Capital structure and managerial compensation: the effects of remuneration seniority

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Abstract

We show that the relative seniority of debt and managerial compensation has important implications on the design of remuneration contracts. Whereas the traditional literature assumes that debt is senior to remuneration, we show that this is frequently not the case according to bankruptcy regulation and as observed in practice. We theoretically show that including risky debt changes the incentive to provide the manager with stronger performance-related incentives ("contract substitution" effect). If managerial compensation has priority over the debt claims, higher leverage produces lower power-incentive schemes (lower bonuses) and a higher base salary. With junior compensation, we expect more emphasis on pay-for-performance incentives. The empirical findings are in line with the regime of remuneration seniority as the base salary is significantly higher and the performance bonus is lower in financially distressed firms.

Keywords: seniority of claims, remuneration contracts, financial distress, insolvency, leverage

JEL Classifications: G32, G33, G34, K12

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1 Introduction

During the 1990s, the use of performance-related compensation packages (based on direct ownership participation) increased dramatically (Murphy (1999)). Financial economists usually consider these forms of managerial compensation as the consequence of a rational attempt by shareholders to reduce the agency problems first illustrated by Jensen and Meckling (1976). The contemporaneous increase in the leverage of Anglo-American corporations has also stimulated interest in the role of debt as a direct incentive device for the management to generate stronger corporate performance (Baker and Wruck (1989), Smith and Watts (1992)).

In this paper, we study the link between remuneration contracts and debt and, more specifically, examine whether debt and incentive bonuses related to the firm performance are complementary in curbing agency conflicts between shareholders and managers. We show that including risky debt in the capital structure changes the "incentive to give incentives" by a principal in charge of managerial contracts. This principal usually is the compensation committee of the board of directors. Moreover, we show that the effect of debt on managers' remuneration depends on the relative priority with which the two claims would be paid if insolvency were to occur.

The question about the relative seniority of debt and remuneration is an important issue which has largely been ignored in the literature. For example, Innes (1990), Hart and Moore (1995), Berkovitch, Israel and Spiegel (2000) and Hart and Moore (1995) recognize that only "hard" (that is, senior and non-postponable) debt plays an important role in reducing managerial discretion. However, in reality, it is not always the case that managerial remuneration is junior to debt claims. Such an assumption may be acceptable for countries with pure liquidation bankruptcy codes, but cannot be generalized. The bankruptcy procedures of countries like the US, UK, Germany etc. make the seniority issue a complex problem. Let us first illustrate this point using UK (and US) regulation.

When a UK firm is insolvent and will be liquidated, the number of claims with preferential status is limited to payroll taxes, VAT and arrears in wages. These last claims are confined to those held by employees (excluding directors), and to GBP 800. Thus, top managers' claims based on salary and bonuses are not senior; they are part of the pool of unsecured claims and hence junior to all preferential debt (the floating and fixed debentures). The assumption in the theoretical literature that managerial remuneration is junior to all debt claims does not completely tie in with the insolvency practice of a liquidation code but is sufficiently close. However, there are many cases in which the managerial remuneration claims are senior to leverage.

First, in case of insolvency, the holder of a floating charge (for a more detailed discussion of UK bankruptcy, see Appendix B) can appoint a receiver who will liquidate the firm's floating assets on his behalf. However, instead of liquidating the firm, the receiver can also exercise another option: he can continue the business if the proceeds of continuation are expected to exceed those of a liquidation. If this were the case, the managerial remuneration contracts (and the arrears remuneration and bonuses) remain valid. A continuation of the business (taken out of the corporate shell) or sale to a third party triggers the "Transfer of undertakings protection of employment" regulations of 1981 (TUPE) which stems from the European Acquired Rights directive. This regulation states that "all the [seller's] rights , powers, duties and liabilities under or in connection with [an employee's contract of employment], shall be transferred to the [buyer]." Furthermore, the buyer assumes liability for "anything done

before the transfer is completed by or in relation to the [seller] in respect of that contract or a person employed in that undertaking or part". TUPE states that such an act "shall be deemed to have been done by or in relation to the [buyer]."

