a performance-dependent wage formula with non-zero weight.⁷ The authors argue that constructing employment contracts dependent on both stock returns and accounting measures of performance shields the CEO from market-wide changes and thus improves contracting efficiency.

Corporate governance standards influence the terms of CEO remuneration contracts (Bertrand and Mullainathan, 2001): the degree of independence of the board of directors may have a direct impact on managerial compensation as it is the non-executive directors (or their representatives in the remuneration committee) who set the remuneration contracts.⁸ In firms whose board of directors is dominated by a powerful CEO (for instance, when he or she also serves as the chairperson), the terms of the top management's remuneration contracts are more likely to be influenced by the CEO (Bebchuk and Fried, 2004). Yermack (1996) also argues that smaller boards appear to act more frequently in the shareholders' interest than larger boards. In particular, he documents an inverse relationship between board size and the performance sensitivity of managerial compensation.

Hypothesis 1b (Governance effects on compensation): Board independence positively affects performance sensitivity of the CEO's monetary compensation. An inverse relation is expected for board size.

For the US, there is ample evidence that forced turnover follows from monitoring by large (activist) block holders and by the external market for corporate control (e.g. Denis and Denis, 1995; Bethel et al., 1998). Denis and Sarin (1999) and Denis and Kruse (2000) show that changes in ownership structure imply adjustments in board composition, and may consequently result in changes in the management team. For UK firms, Franks et al. (2001) confirm that these mechanisms also play a leading role in managerial replacement. The intensity of monitoring may not only depend on mere ownership concentration, but also on the type of blockholders. In particular, substantial insider ownership may lead to managerial entrenchment, which decreases the performance-sensitivity of managerial turnover and reduces the likelihood of CEO dismissal (Chung and Pruitt, 1996; Denis et al., 1997; Crespi et al., 2002).

⁶ Pay-for-performance compensation schemes may also have a punishing role provided that the bonus is forgone in case of poor performance and the base salary is scaled down. Although such a contract could achieve both the goals of disciplining and rewarding simultaneously, it is not observed empirically. Gregg et al. (1993) document that managerial compensation tends to increase over time, even in periods of poor performance.

⁷ This argument of using both types of performance measures (stock- and accounting-based) as determinants of CEO compensation is also invoked in some of the empirical literature for US firms (Core et al., 1999; John and Senbet, 1998; Mehran, 1995).

⁸ In the analyzed period the mere existence of a remuneration committee was not obligatory, even for listed companies. The establishment of remuneration committees was one of the governance recommendations formulated by Cadbury report in 1992, which only subsequently were imposed by the London Stock Exchange on all the listed companies in 1993. Thus, in the pre-Cadbury period we expect a positive relationship between the existence of a remuneration committee and the quality of corporate governance, and, consequently, the performance sensitivity of turnover.

In contrast, outside blockholders may hold management responsible for poor performance and attempt to remove them.

Hypothesis 2a (Blockholder identity effect on turnover): The type of controlling shareholders affects the likelihood of managerial turnover: monitoring by outside blockholders (institutions, families and individuals, industrial firms) leads to increased performance-related CEO removal, whereas insider blockholders impede top executive changes in underperforming firms.

A similar argument applies to the pay-for-performance schemes of top management. Shareholders monitor the firm when their share stakes are sufficiently large and the benefits from monitoring exceed the costs (Admati et al., 1994; Maug, 1998; Kahn and Winton, 1998). Such powerful shareholders may also set the terms of CEO employment contracts. Core et al. (1999) confirm that the presence of outside blockholdings as well as the size of the CEO's equity stake are significant determinants of executive pay in the US. Clay (2000) argues that monitoring activities are delegated to some classes of owners (namely, financial institutions) and that the presence of activist shareholders leads to higher levels of CEO compensation and increasing performance-sensitivity. In contrast, in firms where managers control large equity stakes and/or where the ownership is diffuse, managers are likely to enjoy a high level of decision discretion. In particular, we would expect managers in such firms to promote compensation schemes with only a limited relation to share price performance.⁹ Bebchuk and Fried (2003) and Bertrand and Mullainathan (2001) give evidence that managers enjoying a high degree of discretion influence the terms of their pay package.

Hypothesis 2b (Blockholder identity effect on compensation): The presence of strong outside blockholders positively affects the performance sensitivity of the CEO's monetary compensation, whereas the presence of large executive directors' holdings induces the opposite effect.

The discussion above leaves out one potentially important group of shareholders, namely non-executive directors. The relationship between the size of their equity stakes and CEO compensation or turnover is an open empirical issue. On the one hand, if non-executive directors assume their fiduciary duties appropriately and act in the interest of all shareholders, the impact of non-executives' voting power on CEO compensation and turnover will be similar to that of the outside blockholders (postulated by Hypotheses 2a and 2b). On the other hand, if non-executive directors believe that their careers are closely tied to the fate of the incumbent CEO, they may opt to support the incumbent management and shield them from disciplinary actions. This would be in line with the findings of Franks et al. (2001) who argue that non-executive directors frequently support the incumbent management even in the wake of poor performance. Thus, while testing for Hypotheses 2a and 2b, we control for the size of equity holdings controlled by non-executive directors, but *a priori* we do not hypothesize about the direction of the effect.

⁹ Managers would then prefer remuneration packages related to accounting benchmarks as these can to some extent be manipulated by management (Jensen, Murphy, and Wruck, 2004).

3. Sample description and methodological approach

3.1. Sample description

The sample consisting of 250 UK firms is randomly drawn from the population of all companies quoted on the London Stock Exchange, excluding financial institutions, real estate companies and insurance companies. As we intend to investigate the impact of changes in the corporate governance structure, a company is retained if it has at least three consecutive years of data in the period 1988-1993. A data panel was constructed for this six-year period. Our sample period terminates in 1993 when the London Stock Exchange imposed the recommendations for good corporate governance of the Cadbury report on all listed firms.¹⁰ Thus, our period is characterized by lower corporate governance standards than more recent years, and is therefore particularly interesting from an agency-theory point of view.

For a company to be included in the sample we required that data for at least three consecutive years within the six years time window are available. Hence, the sample also includes those firms that were taken over or went bankrupt. Seven of the 250 companies were dropped because accounting data were not available from Datastream.

3.2. Variable definitions and data description

All data on managerial compensation, turnover and board composition were retrieved from the Directors' Report and the Notes in the annual reports. In our sample, approximately 11% of CEOs lost their position in a given year (Table 1). The mean and median logarithm of the monetary compensation (salary and bonus) was 11.88 and 11.91, respectively (which corresponds to approximately £ 144,000 and £ 149,000). The median age of a CEO is 52 years (with a mean of 52.6). The median tenure equals 4 years (with a mean of 5.2). Every third CEO also holds the position of chairman of the board of directors. The median board consists of 9 directors, 61.5% of whom are non-executive directors. Finally, in approximately 26% of the sample firm-years, CEO compensation is determined by a remuneration committee.¹¹ The fraction of companies having such a committee increases substantially towards the end of the sample period (as also documented by Conyon et al., 1995). Turnover data are corrected for natural turnover. We distinguish between natural and forced turnover, classifying a resignation as 'natural' if the director was described as having left the board for reasons of retirement, death or illness. Otherwise the resignation was classified as being forced. The normal retirement age is between 62 and 65 but we took 62 as the minimum retirement age and viewed any earlier retirement as forced.

Ownership data both for existing and new shareholders for each year of the period 1988-1993 were also collected from the Directors' Report and the Notes in the annual reports. All the directors' holdings greater than 0.1% are recorded as well as other shareholders' stakes of 5% and more (3% and above from 1990 when the statutory disclosure threshold was reduced). The status of the directors (executive/non-executive) and the dates of joining and leaving the board were also obtained from the annual reports and from contacting the firms directly by phone or fax. Non-beneficial share stakes held by the directors on behalf of their families or charitable trusts were added to the directors' beneficial holdings. Although directors do not obtain cash flow benefits from these non-beneficial stakes, they can usually exercise the voting rights. For equity stakes in Nominees accounts, the identity of the shareholders was found

¹⁰ For the effect of the Cadbury recommendations on performance and turnover, see Dahya et al. (2002).

¹¹ The presence of such committees (postulated by Cadbury report) can alter compensation policies and eliminate the situation when the remuneration decision is largely influenced by CEOs themselves (Conyon, 1994).

by contacting the listed firms directly. In 97% of these cases, the shareholders of Nominees accounts were institutional investors.

[Insert Table 1 about here]

As is typical for Anglo-American firms, the ownership concentration shown in Table 1 is relatively low. The median Herfindahl-5 index equals only 0.028 (with a mean of 0.057). Most of CEOs do not hold substantial share stakes: the average CEO owns less than 3% of the equity (with a median of zero). The median of the combined shareholdings of all executive directors (excluding the CEO) amounts to less than 1%, with an average of slightly below 8%. Stakes of non-executives are lower and do not exceed 4%, on average. The most important class of blockholders consists of financial institutions: they hold a (cumulative) median stake of 13% (a mean of 16.6%). Finally, other outsiders – individuals, families and industrial firms – control on average 8.2% of equity.

As proxies for stock performance, we employ annual abnormal stock returns (in percentage terms), which are collected from the London Share Price Database (LSPD). Abnormal returns are calculated using the market model and corrected for thin trading.¹² The stocks in our sample companies underperformed the benchmark by approximately 2.5% in year t (see Table 1). We also use alternative performance measures like the percentage dividend changes (between years $t - 2$ and $t - 1$, and between $t - 1$ and t , respectively), which are collected from Datastream, and employ return on assets (earnings before interest and taxes over book value of total assets) as accounting-based performance indicators. All accounting data are collected from Datastream and are cross-checked with the information from annual reports.

In order to control for (potential) size effects, we introduce the logarithm of total assets (in £ thousands) at the end of a given year. For the median (mean) company in our sample, this value equals to 11.4 (11.3), which corresponds to approximately £ 85 million (£ 78 million). The median and mean ratios of capital gearing (defined as long term-debt on total assets) equal 29.7% and 32.7%, respectively. Finally, we measure risk by the annual volatility of stock returns, which is gathered from the LSPD. The median and mean values amount to 34.4% and 37.4%, respectively.

Some important data are not of sufficient quality to be included in the main models of this study. First, only rudimentary non-monetary elements of CEO remuneration (in particular stock- and option-grants) are disclosed for our sample period. The annual reports usually only mention that management options were granted during the financial year and/or were outstanding without consistently revealing the number of options involved, the exercise price, and the number of options exercised in the preceding year.¹³ Only in the years subsequent to 1995 (when the Greenbury report was issued), some of this information became available. Second, the presence of director interlocks might affect the level of managerial compensation as well (Hallock, 1997). Finally, our sample period is relatively short but extending the data set beyond 1993 would be problematic due to structural differences between pre- and post-Cadbury period.

¹² Both a Dimson (1979)-correction for non-synchronous trading and a Vasicek (1973)-Bayesian updating are applied.