Second, another possibility is that the receiver sells one line of business to pay the secured creditors. At that point, the receiver ceases to act (he only works on behalf of the holders of the floating charge). If the firm is subsequently no longer insolvent, the company is again in the hands of the directors whose remuneration contracts remain valid.

Third, an alternative (in the UK) to the above creditor-oriented receivership is the debtor-oriented 'administration' procedure. In this case, the court supervises a formal workout (financial and/or asset restructuring) with the aim of corporate survival. If the incumbent management is essential for the firm and is maintained after the implementation of the reorganization plan, the claims of past remuneration may still remain valid (or may even be increased). This happened, for example, in the collapse of Barings bank. Likewise, "E&Y, which was appointed as administrator for Railtrack in October 2001 [. . .], took the decision to pay Richard Middleton £700,000 for six months' work to prevent him from leaving the troubled rail group. [. . .] Mr Middleton was one of three directors responsible for the network's safety. E&Y feared that, without his expertise, the network could be plunged into chaos. The engineer, who was involved in the disastrous upgrade of the West Coast Main Line, received a pay rise that included a doubling of his salary of £168,000, a hefty retention bonus and a year's salary for loss of office" (The Times, 23 June 2003).

As a US example, the Regus case shows that in a formal workout, the employees' remuneration contracts (including bonuses) are preserved[1] in spite of very poor past performance resulting in insolvency and Chapter 1 (the US equivalent to UK administration (Franks and Torous (2002))).

Fourth, there are numerous cases which show that management foresees insolvency and still manages to time the payment of substantial bonuses such that its remuneration is effectively senior to debt claims (by paying them out shortly before the corporate collapse). For instance, EuroTelecom collapsed in February 2001, eleven months after raising GBP 15 million through an AIM flotation[2]. Likewise, the UK management of Enron[3] and of NTL[4] cashed in their bonuses shortly before the collapse. Alternatively, in the wake of a corporate

[1] "Regus PLC which filed for Chapter 11 bankruptcy [. . .], is asking a bankruptcy court to allow it to make retention and severance payments to keep selected employees on board while it reorganizes. The company said the value of its business "cannot be preserved and maximized for the creditors' benefit without the employees critical to the operation of those businesses" [. . .] The company is also seeking to establish a general pool of $100,000 for discretionary bonuses to workers not initially covered under the plan. According to the motion, the plan would allow Regus to pay its four most senior U.S. corporate executives [. . .] half their bonuses, equal to 20% of their base salaries [. . .]. The remaining bonuses, also equal to 20% of salaries, would be paid by Jan. 31, 2004, subject to a performance review [. . .]. The company would also assume the executives' current employment contracts, which call for potential bonuses of up to 40% of their salaries. Regus has also proposed to pay the executives one year's base salary as severance plus all deferred or unpaid benefits under the plan. (Dow Jones Corporate Filings Alert, 15 January 2003).

[2] "[The BDO accountants] disclose[s] that on November 6, 2000 three cheques of GBP 50,000 were made out and entered in the cash book as "directors' bonuses in favour of" Mr Derry, Mr Linell and another director, Andy Krawchuk". (The Guardian, 31 March 2001).

[3] "Senior executives at the London subsidiary of collapsed US energy trader Enron received at least GBP 500,000 in cash bonuses weeks before it went into administration." (Scotland on Sunday, 24 March 2002).

[4] "Barclay Knapp, the chief executive of the troubled cable company NTL, was awarded a $561,138 (£382,768) bonus for his work in 2001 as the company lurched towards bankruptcy" (The Independent, 31 May 2002).

crash, top management can make the firm sign a new contract including generous severance payments (as in the Marconi case[5]).

Not only the evidence above supports the idea that debt is often "soft" compared to managerial compensation. Firms are sometimes able to keep parts of their subsidiary's profits out of reach of creditors. For example in the case of the bankruptcy filing of the US utility Pacific Gas and Electric it became clear that its profits were transferred to its subsidiary National Energy Group, allowing the management to enjoy performance bonuses even in a situation very close to financial distress of one subsidiary. "Pacific Gas and Electric transferred $ 4.1 billion between 1997 and 1999. Most of this went to dividends and stock repurchases, but $ 838 million was invested in other subsidiaries, primarily its National Energy Group unit. [. . .] 'Executives of the companies say the transfers were proper. Audits have shown that "we followed the rules and didn't do anything wrong" ('While a Utility May Be Failing, Its Owner is Not', The New York Times, 30 April 2001)[6].