¹³ As a robustness check, we investigate whether the non-monetary part of the remuneration package influences the monetary pay-for-performance relation by expanding the main models by some proxies of non-monetary remuneration. We include proxies for the size of the stock/option grants, for the value of the CEO's stock grants, and for the wealth effects of CEO's equity holdings (see Section 5.1 for detailed definitions and the results).

3.3. Methodology

We employ the following econometric techniques. First, sample selection models are applied to analyze jointly executive compensation and turnover. Second, in order to assure the robustness of the conclusions, survival analysis is applied to investigate the factors leading to managerial turnover. We also analyze corporate remuneration using a fixed-effects panel regression framework in order to compare these estimates with the results from the sample selection models. This allows us to draw some conclusions about whether or not the fixed-effects methodology or simple OLS regressions, frequently used in previous research, biases the results of earlier studies.

We simultaneously explain managerial turnover and compensation within a sample selection model framework. The model, often referred to as a type-2 Tobit model, is specified as follows:

$$\begin{cases} y_{1it}^* = X'_{1it} \beta_1 + \varepsilon_{1it} & (1a) \\ y_{2it}^* = X'_{2it} \beta_2 + \varepsilon_{2it} & (1b) \end{cases}$$

$$y_{1it} = \begin{cases} 1 & \text{if } y_{1it}^* > 0 \\ 0 & \text{if } y_{1it}^* \leq 0 \end{cases} \quad (2)$$

$$y_{2it} = \begin{cases} y_{2it}^* & \text{if } y_{1it}^* > 0 \\ 0 & \text{if } y_{1it}^* \leq 0 \end{cases} \quad (3)$$

where $\{\varepsilon_{1it}, \varepsilon_{2it}\}$ are drawn from a bivariate normal distribution with mean 0, variances σ_1^2 and σ_2^2 , and covariance σ_{12} (Amemiya, 1984). y -variables are quantities of interest while X -variables correspond to the explanatory variables. Finally, β_1 and β_2 are vectors of the model coefficients. It is assumed that only the sign of y_{1it}^* is observed and that y_{2it}^* is observed only when $y_{1it}^* > 0$. Moreover, it is assumed that X_{1i} are observed for all i , but X_{2i} need not be observed for i such that $y_{1it}^* \leq 0$. Finally the two sets of explanatory variables, i.e., X_{1it} and X_{2it} , are not disjoint (they can differ, however).

In a standard setting, error terms are assumed to be i.i.d. drawings from a bivariate normal distribution. In our models, i corresponds to a firm and t to a year. We relax the assumption of independence of ε 's across t and allow clustering of observations corresponding to a given firm, i.e. we assume error terms to be i.i.d. across firms, but not necessarily for different observations within the same firm. All the reported standard errors of estimates are adjusted for clustering (StataCorp, 2001). This procedure enhances robustness of our findings and allows us to take the panel data structure of our sample explicitly into account. To estimate the type-2 Tobit models, we employ a two-step procedure suggested by Heckman (1979), which yields consistent parameter estimates.

Throughout the paper we call equation (1a) a selection equation, while equation (1b) is referred to as a regression equation. The selection equation explains CEO turnover, i.e., $y_{1it} = 1$ corresponds to those firm-years when the CEO keeps his or her position. The regression equation explains the compensation of these CEOs in the subsequent year. As the notion of compensation sensitivity to previous year performance is not meaningful for new CEOs, we restrict the remuneration analysis to CEOs with a tenure of more than one year. Estimating the parameters of the regression equation (1b) on the basis of the non-turnover sample only,

would not be a valid alternative to the proposed method because the OLS estimator of β_2 is biased when the selection of the regression sample is endogenous (i.e., $\sigma_{12} \neq 0$). Instead, our sample selection model deals with the endogeneity of selection, and therefore renders reliable parameter estimates for the regression equation (Greene, 2000).

Our hypotheses are tested within Tobit-2 models with interaction terms. This can be illustrated by the following general example. Consider a given model of the form:

$$y_i = \beta_0 + \beta_1 \cdot Perf_i + \gamma_1 \cdot M_{1i} + \dots + \gamma_k \cdot M_{ki} + \delta_1 \cdot Perf_i \cdot M_{1i} + \dots + \delta_k \cdot Perf_i \cdot M_{ki} + B \cdot X_i + \varepsilon_i, \quad (4)$$

where y is a dependent variable; $\beta_0, \beta_1, \gamma_1, \dots, \gamma_k, \delta_1, \dots, \delta_k$, and a vector B are model parameters; $Perf_i$ is the analyzed performance indicator; M_{1i}, \dots, M_{ki} , are k (median-centered)¹⁴ moderating variables (e.g. board characteristics, or stakes controlled by executives, non-executive directors, and outsider blockholders) for firm i ; X_i is a vector containing other regressors; and ε_i is an error term. The conditional estimate (CE) of the effect of the performance variable on y (given M_{1i}, \dots, M_{ki}) in such a model can be expressed as:

$$\hat{CE}_{Perf}(M_{1i}, \dots, M_{ki}) = \hat{\beta}_1 + \hat{\delta}_1 \cdot M_{1i} + \dots + \hat{\delta}_k \cdot M_{ki}, \quad (5)$$

where $\hat{\cdot}$ denote estimates of the parameters. Such conditional estimates for one of our models are illustrated by Figures 1 and 3 and will be discussed in Section 4.

The variance of this conditional estimate is given by:

$$\begin{aligned} \text{var}\left\{\hat{CE}_{Perf}(M_{1i}, \dots, M_{ki})\right\} &= \text{var}\left\{\hat{\beta}_1\right\} + \sum_{j=1}^k M_{ji}^2 \cdot \text{var}\left\{\hat{\delta}_j\right\} + \\ &+ \sum_{j=1}^k 2 \cdot M_{ji} \cdot \text{cov}\left\{\hat{\beta}_1, \hat{\delta}_j\right\} + \sum_{p=1}^{k-1} \sum_{q=p+1}^k 2 \cdot M_{pi} \cdot M_{qi} \cdot \text{cov}\left\{\hat{\delta}_p, \hat{\delta}_q\right\} \end{aligned} \quad (6)$$

Finally, the conditional z-statistic (illustrated for one of the models by Figures 2 and 4) is defined as:

$$z = \frac{\hat{CE}_{Perf}(M_{1i}, \dots, M_{ki})}{\sqrt{\text{var}\left\{\hat{CE}_{Perf}(M_{1i}, \dots, M_{ki})\right\}}}. \quad (7)$$

Under the null hypothesis (H_0 : Conditional performance sensitivity = 0), it has an asymptotic standard normal distribution (Aiken and West, 1991).

In order to investigate the robustness of the type-2 Tobit models, the determinants of CEO turnover are also analyzed with Cox proportional hazard regressions (Cox, 1972; Cox and Oakes, 1984). The hazard function is defined as:

$$h_i(t) = \lim_{\Delta \rightarrow 0^+} \frac{\Pr(t \leq T_i < t + \Delta | t \leq T_i)}{\Delta}, \quad (8)$$

¹⁴ In models with interaction terms, variable-centering is applied for two reasons: (i) it mitigates collinearity problems; (ii) it results in straightforward interpretation of the main-effect coefficient - such a coefficient shows the strength of the relationship for a median (or mean) level of the moderating variable (Aiken and West, 1991).

where T_i is the date of dismissal of CEO i . Hence, the hazard function for a given manager can be interpreted as the marginal conditional probability of being replaced in the time instant Δ given that he or she was not replaced up to time t . Consequently, a positive parameter estimate for a given variable reflects that larger values of this variable increase the probability of CEO dismissal.

The basic proportional hazard model looks as follows:

$$h_i(t) = \psi(X_i, \beta) \cdot h_0(t), \quad (9)$$

where $h_i(\cdot)$ is the hazard function for individual i , $\psi(\cdot)$ is some function of model covariates X_i and of parameters β , and $h_0(\cdot)$ is the underlying (unspecified) baseline hazard function. Following the literature, we use a log-linear specification, i.e. we impose the following form of the function ψ :

$$\psi(X_i, \beta) = \exp(X_i' \beta). \quad (10)$$

The advantage of this approach is that we do not have to parameterize the baseline hazard function. Instead, since we are mainly interested in the values of the model parameters β , we need to maximize only the partial likelihood, which for a given observation is given by:

$$L_i = \frac{\exp(X_i' \beta)}{\sum_{j \neq i} \exp(X_j' \beta)} \quad (11)$$

and does not depend on h_0 (Geddes and Vinod, 1997).

We allow the explanatory variables to be time-varying, which results in multiple observations for each of the analyzed firms. In order to assure the robustness of the results, we account for a possible dependence between different observations corresponding to the same firm. We allow for clustering and implement the procedure which assumes the observations to be independent across firms, but does not require different observations on the same firm to be independent (StataCorp, 2001). Finally, a robust estimate of the coefficient covariance matrix is computed as in Lin and Wei (1989).

4. Results

In Section 4.1, we discuss the results from the sample selection models which simultaneously explain CEO turnover and compensation. Subsequently, the hazard rate analyses of managerial survival are outlined in Section 4.2.

4.1. Sample selection models explaining managerial compensation and turnover

4.1.1. CEO turnover

The results of Panel A of Table 2 support the disciplinary role of managerial turnover as performance is negatively correlated to future turnover in the selection equations.¹⁵ This effect is statistically significant for either the industry-adjusted accounting-based performance measure or the abnormal stock return (or both) in all the models. Unsurprisingly, managers generating high corporate performance are more likely to keep their position during the subsequent year.

¹⁵ The performance coefficients in the regression equations (panel A of Table 2) are positive but this signifies that the relation between turnover and performance is negative because the dependent variable equals 1 if the CEO keeps his position and 0 when he departs (for reasons other than retirement).

A more detailed analysis of the parameter estimates highlights the economic significance: for instance, Model 2 implies that the CEO of the median company has 11.9% probability of losing his or her job. The median firm is characterized by median values of firm-specific characteristics (performance, board composition, control variables). In well-performing companies (both performance indicators are at the top quartile of performance) with median board structure and control variables, the probability of CEO turnover drops to merely 3.4%, while in poorly performing firms (both performance indicators are at the bottom quartile performance), a substantially higher percentage of CEOs (31.7%) departs annually.

[Insert Table 2 about here]

We also obtain strong results for the relationship between turnover and board characteristics (Panel A of Table 2). The presence of larger boards facilitates the replacement of the CEO in the UK. Contrary to the US evidence of e.g. Yermack (1996), the CEOs of firms whose stock underperformed in the previous years are more likely to be penalized by larger boards (as reflected by the significantly positive coefficient of the interaction between stock performance and board size). It may be that larger boards represent a larger internal pool of managerial talent.

Our findings also confirm the intuition of the ‘Recommendations for Good Corporate Governance’ (the 1992 Cadbury report and its successors): boards with a larger percentage of outside, independent directors replace CEOs more frequently. Still, the interaction terms of the proportion of non-executive directors and either of the performance measures are not statistically significant. This suggests that boards with a high proportion of non-executive directors do not appear significantly more apt to replace underperforming management. Hence, our results do not confirm Weisbach’s (1988) findings that outsider-dominated boards, supposedly more independent from management, are more able to enforce disciplinary turnover.