These are only some of the numerous cases in which top management is able to safeguard their base salary and bonuses by timing those payments well, by relating bonuses to the performance of subsidiaries where performance is amassed (at the expense of other subsidiaries) or by redisigning contracts (with substantial severance payments) even when the firm is close to insolvency. The research question as to how the relative seniority structure of managerial compensation and debt contracts determine the managerial incentives constitutes a contribution to the theoretical literature as this has – to our knowledge – not been addressed. Therefore, in this paper we theoretically analyze and empirically test the effect of, respectively, senior and junior debt on the choice of managerial incentive contracts (assuming the financing decision is taken prior to managerial contract negotiation). We show that the pay-for-performance sensitivity decreases with leverage, while the base salary increases with leverage, when debt is considered to be junior to compensation in case the firm enters a bankruptcy procedure. With senior debt, we find opposite relations.

These results are obtained from the following principles. First, at the moment of designing the compensation package, the existing capital structure determines the "incentive to give incentives" by the remuneration committee of the board of directors when it acts in the interest of the existing shareholders: this effect by itself changes the optimal contract a shareholder-principal offers the managers for different levels of debt in the capital structure. Secondly, for a given level of leverage, the degree of protection of the management pay against creditors' claims on corporate value changes the payment the manager would receive in the case of insolvency. Therefore, the relative seniority of debt versus compensation influences the management's incentives to put effort into the firm.

[5] Lord Simpson of Dunkeld (CEO) managed to extract a severance pay of GBP 2.2 million. "It was hardly news, in August, that Marconi was in trouble. Simpson knew this when he entered into negotiations with those supine non-executives on the remuneration committee. So did they. But both parties signed." (The Times, 29 September 2001).

[6] Consider Global Crossing: "[T]he US telecoms giant's board signed what must be among the most generous employment contracts of all time. On joining the company, Robert Annunziata, chief executive, was handed a $10 million (Euro 12 million) signing bonus, options on two million shares with an exercise price $10 below market value, and "guaranteed annual bonus" worth another $500,000. His contract also specified the make and model of Mercedes the company would purchase for him, sanctioned the use of the corporate jet, and agreed to pay for first class air travel for his entire family, including his mother. Annunziata lasted 53 weeks in the job, but amassed no less than $151m in pay. As has now become clear, the board's pay policy failed to buy performance" (The Financial News, 4 February 2002).

The fact that compensation is paid with priority over the debt claims if the firm is insolvent has two implications. First, the base salary is partly paid by the debtholders whenever the firm is in financial distress: the shareholders do not suffer the entire cost of offering a high base salary to the management. Secondly, higher managerial effort decreases the likelihood the firm will be insolvent, thus increasing the value of debt claims. Why then should the shareholders, who enjoy positive profits only in good states of the world, give up a substantial part of these profits in the form of high incentive bonuses when part of the advantage of the higher effort will be cashed-in by the debtholders? The consequence of these two effects is that shareholder-principal offers the agent-manager a lower performance bonus in highly levered firms.

On the contrary, when the base salary is subordinated (i.e. junior) to debtholders' claims in a bankruptcy procedure, leverage acts as a direct incentive device to enforce higher managerial effort, as in Innes (1990), Dewatripont and Tirole (1994), Hart and Moore (1995) (the so-called "incentive effect"). This is because the agent-manager is implicitly made a residual claimant by the presence of senior debt, committing her to a choice of high effort. On the other hand, under this regime, leverage reduces the resources free from debt service which can then be allocated to the management (Berkovitch, Israel and Spiegel (2000): the "cash-flow effect"). When the incentive effect prevails over the cash-flow effect, the principal has to reward the management with a greater bonus as leverage increases. In this sense, we prove that "hard" debt and junior incentives are complementary.

We also test the theoretical predictions of our model empirically using a sample selection model (type-2 Tobit model). The selection equation selects the firms where a new CEO has been appointed and the regression equation captures the relation between the CEOs monetary remuneration and pre-existing debt. As the relative seniority of debt and performance contracts are especially important in case of financial distress, we pay special attention to subsamples of poorly performing firms. Studying a UK data panel over 1988-93 (pre-Greenbury), for which we cannot distinguish between base salary and performance bonus, we find a positive relation between total remuneration and lagged leverage for poorly performing firms in financial distress. However, from a second sample of the 510 largest UK firms by market capitalization in 1997-98 (post-Greenbury) we observe that the base salary is significantly higher for poorly performing firms in financial distress, while the performance bonus is lower. The net effect of total monetary remuneration is (marginally) positive (as for the pre-Greenbury period). These findings confirm our predictions in the case where remuneration is effectively senior to debt contracts, as we have motivated with the insolvency regulation and the cases above.

The present paper is organized as follows. Section 2 presents the general model. In section 3, we study the choice of managerial remuneration contract by the shareholders in the two different cases of seniority of (a) the manager remuneration claims and (b) the debt claims. In section 4, we collect the empirically testable implications of the model. Section 5 describes the data and methodology of the empirical study and section 6 discusses the empirical results. Section 7 concludes. Appendix A collects the proofs while appendix B details the UK bankruptcy procedures.

2 The model

Consider a firm operating in two periods $t = 1, 2$. At date $t = 1$, a principal P (typically the remuneration committee of the board of directors) offers a contract specifying a compensation scheme to a manager A and then delegates to her the business activity. As in the standard principal-agent model, the principal cannot monitor the manager's actions, but he can exactly observe (and verify through a legal procedure and hence write contracts upon) the realization of the firm cash flows at $t = 2$[7]. P offers A a state-contingent, complete contract $w(q)$ specifying the payment she will get at the final date $t = 2$ for any realized cash flow $\widetilde{q}$. We allow her to compensate the agent only through monetary payments, excluding any other form of remuneration (shares or option plans, promotions or perks).

We will consider a risk-neutral principal and a risk averse agent. If the manager accepts the contract at $t = 1$, she then chooses a non-verifiable effort level, e in an interval $\Lambda = [0, \overline{e}]$, that affects the probability distribution of the final cash flows. We assume for simplicity that, at $t = 2$, the firm can only produce a high cash-flow q_1 or a lower cash flow q_0[8] without any earnings maturing at time one. For the moment, we assume that, once in place, the manager cannot change the pre-existing capital structure, which is given at the moment of the contract negotiation. We will discuss later on how the results change when this assumption is removed, and the hired manager can change the capital structure of the firm at date 1.

At the last stage, the realized cash-flow of the firm $(q_i)_{i=0,1}$ is distributed to the different claimholders (including the agent) according to their respective claims and following a pre-specified, law-enforced rule of priority.

Assumption 1: *The cash-flow of the firm at $t = 2$ is a two-states random variable distributed according to $p(e) = \Pr(q_1; e)$ where $p(e)$ is assumed to be continuous in e, weakly increasing and weakly concave.*

Assuming that $p(e)$ is weakly increasing and concave guarantees that both Monotone Likelihood Ratio Property (MLRP) and Cumulative Distribution Function Convexity (CDFC)[9] properties are verified[10], so that we can be sure that the first-order condition of the agent problem only picks up global optima (Holmstrom (1979), Rogerson (1985)).

All the information about the firm returns and the contract with the agent is commonly known at time 1 by all individuals.

We make the following assumption on the preferences of the agent:

Assumption 2: *The agent's utility function in his remuneration and his action is $U(e, w(y))$ and it can be written as $(u(w_1)p(e) + u(w_0)(1 - p(e)) - c(e)$ where $c(e)$ is in-*

[7] One could criticize the complete contracting approach in the sense that the possibility exists for the agent to manipulate the realized cash-flows, for example via some accounting procedures.

[8] If the firm has liquid assets-in-place L at time zero, which can be turned into cash at $t = 2$, and whose market value at time 2 is independent of managerial effort, we include them in q. Hence, q is a composite measure of both the firm liquid assets-in-place and project cash-flows, with the difference that the $t = 2$ value of the latter is affected by the effort the manager chooses previously.