Finally, when a person fulfills the tasks of CEO and chairman of the board simultaneously, the likelihood of his or her replacement significantly decreases. This danger of conflicts of interest provides further support for the need to separate the positions of CEO and chairman. Yet, the degree of entrenchment does not affect the performance sensitivity of turnover, as the corresponding interaction terms are insignificant. Thus, our analysis fails to support Hypothesis 1a.

Models 3 and 4 do not yield support for Hypothesis 2a as none of the interaction terms between ownership variables (of executive directors and outside blockholders) and performance indicators is statistically significant. Thus, ownership concentration does not seem to affect the performance sensitivity of CEO turnover. In particular, neither an analysis with outsider ownership concentration (Models 3 and 4), nor a more detailed analysis with ownership concentration held by institutions, families and individuals, other corporations, and the government (not shown) give evidence of outside shareholder monitoring. Still, Model 3 suggests that strong insider control implies a higher probability that the CEO will not be removed. Executive directors with large ownership stakes appear able to successfully ward off any attempts to replace the CEO regardless of corporate performance. Finally, the size of the shareholdings controlled by non-executive directors does not have a direct impact on the likelihood of CEO turnover. Interestingly, however, the significance of the interaction term between the non-executives’ stake and past stock performance indicates that non-executive directors tend to protect the CEOs of firms whose stock underperformed (which is in line with the findings by Franks et al., 2001). This result further illustrates the lack of monitoring by non-executive directors. Thus, poor performance may not only be the result of poor management, but maybe also of poor corporate governance.

Finally, firm-specific characteristics such as firm size, capital gearing, and risk do not appear to affect the likelihood of CEO turnover consistently.

4.1.2. CEO compensation

Strong support for the rewarding effect of compensation can be found in Panel B of Table 2. In all but one model, monetary compensation, consisting of salary and bonus, is sensitive to both past accounting and stock price performance within the 5% (and frequently 1%) level of statistical significance (Models 1-4). There are few significant relations between board characteristics (including those interacted with performance) and the CEO's monetary remuneration. The impact of board size is significant though: CEOs of firms with large boards receive a larger compensation. Still, this effect is not performance-dependent (which distinguishes our results from those obtained for the US by Yermack, 1996). A high proportion of non-executive directors, the presence of a remuneration committee, the separation of the functions of the CEO and the chairman do not seem related to the way managerial remuneration contracts are drawn up. The only statistically significant effect in this part of the analysis is the interaction of the CEO-Chairman indicator with the accounting performance measure. Apparently, if CEOs act also as chairmen of the board, their remuneration is more sensitive to accounting performance. A possible interpretation might be that such powerful executives adopt accounting performance as the yardstick they are assessed against, because –due to the large degree of discretion they enjoy– they may be able to manipulate this benchmark for some years. Finally, the presence of a remuneration committee (consisting of non-executive directors) does not have a significant impact on CEO compensation. In addition, the coefficients corresponding to the interactions of this variable with performance indicators are insignificant. Overall, we find little relation between board structure and monetary compensation and therefore reject Hypothesis 1b.

In the remuneration regression equation (Panel B of Table 2), we find that when executive directors hold large share stakes, the CEO's monetary remuneration is lower. It may be that executives deriving substantial wealth from their equity investment in their corporation care less about their monetary income.¹⁶ Still, when stock prices decrease, it seems that CEOs compensate disappointing stock returns by augmenting the cash-based compensation package.¹⁷ Thus, Models 3 and 4 illustrate pernicious remuneration incentive schemes where CEOs receive a higher monetary compensation in the wake of poor stock performance of firms in which they can exert considerable voting power. However, given that the levels of compensation are lower in firms with powerful executive directors, we cannot fully support the managerial power (or the skimming) model for executive compensation as formulated by Bebchuk and Fried (2003).

When outside shareholders hold large stakes, the monetary compensation of the CEO appears to be lower (see Model 4). However, outside shareholders do not seem to impose a pay-for-performance remuneration scheme, as the interaction of the size of the outside blockholdings with performance is not statistically significant in Models 3 and 4.¹⁸ It may well be that pay-for-performance schemes and shareholder control are supplementary monitoring mechanisms.

¹⁶ In our robustness tests (Section 5.1), we address such a possibility in a greater detail.

¹⁷ See the interactive term of abnormal return with executives' ownership in Models 3 and 4 (Panel B of Table 2).

¹⁸ An analysis of the different types of outside blockholders does not give any significant results, apart from the fact that CEOs' compensation is less sensitive to the accounting-based benchmark in firms with a high proportion of equity controlled by financial institutions.

Consequently, we only find partial evidence supporting Hypothesis 2b: there is no evidence that CEO remuneration is more performance-related in outsider-dominated firms, while strong director control concentration leads to a lower performance sensitivity of CEO remuneration.

Finally, the size of the equity stakes controlled by non-executive directors is negatively related to the level of CEO remuneration (see Models 3 and 4 in panel B of Table 2). Apparently, in companies where non-executive directors are less powerful (in terms of voting power), the CEO is more likely to enjoy higher levels of compensation. Still, powerful non-executive directors do not impose a performance-related remuneration scheme on the management as the interaction terms are not statistically significant.

Our calculation of the conditional estimates (see Section 3.3) clarifies the economic significance of the above results. In a median firm, the estimates of stock- and accounting-based performance sensitivity of remuneration equal 0.00195 and 0.00385, respectively (see Model 3). Hence, top managers can expect an increase in their industry-adjusted remuneration by 0.195% for every percentage point of increasing abnormal stock returns generated over the previous year. Similarly, top managers can expect their monetary compensation to exceed the salaries enjoyed by the CEOs of their industry peers by 3.85% provided that the ROA of their own firms exceeded the industry median by 10 percentage points in the preceding year.

In outsider-dominated firms, the conditional stock performance sensitivity of CEO remuneration rises to 0.00230 (from 0.00195 for the median firms) and is highly significant with a z-statistic of 3.99 (p-value of 0.0001).¹⁹ In contrast, the conditional accounting performance sensitivity of remuneration in firms controlled by outside shareholders only equals 0.00256 (which is lower than the 0.00385 value for a median firm) and is only marginally significant (the z-statistic equals 1.83 with a p-value of 0.068).

Interestingly, we find opposite results for insider-dominated firms. Comparing the pay-for-stock price performance sensitivity of the median firm and of the insider-dominated company, we find a drop in sensitivity from 0.00195 to a mere 0.00111. The conditional z-statistic indicates that the latter number is no longer significantly different from zero (z-statistic is 1.46 with a p-value of 0.145). While the CEO's remuneration in an insider-dominated firm is not sensitive to stock price performance, we find the opposite for accounting performance. The accounting performance sensitivity of firms with insider control is much higher than the corresponding value for the median firm (0.00599 as opposed to 0.00385) and is highly significant (the z-statistic equals 2.50 with a p-value of 0.012). These findings are consistent with the managerial power or skimming model in which powerful management sets its own performance standards: CEO remuneration is more sensitive to stock price performance in firms with strong outside blockholders, whereas in insider-dominated firms, it is more sensitive to accounting returns.

[Insert Figures 1-4 about here]

¹⁹ We define an outsider-dominated company as a firm of which 37.05% of equity is controlled by outside blockholders (equivalent to the 3rd quartile of the outsiders' blockholdings) and for which there are neither executive nor non-executive block holdings (as the 1st quartile for both the executives' and non-executive holdings equal zero). Analogously, an insider-dominated firm is defined as a firm with 8.64% of voting equity controlled by the executive directors (equivalent to the 3rd quartile of the executives' holdings), 1.11% of voting equity controlled by the non-executive directors (equivalent to the 3rd quartile of the non-executives' holdings) and 9.40% of shares held by outside blockholders (equivalent to the 1st quartile of the outsiders' blockholdings).

Figure 1 confirms that the presence of large blocks controlled by executive directors obliterates the pay-for-stock price performance relationship for virtually all levels of outside block-holdings.²⁰ In firms where executive directors hold more than approximately 20% of the outstanding equity, the relationship between past stock performance and monetary compensation is insignificantly different from zero, irrespectively of the outside equity concentration (Figure 2). One could argue that in such firms managerial incentives stem mainly from the equity holdings and that compensation only plays a marginal role in strengthening the pay-for-stock price-performance relationship. Figure 3 shows that the accounting-based performance sensitivity of a CEO's monetary compensation increases with the size of the executive directors' stake. The sensitivity significantly exceeds zero in the case of strong insider control in the presence of moderate or no outsider control (Figure 4).

Table 2 also provides some interesting insights concerning the impact of firm-specific control variables (size, gearing and risk) on CEO remuneration (Panel B). In line with the UK remuneration literature, CEOs of larger firms enjoy significantly higher industry-adjusted monetary compensation. Top management usually tries to justify – rightly so or not – size-related compensation by the fact that special managerial skills (which are in short supply) are needed to manage larger firms. We also document that firm leverage has no impact on compensation.

Our results show that CEO remuneration increases with corporate risk. Aggarwal and Samwick (1999), and Jin (2002) argue that in an agency framework, managerial risk aversion implies that firm risk moderates the performance sensitivity of executive compensation. We verified this claim and expanded our models with interaction terms of company risk and performance (tables available upon request). None of these interaction terms are statistically significant. Hence, we fail to corroborate the risk hypotheses of the above studies.

4.1.3. Sample selection model vs. fixed-effect panel regression

Panel C of Table 2 reports the estimates of the correlation coefficients of the error terms in the selection. Those estimates are highly significant for Models 1 and 2, which confirms that if an analysis of compensation performance-sensitivity were to be performed using a simple regression framework (OLS or fixed-effects estimations on a censored sample), the study is likely to suffer from a severe selection bias (see Section 3.3 above). In particular, ignoring the selectivity resulting from disciplinary CEO turnover can substantially bias the estimated strength of the remuneration rewarding effect (and of the impact of other covariates). Table 3 illustrates this point. It reports the estimates of panel data fixed-effect models explaining industry-adjusted CEO monetary compensation for the sample of executives who are at least one year in place.²¹ Models 5-8 correspond to the regression equations of Models 1-4 reported in Table 2.

²⁰ Figures 1-4 are plotted under assumption that the equity stake controlled by non-executive directors is zero (i.e. it equals to the median value of this variable).

²¹ To estimate $y_{it} = \alpha_i + X_{it}'\beta + \varepsilon_{it}$, fixed-effects and random-effects techniques are frequently used. y_{it} stands for i -th firm CEO compensation in year t . X_{it} is a vector of covariates (again for firm i at time t). α_i is a firm-specific effect characterizing i -th company, β is the vector of model parameters, and ε_{it} is an error term. In the fixed-effects approach, α_i 's are treated as model parameters and are hence estimated. The random-effect model treats α_i 's as the result of a random draw from some distribution (e.g., the normal one). For a data panel like ours (relatively large number of firms drawn randomly from an even larger population of companies), the use of a random-effects model is recommended (Verbeek, 2000), as the number of parameters to be estimated is substantially lower with this technique. Furthermore, more efficient estimates are obtained than with fixed-effects models. Still, the consistency criterion of such a random-effects approach requires α_i 's to be uncorrelated with explanatory variables of the model, i.e. the X 's (Baltagi, 2001). Since the Hausman

Table 3 indicates that, as a consequence of ignoring the problem of sample selection, the statistical inference may lead to spurious conclusions. Based on the evidence of Table 3, we would reject the hypothesis predicting a significant relationship between past accounting performance and CEO compensation in all of the Models 5-8. The significance of stock performance sensitivity of remuneration survives in some models, but the coefficient estimates are lower than those reported in Table 2. For instance, Model 6 reports the stock performance sensitivity of CEO compensation in the median firm: it is merely 0.00041, statistically insignificant and less than a quarter of the number found earlier in Model 2 (i.e., 0.00195). Since all the estimates of the performance sensitivity coefficients in Table 3 are lower than their counterparts in Table 2, these fixed-effects results underestimate the true economic significance of the relations.²² The discrepancies between the parameter estimates obtained by these two estimation methods are even more extreme for some other regressors (e.g. for the firm size variable, the estimates reported in Table 3 are at least six times smaller than those in Table 2). These findings may explain the differences in conclusions between our analysis and earlier UK compensation studies (e.g. Conyon et al., 1995) and suggest that one ought to be cautious interpreting the evidence on remuneration of past studies.²³

[Insert Table 3 about here]

4.2. Hazard rate analysis of CEO survival

Survival analysis allows us to investigate the determinants of managerial replacement and the robustness of our conclusions from the simultaneous estimation of the previous section. Using a series of Cox regression models reported in Table 4, we confirm the disciplinary character of CEO turnover. Previous year's poor accounting performance significantly increases the likelihood of CEO removal. The results for past stock market performance, albeit weaker in some of the models, still point in the same direction.

[Insert Table 4 about here]

Significant results, in line with those reported in Section 4.1, are obtained for the relationship between turnover and board characteristics. Large boards and boards with a high proportion of outside directors facilitate the removal of CEOs. When the CEO dominates the board by also assuming the tasks of the chairman, he or she is more likely to 'survive' longer. Still, the interactive terms between board characteristics and performance indicators are insignificant in all cases, which (as before) allows us to reject Hypothesis 1a. Apparently more independent directors are not more able to discipline underperforming management.

Model 11 shows that the presence of specific types of blockholders determines the (non-natural) CEO departure. In companies where executive directors hold larger a fraction of the voting rights, entrenchment is more likely. This is especially the case in firms that report weak accounting performance. Thus, our evidence supports Hypothesis 2a. In contrast, the presence of executive directors' blockholdings seems to increase CEO vulnerability in firms with poor stock price performance (as captured by the interaction terms between executives'

specification tests points out that in almost all our specifications this assumption is violated, we report the results from the fixed-effects approach.

²² The exception is the accounting performance sensitivity coefficient, the estimates of which are almost identical in Models 4 and 8.

²³ Some of the past remuneration research on the UK does not find a positive pay-for-performance relation. It is likely that the reason for this lack of results follows from the fact that inappropriate econometric techniques were used.

stakes and stock performance in Models 11 and 12). This result fails to support Hypothesis 2a. The size of outside blockholdings as well as its interaction term with past performance is insignificant in both Models 11 and 12, contrary to the predictions of Hypothesis 2a. Finally, the only effect induced by the presence of substantial shareholdings controlled by non-executive directors is a weakening of the relationship between past stock performance and CEO turnover. This result corroborates the findings reported in Table 2.

Table 4 reveals that the annual volatility of stock returns, our proxy for firm risk, always has a positive sign (and is significant in Models 9-10). This implies that top executives of high-risk firms are more vulnerable to dismissal. Finally, the other two control variables (leverage and firm size) are insignificant in most of the Cox models explaining CEO turnover.²⁴

5. Additional analyses and robustness tests

5.1. The effects of non-monetary components of CEO remuneration

The models discussed in Section 4 analyze the determinants of the monetary component of CEO remuneration. As mentioned above, reliable data on the other elements of executive compensation (mainly stock and option grants) are scarce. Still, this section employs the available data to verify whether the presence of non-monetary components of CEO's remuneration affects the conclusions drawn in Section 4.

We first construct some proxies to capture the importance of option/stock grants awarded to the CEO. A first proxy for the size of such grants was calculated as the difference between the CEO's equity holdings in years t and $t - 1$, if the difference was positive and zero otherwise. This variable is positive for only about 9% of the CEO-years in the sample.²⁵ For this subsample, the median (average) size of the grant was 0.5% (2.7%, respectively) of the equity outstanding. Second, we construct a proxy to measure the value of CEO's stock grants. It was obtained by multiplying the size of the grant (defined above) by the market capitalization of the relevant firm. In the subsample of CEO-years where the proxy for the stock grant size is non-negative, the median (average) value of such a grant is about £283,000 (£11.73m, respectively). Third, we calculated the wealth effects of CEOs' equity holdings in order to obtain a direct measure of incentives resulting from managerial stock ownership.²⁶ Such variables allow us to control for the possibility of *ex post* settling up in the bargaining between a CEO and the body responsible for wage-setting (cf. Fama, 1980). More specifically, the board of directors (or the remuneration committee) who stipulate the terms of the CEO compensation may take into account the capital gains or losses experienced by the CEO over the previous year and adjust the monetary element of the remuneration package accordingly. Finally, we construct a dummy variable that equals one for the firm-years in which the CEO was granted

²⁴ The only exception is the marginally significant negative relationship between CEO turnover and firm size in Model 12 (which is consistent with the result obtained earlier in Model 1).

²⁵ It may be the case that CEOs who are awarded stock grants sell their shares immediately following the grant (Ofek and Yermack, 2000). If it is the case, our proxy underestimates the importance of such option grants. Another important source of noise is that this proxy does not only capture the stock awarded to the CEO resulting from a stock grant, but also the shares acquired by the CEO and financed from his or her personal wealth as well as the stock obtained as a result of the exercise of stock options. Consequently, the proxy may overestimate the size of the stock grants awarded to the CEO in a given year as well.

²⁶ Two versions of the wealth effect variable were computed. The 'raw wealth effect' is obtained by multiplying the value of the CEO's equity stake by the *raw* stock return over the last year. For 'abnormal wealth effect', we multiply the value of the CEO's equity stake by the *abnormal* stock return over the last year.

stock options and zero otherwise.²⁷ On average 73% of the firms reported that their CEOs received a stock option package.

In order to verify robustness of conclusions drawn in Section 4.1, we extend Models 1-4 using the four proxy variables discussed above.²⁸ This allows us to examine the determinants of the CEO's monetary compensation, while controlling for non-cash components of the remuneration package.²⁹ Not surprisingly, the size of the stock grant (i.e. the percentage of equity awarded to CEO) is negatively related to the level of a CEO's monetary compensation, but the corresponding coefficient is statistically insignificant. The results are stronger for the value of new stock grants: the corresponding coefficient is significantly negative in some models. The negative relationship is intuitive: non-monetary elements of a CEO compensation package appear (imperfect substitutes) for monetary remuneration. Importantly, the extended models (including the proxies for the new stock grants) still support all the conclusions drawn from Models 1-4 in Section 4.1.

We found no relationship between the wealth effects of CEO equity holdings and the level of monetary compensation enjoyed by a particular CEO. The models employing proxies for wealth effects of CEO equity holdings still corroborate earlier findings. Finally, awarding a CEO with an option grant does not affect the level of CEO monetary compensation. Therefore, we conclude that the models extended with information on the non-monetary remuneration corroborate the earlier conclusions of Models 1-4.

5.2. Alternative variable specifications in the simultaneous equations estimation.

5.2.1. Corporate performance

We substituted unadjusted ROA and (yearly) changes in EBIT for our accounting performance measure and obtained similar results both in the regression and the selection equation. Alternative measures of stock performance (dividend changes as a signal of future value and Tobin's Q) correlate positively with remuneration in the regression equations, but do not seem to be used as a benchmark to remove the CEO. Finally, we extend the models by including two-year lags of the performance indicators. In most of the specifications, both the accounting- and market-based proxies lagged two years are insignificant, which implies that only recent performance information is used in the decision to dismiss or remunerate.

5.2.2. Ownership and control

In relation to the tests of Hypotheses 2a and 2b, we tried alternative proxies to measure the stakes and voting power of different types of owners (e.g. the largest stake in each of the classes of owner, the Herfindahl-3 concentration indices within each shareholder class, the Shapley value for the largest blockholder, the Shapley values by class of owner). The results are in line with those reported in Section 4.1: we only find consistent support for managerial entrenchment as larger stakes controlled by executives mitigate the likelihood of CEO dismissal.

²⁷ Information on neither the size of those grants nor about the terms of the options granted (e.g. exercise price, vesting period) was available. Moreover, our proxy may underestimate the importance of the grants, since the disclosure of such awards was not mandatory in the analyzed period.

²⁸ The corresponding estimation results are not tabulated in the text and are available upon request.

²⁹ This approach is similar to the one applied by Yermack (2005). His regressions explaining executives' perquisite consumptions control for other forms of compensation.

With respect to the regression equations (on remuneration), our results are robust to different proxies of ownership structure. Replacing cumulative stakes of various classes of owners by the largest block in each of the groups, by Shapley values of the largest investor in each of the owner-type classes, by Herfidahl-3 indices for different groups, or by class Shapley values produces results that are comparable to those reported earlier in Section 4.2.

5.2.3. Leverage

The results are also robust to the choice of leverage proxy (book or market value), as none of the conclusions is challenged in these alternative specifications. Extending the models by firm-specific control variables capturing the changes in capital structure (such as a dummy variable for firms issuing new equity) does not materially affect the results.

5.2.4. Model extensions by CEO age

Several studies argue that CEO age is one of the crucial determinants of compensation and of turnover. We expand the models in Table 2 by including CEO age and find that this variable has no impact on CEO monetary compensation (the corresponding coefficients are positive, though statistically insignificant). We also find that older CEOs are less likely to suffer involuntary replacement. None of the other results presented in Table 2 are rejected. The reason why we do not present these additional results in Tables 2-4 is that the CEO age variable is disclosed for only 60% of our sample firms.

5.3. Robustness tests for hazard models

In spite of the advantages of the methodology applied in Section 4.2 - more specifically the fact that we do not need a full parameterization of the hazard function - we also estimate panel-data fixed-effect logit models to verify robustness further. Due to the requirements of the estimation procedure (i.e., the conditional maximum likelihood), the sample size shrinks substantially (by approximately 60%), which leads to lower levels of statistical significance. Nevertheless, the major qualitative conjectures concerning CEO turnover are upheld irrespectively of the choice of methodology.