[9] The MLRP holds if the likelihood ratio $\frac{p_i(e)}{p_i(e')}$ is non-decreasing in the state i, given any two actions e, e' in the set Λ and given that action e is more expensive to be implemented in first-best, i.e. $C^{FB}(e') \leq C^{FB}(e)$. The CDFC requires that the distribution function $P(q, e)$ is convex in the action e.

[10] See Result A in the Appendix for a formal proof of this statement.

creasing, twice continuously differentiable and strictly convex in e. Moreover, $c' > 0$, $c'' > 0$, $c(0) = 0$, $c'(0) = 0$.

The solution of the model involves two subsequent steps: at $t = 1$ the choice of the optimal remuneration contract by the principal P; and successively the optimal effort choice by the agent A once he has signed the contract. Since the individuals are perfectly rational and have complete knowledge of the model, we can analyze the sequence of the events by working recursively. We first describe the agent's choice of effort.

Given the state-contingent, complete contract (w_0, w_1), A solves the following problem:

$$\max_{e \in [e_{\min}, e_{\max}]} u(w_1)p(e) + u(w_0)(1 - p(e)) - c(e) \tag{A}$$

At time $t = 1$, the principal P (the remuneration committee) chooses the contract that maximizes the shareholders' value: in doing this he has to take as given the incentive compatibility constraint (IC) generated by the unobservable choice of effort by the agent.

Let $D \geq 0$ be the face value of the existing debt in the capital structure of the firm with maturity $t = 2$. The problem of optimal-contract is

$$\begin{aligned} & w_i^* \in \arg\max_{w_0, w_1} \; V^E \\ & s.t. \quad \begin{array}{ll} p(e)u(w_1) + (1 - p(e))u(w_0) - c(e) \geq \overline{U} & (IR) \\ e(w_i) \text{ is the solution to (A) given } w_i^* & (IC) \end{array} \end{aligned} \tag{P}$$

where, assuming no discount and risk-neutral shareholders, the value of equity is[11]:

$$V_E = p(e(w_0^*, w_1^*)) \max\{q_1 - w_1^* - D; 0\} + (1 - p(e(w_0^*, w_1^*))) \max\{q_0 - w_0^* - D; 0\}$$

where IR is the participation constraint for the agent.

2.1 Some preparatory results

By assumption 1 on $p(e)$, we can substitute the incentive compatibility constraint (IC) with the first order condition (f.o.c.) in the effort choice whenever IC is binding[12] (Rogerson (1985)). Given the contract payments (w_0, w_1) the agent solves:

$$e \in \arg\max_{\widehat{e} \in [0, \overline{e}]} \; p(\widehat{e})u(w_1) + (1 - p(\widehat{e}))u(w_0)$$

and the global maximum is characterized by:

$$p'(e)\,(u(w_1) - u(w_0)) = c'(e) \tag{1}$$

The characterization of the choice of effort by the agent allows us to determine some properties of the optimal contract problem.

[11] Given that the information is symmetrically distributed across all individuals, all the investors can anticipate rationally the decisions of P and A and then can correctly price their claims on the firm payoffs. With no discount and risk-neutrality all the claims are priced under the risk-neutral probability $p(e)$.

[12] In our framework IC is not binding for the implementation of $e = 0$: in that case P can fully insure A paying a fixed wage w^{fi} at which IR is binding (Grossman and Hart (1983)).

Assumption 3: $\overline{U} > \frac{c'(\overline{e})}{p'(\overline{e})}p(\overline{e}) - c(\overline{e})$; $q_0 - u^{-1}\left(\overline{U}\right) > 0$;
$q_1 - u^{-1}\left(\overline{U} + c(\overline{e}) + \frac{c'(\overline{e})}{p'(\overline{e})}\left(1 - p(\overline{e})\right)\right) > q_0$.