Next, we re-estimate Cox models of Section 4.2 using alternative proxies for stock price performance (yearly dividend changes), for accounting-based performance (unadjusted ROA and changes in EBIT), and for leverage (book- or market-based) and generate results that hardly differ from those presented in Table 4. Two-year lags of the performance variables are insignificant. Franks et al. (2001) state that new equity issues present the ideal opportunity to replace poorly performing CEOs, but we find no evidence that the dummy variable capturing the fact that a new equity issue took place, is correlated with CEO replacement.

6. Conclusion and discussion

In this paper we simultaneously analyze two mechanisms of the managerial labor market: CEO turnover and monetary remuneration schemes. Sample selection models and hazard analyses are applied to a random sample of 250 firms listed on the London Stock Exchange over a six-year period. Our approach yields novel results (compared to earlier UK research): the managerial remuneration and the termination of labor contracts play an important role in mitigating agency problems between managers and shareholders. We find that both the CEO's industry-adjusted monetary compensation and CEO replacement are strongly performance-sensitive. Top executive turnover is shown to serve as a disciplinary mechanism in case of corporate underperformance, whereas the level of monetary compensation rewards good

past performance although the performance criterion chosen depends on the ownership concentration and board structure. Especially the results on remuneration goes against most past UK findings which unveiled little pay-for-performance sensitivity, possibly due to biases introduced by inappropriate estimation techniques and an incorrect choice of remuneration measures and performance benchmarks.

Specifically, our analysis of CEO monetary compensation reveals that CEOs are rewarded for corporate size and risk, but also for good accounting and stock price performance. The fact that the levels of monetary remuneration are lower when executive directors are powerful (in terms of voting rights) supports the alignment of interest-hypothesis which states that managerial ownership aligns the objectives of management and of other shareholders. However, we also find that, when CEOs derive substantial wealth from the equity investment in their firms and when stock prices decrease and negative abnormal returns are incurred, these CEOs seem to compensate the disappointing stock performance by augmenting their monetary compensation package (salary and bonus). This suggests self-dealing and hence provides some support for an alternative theory, namely the skimming or managerial power hypothesis (Bertrand and Mullainathan, 2000; Bebchuk and Fried, 2003). There are also additional findings corroborating this hypothesis. First, CEO remuneration is sensitive to stock price performance in firms with strong outside blockholders, whereas remuneration in firms where insiders (management) control share blocks remuneration is only sensitive to measures of accounting performance. Thus, managers with strong control concentration seem to prefer accounting standards as an evaluation criterion presumably because they have more discretion over this benchmark and hence over their monetary compensation. In contrast, in firms with strong outsider (monitoring) shareholder, management cannot pick its preferred performance benchmark as it is required to focus on the creation of shareholder value. Second, this finding is also corroborated by the fact that CEOs who also exert the function of chairman of the board also earn more when accounting performance is high (but not when share price performance has increased). Likewise, this suggests that powerful CEOs choose their own benchmark. Third, in monitored firms (in particular in firms where non-executive directors and outside shareholders control large share blocks), the CEO's remuneration is lower.

There are no elements reflecting board independence (apart from the separation of CEO and chairman) which have an impact on the pay-for-performance sensitivity. Neither a large proportion of non-executive directors on the board nor the presence of a remuneration committee seems to influence the remuneration policy of the firm. Our results in this respect appear consistent with the widely perceived failure of this mechanism in tackling governance problems as the *Financial Times* (May 20, 2003) puts it:

‘Ten years ago company boards set up remuneration committees to restrain greedy chief executives and make the salary setting process more transparent. Yet the excesses seem to have increased as a result. The committees create a veneer of respectability that protects chief executives from direct accountability. They rely on salary surveys and often use absurd overseas comparisons to justify huge salaries for UK-based executives. The committees generally want their chief executives to be paid an above-average wage, thereby creating an inflationary spiral... [B]ecause many chief executives sit on each other's remuneration committees, there is a suspicion of mutual back-scratching’.

We also document that CEO dismissal strongly performance-sensitive. Compared to the median firm, the probability of CEO turnover in well-performing companies drops to merely 3.4% annually, while in poorly performing firms 31.7% departs. CEOs are more easily re-

moved in firms with more independent directors and in firms with larger boards of directors, although these relations do not depend on corporate performance. Powerful outsider shareholders (institutions, families or individuals, other corporations) do not seem to be more apt to remove CEOs, even in the wake of poor performance. This implies that there is little evidence of disciplinary monitoring by outsider shareholders. In line with earlier research, we find that non-executive directors owning share blocks seem to protect the incumbent CEO in poorly performing companies. Insiders with strong voting power successfully resist CEO dismissal, irrespective of corporate performance. Such managerial entrenchment is exacerbated when the CEO also holds the position of chairman of the board. In firms with larger boards, CEO departure is more likely, possibly as those boards may constitute a larger pool of managerial talent. Boards with a high proportion of non-executive directors and with separate persons fulfilling the tasks of CEO and chairman, replace the CEO more frequently, but these boards are not more apt to replace underperforming management.

7. References

- Admati, A. R., P. Pfleiderer, and J. Zechner, 1994, Large shareholders activism, risk sharing, and financial markets equilibrium, *Journal of Political Economy* 102, 1097-1130.
- Aggarwal, R. K. and A. A. Samwick, 1999, The other side of the trade-off: The impact of risk on executive compensation, *Journal of Political Economy* 107, 65-105.
- Agrawal, A. and C. R. Knoeber, 1996, Firm performance and mechanisms to control agency problems between managers and shareholders, *Journal of Financial and Quantitative Analysis* 31, 377-397.
- Agrawal, A. and C. R. Knoeber, 1998, Managerial compensation and the threat of takeover, *Journal of Financial Economics* 47, 219-239.
- Aiken, L. S. and S. G. West, 1991, *Multiple Regression: Testing and Interpreting Interactions* (Sage, Newbury Park).
- Amemiya, T., 1984, Tobit models: A survey, *Journal of Econometrics* 24, 3-63.
- Baltagi, B. H., 2001, *Econometric Analysis of Panel Data* (Wiley, Chichester).
- Bebchuk, L. A. and J. M. Fried, 2003, Executive compensation as an agency problem, *Journal of Economic Perspectives* 17, 71-92.
- Bebchuk, L. A., J. M. Fried, and D. I. Walker, 2002, Managerial power and rent extraction in the design of executive compensation, *University of Chicago Law Review* 69, 751-846.
- Bebchuk, L. A. and J. M. Fried, 2004, *Pay without performance: The unfulfilled promise of executive compensation* (Harvard University Press, Harvard).
- Bertrand, M. and S. Mullainathan, S., 2000, Agents with and without principals, *American Economic Review* 90, 203-208.
- Bertrand, M. and S. Mullainathan, 2001, Are CEOs rewarded for luck? The ones without principals are, *Quarterly Journal of Economics* 116, 901-932.
- Bethel, J. E., J. P. Liebeskind, and T. Opler, 1998, Block share purchases and corporate performance, *Journal of Finance* 53, 605-634.
- Borokhovich, K. A., R. Parrino, and T. Trapani, 1996, Outside directors and CEO selection, *Journal of Financial and Quantitative Analysis* 31, 337-355.
- Brickley, J. A., J. S. Link, and J. L. Coles, 1999, What happens to CEOs after they retire? New evidence on career concerns, horizon problems, and CEO incentives, *Journal of Financial Economics* 52, 341-377.
- Bushman, R. M. and R. J. Indjejikian, 1993, Accounting income, stock price, and managerial compensation, *Journal of Accounting and Economics* 16, 3-23.
- Chan, K., N. Jegadeesh, and T. Sougiannis, 2004, The accrual effect on future earnings, *Review of Quantitative Finance and Accounting* 22, 97-129.
- Chang, C., 1995, Performance-based compensation and outside interventions as alternative incentive mechanisms and the commitment role of the board, Working paper, University of Minnesota, Minneapolis.
- Chung, K. H. and S. W. Pruitt, 1996, Executive ownership, corporate value, and executive compensation: A unifying framework, *Journal of Banking and Finance* 20, 1135-1159.
- Clay, D., 2000, The effects of institutional investment on CEO compensation, Working paper, University of Chicago, Chicago.
- Conyon, M., 1994, Corporate governance changes in UK companies between 1988 and 1993, *Corporate Governance: An International Review* 2, 77-99.

- Conyon, M., P. Gregg, and S. Machin, 1995, Taking care of business: Executive compensation in the United Kingdom, *Economic Journal* 105, 704-714.
- Conyon, M. J. and K. J. Murphy, 2000, The prince and the pauper? CEO pay in the United States and the United Kingdom, *Economic Journal* 110, 640-671.
- Core, J. E., R. W. Holthausen, and D. F. Larcker, 1999, Corporate governance, chief executive officer compensation and firm performance, *Journal of Financial Economics* 51, 371-406.
- Coughlan, A. T. and R. M. Schmidt, 1985, Executive compensation, management turnover, and firm performance: An empirical investigation, *Journal of Accounting and Economics* 7, 43-66.
- Crespi, R., C. Gispert, and L. Renneboog, 2002, Cash-based executive compensation in Spain and UK, in: J. McCahery, P. Moerland, T. Raaijmakers, and L. Renneboog, *Corporate Governance Regimes: Convergence and Diversity* (Oxford University Press, Oxford), 647-667.
- Cox, D. R., 1972, Regression models and life tables, *Journal of Royal Statistic Society* 34, 187-220.
- Cox, D. R. and D. Oakes, 1984, *Analysis of Survival Data* (Chapman and Hall, London).
- Dahya, J., J. J. McConnell, and N. G. Travlos, 2002, The Cadbury committee, corporate performance, and top management turnover, *Journal of Finance* 57, 461-484.
- Dechow, P. and R. Sloan, 1991, Executive incentives and the horizon problem, *Journal of Accounting and Economics* 14, 51-89.
- Denis, D. J. and D. K. Denis, 1995, Performance changes following top management dismissals, *Journal of Finance* 50, 1029-1057.
- Denis, D. J., D. K. Denis and A. Sarin, 1997, Ownership structure and top executive turnover, *Journal of Financial Economics* 45, 193-221.
- Denis, D. J. and T. A. Kruse, 2000, Managerial discipline and corporate restructuring following performance declines, *Journal of Financial Economics* 55, 391-424.
- Denis, D. J. and A. Sarin, 1999, Ownership and board structures in publicly traded corporations, *Journal of Financial Economics* 52, 187-223.
- Dimson, E., 1979, Risk measurement when shares are subject to infrequent trading, *Journal of Financial Economics* 7, 197-226.
- Fama, E. F., 1980, Agency problems and the theory of the firm, *Journal of Political Economy* 88, 288-307.
- Franks, J., C. Mayer, and L. Renneboog, 2001, Who disciplines the management of poorly performing companies?, *Journal of Financial Intermediation* 10, 209-248.
- Geddes, R. R. and H. D. Vinod, 1997, CEO age and outside directors: A hazard analysis, *Review of Industrial Organization* 12, 767-780.
- Gibbons, R. and K. J. Murphy, 1990, Relative performance evaluation for chief executive officers, *Industrial and Labor Relations Review* 43, 30-S-51-S.
- Gibbons, R. and K. J. Murphy, 1992, Optimal incentive contracts in the presence of career concerns: Theory and evidence, *Journal of Political Economy* 100, 468-505.
- Girma, S., S. Thompson, and P. Wright, 2002, Merger activity and executive pay, CEPR Discussion Paper no. 3255, <http://ssrn.com/abstract=306822>.
- Greene, W. H., 2000, *Econometric Analysis* (Prentice Hall, Upper Saddle River).