Lemma 1: *Under Assumption 1,2, and 3, for any* $e \in [0, \overline{e}]$*:*
(i) IR is always binding, and each action can be induced with positive payments to the agent; moreover, the higher the agent's reservation price for action e, (in the sense of higher $C^{FB}(e)$*), the (weakly) higher* w_1*, and the (weakly) lower* w_0 *necessary to implement such an action e.*
(ii) for any given action $e > 0$ *P wishes to implement, the higher* w_0*, the higher the bonus* $b = w_1 - w_0$ *that he has to pay to the agent in state* q_1*.*
Proof: See the Appendix.

Corollary 2 *(co-monotonicity of payoffs of A and P): a compensation scheme* $(w_0(e), w_1(e))$ *satisfying IR and s.t.* $w_0(e) > w_1(e)$ *is never optimal for P whenever* $q_1 - w_1(e) > q_0 - w_0(e)$*.*
Proof: See Grossman and Hart (1983), Proposition 4.

Assumption 3 and Lemma 1 have two important consequences: first, they guarantee that adding limited liability constraints on the agent and on the principal do not change our results; secondly, they allow us to order the set of payments the principal has to offer in order to induce any action e:

$$\begin{aligned} 0 &< q_0 - w_0^{fi} < q_0 - w_0^{\min} < q_0 \\ 0 &< q_1 - w_1^{\max} < q_1 - w_1^{fi} < q_1 \end{aligned}$$

2.2 The optimal contract in an all-equity firm

If no debt with maturity $t = 2$ is present in the capital structure of the firm at the moment of the contract negotiation, the principal solves the following problem at $t = 1$:

$$\begin{aligned} e^0 \in \arg\max_e \;\; & V^E = p(e(w_1))\left(q_1 - w_1\right) + \left(1 - p(e)\right)\left(q_0 - w_0\right) \\ s.t. \quad & w_0(e) = h\left(\overline{U} + c(e) - \frac{c'(e)}{p'(e)}p(e)\right) \\ & w_1(e) = h\left(\overline{U} + c(e) + \frac{c'(e)}{p'(e)}\left(1 - p(e)\right)\right) \end{aligned} \tag{2}$$

where the function h denotes u^{-1}.

Assumption 4 *The utility function of the agent and the probability* $p(e)$ *are such that* $-p(e)h(\overline{U} + c(e) + \frac{c'(e)}{p'(e)}\left(1 - p(e)\right))$ *is concave in* $e \in [0, \overline{e}]$*.*

Under Assumption 1-4 this problem is a concave problem (Laffont and Martimort (1999)) whose solution is then characterized by its first order condition:

$$p'(e^0)(q_1 - q_0) = \frac{\partial C^{SB}(e)}{\partial e} \tag{3}$$

where $C^{SB}(e)$ is the cost for the principal to implement action e under moral hazard (second-best cost): $C^{SB}(e) = p(e)w_1(e) + (1 - p(e))w_0(e)$.

Proposition 1: *The optimal contract under full-equity financing induces the effort* e^0 *such that* $q_0 - w_0(e^0) \geq q_1 - w_1(e^0)$ *and it is characterized by the following equality:*

$$p'(e^0)(q_1 - q_0) = p'(e^0)(w_1(e^0) - w_0(e^0)) + p(e)(1-p(e))\frac{c''(e)p'(e) - c'(e)p''(e)}{(p'(e))^2}\left(h'(\overline{u}) - h'(\underline{u})\right)$$

Proof: See the Appendix.

Proposition 1 allows us to fix the benchmark solution of the optimal contract in the case of full-equity financing of the firm. We now move to check how the presence of debt in the capital structure affects the choice of contract by the principal.

3 The relative seniority of compensation versus debt

Since the equity claims are junior to both debt and to managerial monetary compensation, the equityholders receive a positive payment only in case the firm payoff q_i exceeds $w_i + D$, regardless of the relative seniority of debt and remuneration. From the objective function in (P), one can immediately see that it changes non-linearly with the debt due at $t = 2$, D[13]. Therefore, it is clear that the optimal contract (w_i^*) chosen by P will depend on D. We call this effect of capital structure on the managerial compensation the "*contract substitution*" effect.