- Gregg, P., S. Machin, and S. Szymanski, 1993, The disappearing relationship between directors' pay and corporate performance, *British Journal of Industrial Relations* 31, 1-9.
- Grossman, S. J. and O. Hart, 1983, An analysis of the principal-agent problem, *Econometrica* 51, 7-45.
- Hallock, K. F., 1997, Reciprocally interlocking boards of directors and executive compensation, *Journal of Financial and Quantitative Analysis* 32, 331-344.
- Heckman, J., 1979, Sample selection bias as a specification error, *Econometrica* 47, 153-161.
- Healy, P. M., 1985, The effect of bonus schemes on accounting decisions, *Journal of Accounting and Economics* 7, 85-107.
- Holmström, B., 1979, Moral hazard and observability, *Bell Journal of Economics* 10, 74-91.
- Holmström, B., 1982a, Managerial incentive schemes - a dynamic perspective, in: *Essays in Economics and Management in Honour of Lars Wahlbeck*, Helsinki.
- Holmström, B., 1982b, Moral hazard in teams, *Bell Journal of Economics* 13, 324-340.
- Jensen, M. C. and W. H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs, and ownership structure, *Journal of Financial Economics* 3, 305-360.
- Jensen, M. C. and K. J. Murphy, 1990, Performance pay and top-management incentives, *Journal of Political Economy* 98, 225-264.
- Jensen, M. C., K. J. Murphy, and E. G. Wruck, 2004, Where we have been, how we got there, what are the problems and how to fix them, Working paper, Harvard NOM, [http://ssrn.com/abstract= 561305](http://ssrn.com/abstract=561305).
- Jin L., 2002, CEO compensation, diversification, and incentives, *Journal of Financial Economics* 66, 29-63.
- John, K. and L. W. Senbet, 1998, Corporate governance and board effectiveness, *Journal of Banking and Finance* 22, 371-403.
- Kahn, C. and A. Winton, 1998, Ownership structure, speculation, and shareholder intervention, *Journal of Finance* 53, 99-129.
- Kang, J.-K. and A. Shivdasani, 1995, Firm performance, corporate governance, and top executive turnover in Japan, *Journal of Financial Economics* 38, 29-58.
- Kim, O. and Y. Suh, 1993, Incentive efficiency of compensation based on accounting and market performance, *Journal of Accounting and Economics* 16, 25-53.
- Kole, S. R., 1997, The complexity of compensation contracts, *Journal of Financial Economics* 43, 79-104.
- Lazear, E. P. and S. Rosen, 1981, Rank-order tournaments as optimum labor contracts, *Journal of Political Economy* 88, 841-864.
- Lewellen, W., C. Loderer, and K. Martin 1987, Executive compensation and executive incentive problems: An empirical analysis, *Journal of Accounting and Economics* 9, 287-310.
- Lin, D. Y. and L. J. Wei, 1989, The robust inference for the Cox proportional hazards model, *Journal of American Statistical Association* 84, 1074-1078.
- Martin, K. J. and J. J. McConnell, 1991, Corporate performance, corporate takeovers, and management turnover, *Journal of Finance* 46, 671-687.
- Maug, E., 1998, Large shareholders as monitors: Is there a trade-off between liquidity and control?, *Journal of Finance* 53, 65-98.
- Mehran, H., 1995, Executive compensation structure, ownership, and firm performance, *Journal of Financial Economics* 38, 163-184.

- Mikkelson, W. H. and M. M. Partch, 1997, The decline of takeovers and disciplinary managerial turnover, *Journal of Financial Economics* 44, 205-228.
- Murphy, K. J., 1985, Corporate performance and managerial remuneration: An empirical analysis, *Journal of Accounting and Economics* 7, 11-42.
- Murphy, K. J., 1986, Incentives, learning, and compensation: A theoretical and empirical investigation of managerial labor contracts, *RAND Journal of Economics* 17, 59-76.
- Narayanan, M. P., 1996, Form of compensation and managerial decision horizon, *Journal of Financial and Quantitative Analysis* 31, 467-491.
- Ofek, E. and D. Yermack, 2000, Taking stock: Equity-based compensation and the evolution of managerial ownership, *Journal of Finance* 55, 1367-1384.
- Parrino, R., 1997, CEO turnover and outside succession: A cross-sectional analysis, *Journal of Financial Economics* 46, 165-197.
- Roe, M., 1994, *Strong Managers, Weak Owners: The Political Roots of American Corporate Finance* (Princeton University Press, Princeton).
- Roe, M., 2002, *Political Determinants of Corporate Governance* (Oxford University Press, Oxford).
- Rosenstein, S. and J. G. Wyatt, 1997, Inside directors, board effectiveness, and shareholder wealth, *Journal of Financial Economics* 44, 229-250.
- Shleifer, A. and R. W. Vishny, 1997, A survey of corporate governance, *Journal of Finance* 52, 737-783.
- Sloan, R. G., 1993, Accounting earnings and top executive compensation, *Journal of Accounting and Economics* 16, 55-100.
- StataCorp, 2001, *Stata Statistical Software: Release 7.0* (Stata Corporation, College Station).
- Vasicek, O., 1973, A note on using cross-sectional information in Bayesian estimation of security betas, *Journal of Finance* 28, 1233-1239.
- Verbeek, M., 2000, *A Guide to Modern Econometrics* (Wiley, Chichester).
- Warner, J. B., R. L. Watts, and K. H. Wruck, 1998, Stock prices and top management changes, *Journal of Financial Economics* 20, 461-492.
- Weisbach, M. S., 1995, CEO turnover and the firm's investment decisions, *Journal of Financial Economics* 37, 159-188.
- Weisbach, M. S., 1988, Outside directors and CEO turnover, *Journal of Financial Economics* 20, 431-460.
- Yermack, D., 2005, Flights of fancy: Corporate jets, CEO perquisites, and inferior shareholder returns, AFA 2005 Philadelphia Meetings paper, <http://ssrn.com/abstract=529822>.
- Yermack, D., 1996, High market valuation of companies with a small board of directors, *Journal of Financial Economics* 40, 185-211.

8. Tables and figures

Table 1. Sample characteristics

	Median	Mean	Std. deviation
<i>CEO turnover</i>			
CEO dismissal (dummy)	0.000	0.110	0.313
<i>CEO compensation</i>			
Industry-adjusted logarithm of salary	0.000	0.002	0.623
Logarithm of salary	11.878	11.909	0.687
<i>CEO characteristics</i>			
CEO age (years)	52.000	52.581	6.343
CEO tenure (years)	4.000	5.151	5.482
CEO is the board chairman (dummy)	0.000	0.335	0.472
<i>Board composition</i>			
Proportion of non-executive directors (%)	61.540	61.411	15.035
Board size (logarithm)	2.197	2.173	0.372
Remuneration committee presence (dummy)	0.000	0.259	0.438
<i>Ownership variables</i>			
Herfindahl-5 concentration index	0.028	0.057	0.084
CEO stake (%)	0.000	2.983	8.095
Executives' stake (%)	0.120	4.572	10.746
Non-executives' stake (%)	0.000	3.914	9.625
Institutions' stake (%)	13.000	16.596	16.116
Families/individ.'s and corporations' stake (%)	0.000	8.218	14.083
<i>Performance indicators (all in %)</i>			
Abnormal stock return in year t	-5.195	-2.506	47.150
Abnormal stock return in year $t-1$	-3.710	-2.418	38.173
Abnormal stock return in year $t-2$	-1.370	2.063	41.054
Return on assets in year t	16.315	15.234	26.572
Return on assets in year $t-1$	18.100	17.704	20.420
Return on assets in year $t-2$	19.590	19.000	20.194
<i>Firm-specific control variables</i>			
Logarithm of firm size	11.259	11.349	1.794
Capital gearing (%)	29.715	32.651	24.784
Risk (%)	34.390	37.429	13.070

Note to Table 1: CEO dismissal equals one for firm-years in which CEO change took place. Logarithm of salary is a natural logarithm of CEO total monetary compensation (including bonuses) expressed in pounds. Industry-adjusted logarithm of salary is an industry-year median-adjusted logarithm of CEO salary (as defined above). The last of the CEO characteristics is a dummy variable that equals one for those CEOs who also hold the function of chairman of the board. The proportion of non-executive directors is based on the total number of directors. The presence of a remuneration committee is a dummy variable equaling one for those firm-years for which a remuneration committee is in place. The Herfindahl-5 concentration-index is calculated using the equity

stakes of the five largest shareholders. The following ownership variables represent cumulative total percentage stakes for the CEO, executive directors, and non-executive directors. The last two ownership variables represent the cumulative percentage stakes for financial institutions and for families, individuals, and corporations, respectively. The first three performance indicators are abnormal stock returns and their values lagged one and two years, respectively. Return on assets (contemporaneous, lagged one and two years) is defined as the ratio of EBIT over total assets in a given year. Firm size is proxied by a natural logarithm of the total book value of assets. Capital gearing is defined as the ratio of debt to total assets and expressed in percentage terms. Risk is measured as an annual volatility of stock returns.

Table 2. Sample selection models explaining CEO turnover and industry-adjusted monetary compensation

	Model 1		Model 2		Model 3		Model 4	
Panel A: Selection equations	Dependent variable equals 0 if the CEO is replaced and 1 otherwise.							
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	3.27605	0.000	4.12311	0.000	1.91410	0.073	4.03002	0.003
<i>Performance indicators</i>								
Abnormal stock returns in year <i>t</i> -1	0.00332	0.076	0.00382	0.076	0.00555	0.028	0.00654	0.019
Industry-adjusted ROA in year <i>t</i> -1	0.00425	0.211	0.01093	0.002	0.01319	0.060	0.00907	0.315
<i>Board composition</i>								
Board size			-0.94161	0.000			-0.95282	0.008
Stock price perform. * Board size			0.01143	0.048			0.00395	0.517
Accounting perform. * Board size			0.00770	0.506			0.01521	0.223
Proportion of non-executive directors			-0.00696	0.086			-0.01339	0.024
Stock price perform. * Prop. of non-executives			0.00000	0.978			-0.00008	0.574
Accounting perform. * Prop. of non-executives			-0.00020	0.337			-0.00013	0.679
CEO is also the chairman			0.39811	0.007			0.30943	0.049
Stock price perf. * CEO is also the chairman			-0.00127	0.749			-0.00278	0.632
Accounting perf. * CEO is also the chairman			-0.00845	0.227			-0.00367	0.721
<i>Ownership concentration</i>								
Executives' stakes					0.06234	0.004	0.05166	0.178
Stock price perform. * Executives' stakes					0.00042	0.183	0.00037	0.188
Accounting perform. * Executives' stakes					-0.00084	0.121	-0.00047	0.512
Outside block holdings					-0.00575	0.156	-0.00476	0.283
Stock price perform. * Outside block holdings					-0.00008	0.395	-0.00006	0.611
Accounting perform. * Outside block holdings					-0.00001	0.947	0.00003	0.907
Non-executives' stakes					0.00400	0.506	0.00375	0.614
Stock price perform. * Non-executives' stakes					-0.00042	0.004	-0.00045	0.004
Accounting perform. * Non-executives' stakes					-0.00056	0.319	-0.00016	0.805
<i>Firm size, leverage, and risk</i>								
Firm size	-0.09618	0.027	0.05508	0.206	0.05285	0.377	0.10879	0.105
Capital gearing	-0.00256	0.229	0.00072	0.783	-0.00320	0.292	0.00010	0.977
Risk	-0.00603	0.286	-0.00726	0.220	0.00141	0.842	-0.00633	0.416
<i>Year and industry control variables</i>								
Year dummies	Yes		Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes		Yes	
Wald χ^2	$\chi^2(20) = 104.29$		$\chi^2(29) = 105.84$		$\chi^2(29) = 161.77$		$\chi^2(38) = 153.55$	
P-value for χ^2	< 0.001		< 0.001		< 0.001		< 0.001	

Table continues on next page.

Table 2 - continued.

	Model 1		Model 2		Model 3		Model 4	
Panel B: Regression equations	Dependent variable = industry-adjusted CEO monetary remuneration							
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	-3.06839	0.000	-3.49374	0.000	-2.96110	0.000	-3.20470	0.000
<i>Performance indicators</i>								
Abnormal stock returns in year <i>t</i> -1	0.00116	0.009	0.00195	0.003	0.00195	0.001	0.00287	0.001
Industry-adjusted ROA in year <i>t</i> -1	0.00420	0.008	0.00330	0.027	0.00385	0.050	0.00310	0.194
<i>Board composition</i>								
Board size			0.18196	0.030			0.20572	0.009
Stock price perform. * Board size			-0.00025	0.839			-0.00087	0.486
Accounting perform. * Board size			0.00283	0.450			0.00116	0.760
Proportion of non-executive directors			0.00158	0.387			0.00214	0.264
Stock price perform. * Prop. of non-executives			0.00004	0.216			0.00005	0.234
Accounting perform. * Prop. of non-executives			0.00000	0.967			-0.00001	0.924
CEO is also the chairman			0.01369	0.769			0.02154	0.680
Stock price perf. * CEO is also the chairman			-0.00126	0.197			-0.00074	0.471
Accounting perf. * CEO is also the chairman			0.00832	0.005			0.00699	0.041
Remuneration committee presence			-0.01532	0.738			0.00151	0.973
Stock price perform. * Remuneration committee presence			-0.00071	0.543			-0.00135	0.359
Accounting perform. * Remuneration committee presence			-0.00047	0.829			0.00049	0.866
<i>Ownership concentration</i>								
Executives' stakes					-0.00440	0.050	-0.00468	0.031
Stock price perform. * Executives' stakes					-0.00007	0.061	-0.00010	0.025
Accounting perform. * Executives' stakes					0.00015	0.205	0.00010	0.460
Outside block holdings					-0.00205	0.248	-0.00332	0.049
Stock price perform. * Outside block holdings					0.00002	0.496	-0.00001	0.829
Accounting perform. * Outside block holdings					-0.00008	0.169	-0.00003	0.694
Non-executives' stakes					-0.00520	0.015	-0.00506	0.023
Stock price perform. * Non-executives' stakes					-0.00003	0.509	-0.00003	0.501
Accounting perform. * Non-executives' stakes					-0.00007	0.553	-0.00005	0.701
<i>Firm size, leverage, and risk</i>								
Firm size	0.24891	0.000	0.23607	0.000	0.23786	0.000	0.20799	0.000
Capital gearing	0.00086	0.356	0.00098	0.309	0.00040	0.674	0.00034	0.699
Risk	0.00535	0.038	0.00892	0.001	0.00895	0.002	0.00862	0.003
<i>Year control variables</i>								
Year dummies	Yes		Yes		Yes		Yes	
Wald χ^2	$\chi^2(9) = 307.05$		$\chi^2(21) = 403.13$		$\chi^2(18) = 402.11$		$\chi^2(30) = 481.57$	
P-value for χ^2	< 0.001		< 0.001		< 0.001		< 0.001	

Table continues on next page.

Table 2 - continued.

	Model 1	Model 2	Model 3	Model 4
Panel C: Model statistics and tests				
Total no. of observations	868	851	782	847
No. of censored observations	102	102	90	101
No. of uncensored observations	766	749	692	746
Log-likelihood	-658.71	-632.70	-585.18	-550.00
Wald χ^2 statistics for testing				
joint significance of two equations	$\chi^2(29) = 676.33$	$\chi^2(50) = 654.38$	$\chi^2(47) = 894.22$	$\chi^2(68) = 964.06$
P-value for χ^2	< 0.001	< 0.001	< 0.001	< 0.001
Estimate of ρ	0.881	-0.472	-0.892	-0.660
Wald χ^2 statistics for testing $\rho = 0$				
(tests of equations independence)	$\chi^2(1) = 69.32$	$\chi^2(1) = 5.64$	$\chi^2(1) = 2.27$	$\chi^2(1) = 1.10$
P-value for χ^2	< 0.001	0.0175	0.1318	0.2953

Note to Table 2: The table presents the estimates of the sample selection models for top executive turnover (selection equation of Panel A) and CEO industry-adjusted compensation (regression equation of Panel B). Standard errors are adjusted for clustering of observations on each firm. The dependent binary variable of Panel A equals one for CEOs that were not replaced in a given year and zero otherwise. Industry-adjusted ROA is defined as the industry-year median adjusted return on equity (in percentage terms) lagged by one year. Likewise, the abnormal stock return is lagged. Board size is defined as the natural logarithm of the total number of directors. Board independence is proxied by the percentage of non-executive directors among the total number of directors and by a dummy variable that equals one for CEOs exerting at the same time the function of board chairmen. Executive stake is defined as the sum of the shareholdings of the CEO and other executive directors. The non-executive stake represents the cumulative stakes held by non-executive directors. Outsider blockholdings denote the stakes held by financial institutions, families and individuals, the government and corporations, respectively, provided the individual stakes are 5% or above. Firm size is proxied by a natural logarithm of the total book value of assets. Capital gearing is expressed in percentage terms. Company risk is measured as an annual volatility of stock returns. In the regression equations (Panel B) the dependent variable is the industry-adjusted CEO monetary compensation in the subsequent year. The explanatory variables are defined in the same way as in the selection equations. The only difference is that here time-varying regressors are lagged one year less compared to those from Panel A. The remuneration committee presence is a dummy variable that equals one for firm-years, when remuneration committee was in place.

Table 3. Fixed-effect panel regressions explaining CEO industry-adjusted monetary compensation for censored sample (CEOs who are not newly appointed)

	Model 5		Model 6		Model 7		Model 8	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Panel A: Model estimates								
Intercept	-0.34233	0.299	-0.34571	0.357	-0.10260	0.761	-0.16453	0.661
<i>Performance indicators</i>								
Abnormal stock returns in year $t-1$	0.00094	0.001	0.00041	0.324	0.00087	0.019	0.00043	0.400
Industry-adjusted ROA in year $t-1$	-0.00009	0.889	-0.00002	0.980	0.00154	0.198	0.00152	0.254
<i>Board composition</i>								
Board size			0.01486	0.820			-0.00695	0.915
Stock price performance * Board size			0.00066	0.439			0.00113	0.194
Accounting performance * Board size			0.00197	0.445			0.00468	0.077
Proportion of non-executive directors			0.00147	0.231			0.00172	0.158
Stock price performance * Proportion of non-executives			0.00003	0.139			0.00001	0.608
Accounting performance * Proportion of non-executives			-0.00011	0.025			-0.00005	0.314
CEO is also the chairman			-0.00716	0.823			-0.00783	0.805
Stock price perf. * CEO is also the chairman			0.00036	0.538			0.00037	0.540
Accounting perf. * CEO is also the chairman			-0.00225	0.244			-0.00112	0.588
Remuneration committee presence			-0.01433	0.614			-0.01070	0.706
Stock price performance * Remuneration committee presence			0.00108	0.089			0.00113	0.087
Accounting performance * Remuneration committee presence			-0.00101	0.426			-0.00109	0.404
<i>Ownership concentration</i>								
Executives' stakes					-0.00619	0.010	-0.00800	0.001
Stock price perform. * Executives' stakes					0.00002	0.439	0.00002	0.357
Accounting perform. * Executives' stakes					-0.00012	0.161	-0.00007	0.423
Outside block holdings					0.00047	0.582	-0.00071	0.431
Stock price perf. * Outside block holdings					0.00001	0.528	-0.00001	0.468
Accounting perf. * Outside block holdings					-0.00010	0.011	-0.00009	0.024
Non-executives' stakes					-0.00147	0.510	-0.00234	0.306
Stock price perform. * Non-executives' stakes					-0.00006	0.048	-0.00005	0.131
Accounting perform. * Non-executives' stakes					0.00015	0.054	0.00016	0.048
<i>Firm size, leverage, and risk</i>								
Firm size	0.04280	0.110	0.02891	0.307	0.02428	0.376	0.01892	0.504
Capital gearing	-0.00033	0.593	0.00006	0.919	-0.00051	0.407	-0.00008	0.897
Risk	-0.00224	0.215	-0.00133	0.497	-0.00159	0.380	-0.00061	0.754
<i>Other control variables</i>								
Year dummies	Yes		Yes		Yes		Yes	

Table continues on next page.

Table 3 - continued.

	Model 5	Model 6	Model 7	Model 8
Panel B: Model statistics and tests				
σ_α	0.536	0.557	0.544	0.544
σ_e	0.201	0.198	0.199	0.195
ρ	0.877	0.888	0.883	0.886
F-test for all $\alpha_i = 0$	F(215,558) = 11.93	F(213,531) = 11.69	F(214,543) = 11.82	F(213,519) = 11.63
P-value for F	< 0.001	< 0.001	< 0.001	< 0.001
Corr(α_i, Xb)	0.457	0.328	0.234	0.196
Model F-test	F(9,558) = 7.96	F(21,531) = 3.69	F(18,543) = 5.38	F(30,519) = 3.59
P-value for F	< 0.001	< 0.001	< 0.001	< 0.001
R ² - within	0.114	0.128	0.151	0.172
R ² - between	0.406	0.261	0.209	0.197
R ² - overall	0.327	0.200	0.189	0.179
No. of groups	216	214	215	214
No. of observations	783	766	776	763

Note to Table 3: The table presents the estimates of the fixed-effect panel data model for CEO industry-adjusted compensation using a censored sample (i.e. for CEOs who were keeping their job for at least one year). The dependent variable is an industry-adjusted CEO monetary compensation in a given year. All variables are defined in Table 2.

Table 4. Hazard analysis of CEO turnover

	Model 9		Model 10		Model 11		Model 12	
Dependent variable is the marginal conditional probability that the CEO is replaced in the time instant Δ given that he was not replaced up to time t .								
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
<i>Performance indicators</i>								
Abnormal stock returns in year $t-1$	-0.00702	0.033	-0.00421	0.120	-0.00754	0.044	-0.00428	0.195
Industry-adjusted ROA in year $t-1$	-0.00896	0.021	-0.00812	0.001	-0.01901	0.034	-0.01497	0.062
<i>Board composition</i>								
Board size			1.33179	0.001			1.53214	0.000
Stock price performance * Board size			-0.01325	0.125			-0.00825	0.266
Accounting performance * Board size			0.00408	0.741			-0.00096	0.950
Proportion of non-executive directors			0.01451	0.039			0.01572	0.044
Stock price performance * Proportion of non-executives			0.00009	0.637			0.00024	0.270
Accounting performance * Proportion of non-executives			0.00008	0.768			-0.00012	0.704
CEO is also the chairman			-1.18224	0.000			-1.12170	0.001
Stock price perf. * CEO is also the chairman			-0.00646	0.450			-0.00365	0.699
Accounting perf. * CEO is also the chairman			-0.00244	0.835			-0.00626	0.644
<i>Ownership concentration</i>								
Executives' stakes					-0.03408	0.022	-0.03225	0.043
Stock price perform. * Executives' stakes					-0.00047	0.059	-0.00059	0.050
Accounting perform. * Executives' stakes					0.00132	0.001	0.00097	0.018
Outside block holdings					0.00556	0.366	0.00832	0.210
Stock price perf. * Outside block holdings					-0.00000	0.989	-0.00004	0.763
Accounting perf. * Outside block holdings					0.00027	0.302	0.00023	0.358
Non-executives' stakes					0.00116	0.933	-0.00524	0.675
Stock price perform. * Non-executives' stakes					0.00044	0.066	0.00037	0.088
Accounting perform. * Non-executives' stakes					0.00033	0.467	-0.00005	0.918
<i>Firm size, leverage, and risk</i>								
Firm size	0.05740	0.366	-0.08339	0.268	-0.0844	0.815	-0.15956	0.073
Capital gearing	0.00473	0.192	0.00204	0.616	0.00587	0.131	0.00267	0.539
Risk	0.01710	0.036	0.01686	0.063	0.00992	0.211	0.00961	0.318
<i>Year and industry control variables</i>								
Industry dummies	Yes		Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes		Yes	
Log-likelihood	-469.79		-448.30		-452.55		-433.09	
Wald test χ^2	$\chi^2(20) = 107.60$		$\chi^2(29) = 250.23$		$\chi^2(29) = 136.67$		$\chi^2(38) = 285.18$	
P-value for χ^2	< 0.001		< 0.001		< 0.001		< 0.001	
Pseudo- R^2	0.049		0.093		0.061		0.102	
No. of observations	1148		1148		1136		1136	

Note to Table 4: The table presents the estimates of the Cox proportional hazard rate model for managerial tenure. Standard errors are adjusted for clustering of observations on each firm. All variables are defined in Table 2.

Figure 1. Conditional estimates of CEO monetary compensation-sensitivity with respect to the stock price-based corporate performance for various levels of ownership concentration.

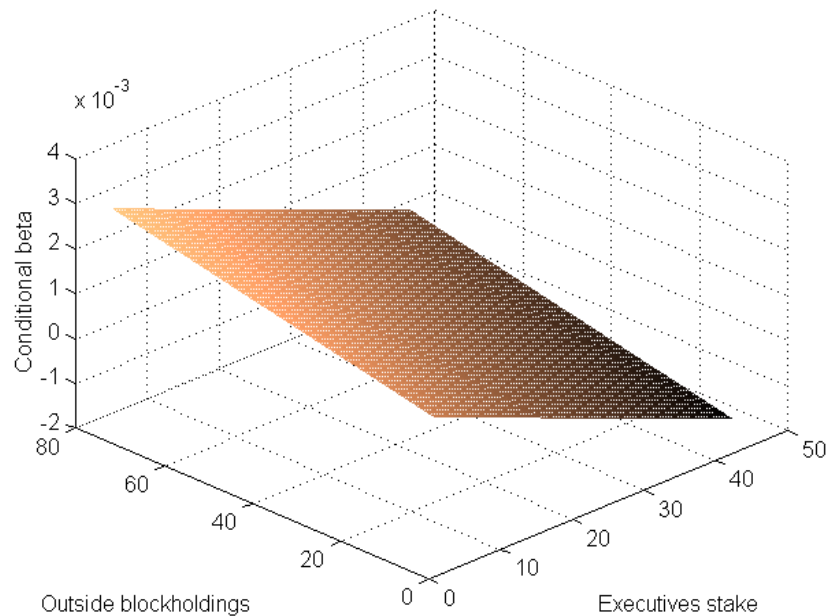
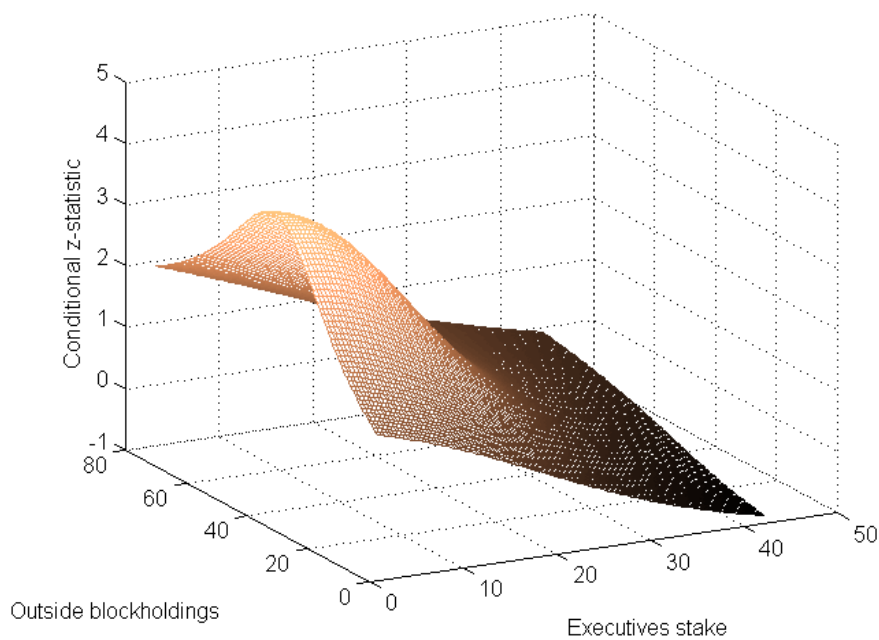


Figure 2. Significance of CEO monetary compensation-sensitivity with respect to the stock price-based corporate performance for various levels of ownership concentration.



Note: Values of the magnitude exceeding 1.96 are significant at 5% level (2-tail test).

Figure 3. Conditional estimates of CEO monetary compensation-sensitivity with respect to the accounting-based corporate performance for various levels of ownership concentration.

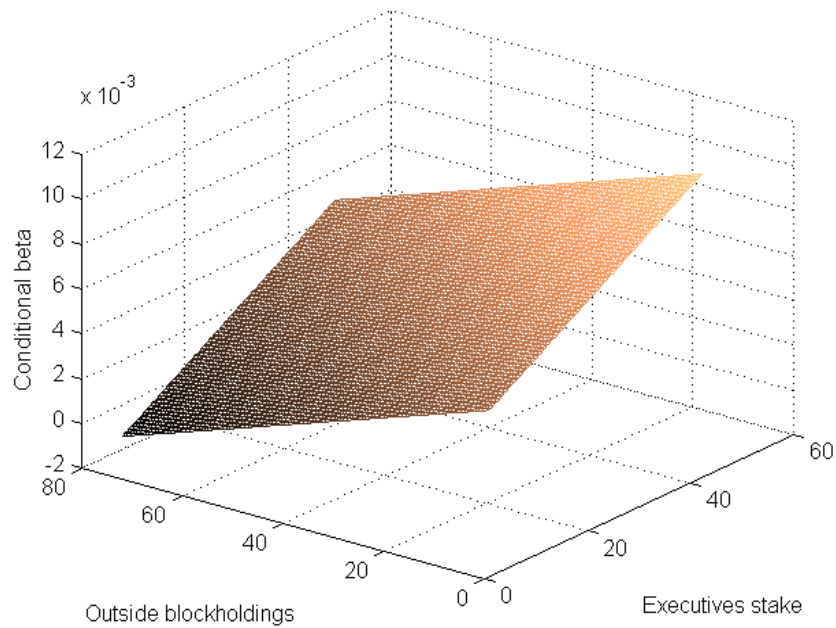
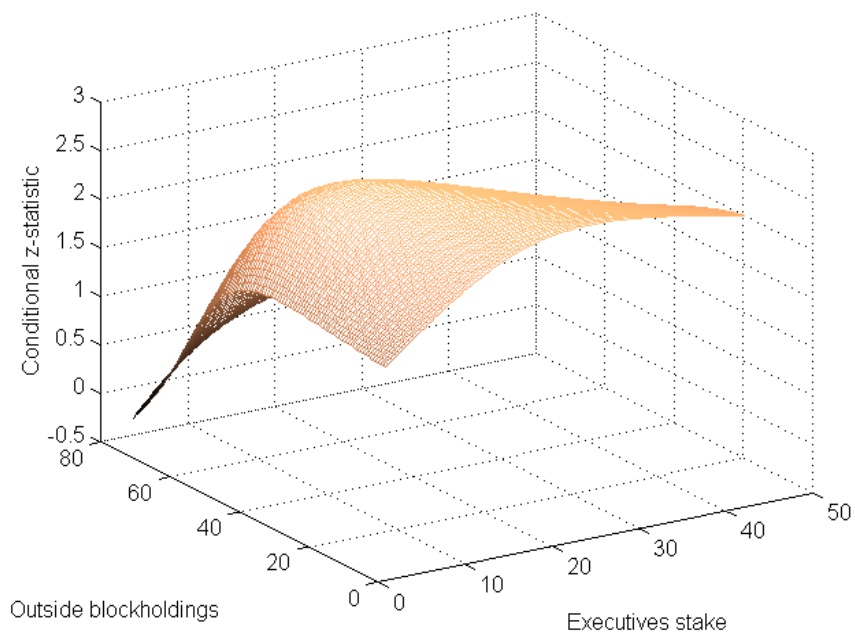


Figure 4. Significance of CEO monetary compensation-sensitivity with respect to the accounting-based corporate performance for various levels of ownership concentration.



Note: Values of the magnitude exceeding 1.96 are significant at 5% level (2-tail test).