In this section, we show that the relation between the remuneration contract and leverage depends on the relative degree of law-enforced seniority of the compensation versus debt. In many existing papers on managerial compensation (Innes (1990), Dewatripont and Tirole (1994), Robe (1999), Berkovitch, Israel and Spiegel (2000)), the management remuneration is considered junior to the debt claims. Such an assumption does not completely tie in with reality as the introduction demonstrates. Our objective here is not to discuss whether top-management compensation can be considered as junior or senior to debt in case of a bankruptcy procedure, but to show that this relative seniority is the all-important variable to understand the effect of leverage on compensation.

3.1 Debt is subordinated to managerial compensation

With managerial remuneration being senior to debt, the agent's problem (A) is not affected by D: the f.o.c. (1) holds for any $D > 0$ as well. What matters for the choice of the optimal contract is only the change in the payoff function for the principal.

Suppose that in the pre-existing capital structure of the firm there is debt $D > 0$ that has to be repaid at $t = 2$. The payoff function of P at $t = 1$ becomes:

$$\begin{aligned} & p(e)\max\{q_1 - w_1 - D; 0\} + (1-p(e))\max\{q_0 - w_0 - D; 0\} \\ = \;& Ben(e;D) - C^{SB}(e) \end{aligned}$$

where

$$\begin{aligned} Ben(e;D) &= p(e)\max\{q_1 - D; w_1\} + (1-p(e))\max\{q_0 - D; w_0\} \\ C^{SB}(e) &= p(e)w_1 + (1-p(e))w_0 \end{aligned}$$

[13] With a continuum set of states higher leverage reduces the states in which equity value is positive, making the function $(q_i - w_i^* - D)$ convex in the states i.

is the benefit for the principal when action e is induced, while $C^{SB}(e)$ is the second-best cost for implementing such action. The fact that the agent's problem is invariant to D has an important consequence: a positive D does not create any direct incentive effect on the agent's effort.

Our purpose is to characterize how the solution of the following problem changes with $D > 0$:

$$\max_{e} \; Ben(e; D) - C^{SB}(e) \tag{4}$$
$$s.t. \quad \begin{aligned} w_0(e) &= u^{-1}\left(\overline{U} + c(e) - \tfrac{c'(e)}{p'(e)}p(e)\right) \\ w_1(e) &= u^{-1}\left(\overline{U} + c(e) + \tfrac{c'(e)}{p'(e)}\left(1 - p(e)\right)\right) \end{aligned}$$

Proposition 2: *If the agent's compensation is due with priority over the debt service in time 2 and if the solution of problem (2) is $e^0 > 0$, then, for $D > q_0$ we have that the solution of (4) is $e^D < e^0$, $w_0^D > w_0^0$, $b^D < b^0$.*

When risky debt is issued, the relative payoff of shareholders changes across states. They end up not paying the agent's compensation entirely in the low state as the fixed part, w_0, is partly paid by the debtholders in the case of insolvency. Proposition 2 suggests that the shareholder-principal transfers part of the cost of the remuneration contract to the debtholders through a higher base salary w_0 and a lower bonus. The cost of such a bonus accrues entirely to the shareholders but it produces benefits that they cannot fully internalize, since they are partly cashed-in by the debtholders. An increase of w_0 has a negative effect on the managerial effort (Lemma 1). Hence, if the management's compensation is protected against the debtors' claims, a principal P acting in the interest of existing shareholders will choose a lower pay-to-performance sensitivity contract, since the marginal cost of the bonus is now higher for that principal. Implicitly, he offers an insurance to agent A (the manager) at the expense of the debtholders.

According to Proposition 2, we should observe low-powered incentive contracts under this regime in firms with risky debt. We will test this empirical prediction in section 6; Smith and Watts (1992) confirm it in firms using traditional, monetary compensation packages.

Finally, note that the result of Proposition 2 does not change when we allow the manager to change the capital structure at time 1. The intuition is simple: when the managerial remuneration is totally senior to debt, any variation of the capital structure posterior to the contract negotiation has no effect on the utility the agent-manager gets at the optimum, making her indifferent towards the debt level.

3.2 Managerial remuneration is subordinated to debt

In the present model we have that the firm is insolvent if at time $t = 2$ the debt service and the managers' compensation exceed the generated cash flows. Thus, if the bad contingency q_0 realizes and $q_0 < D + w_0$, the firm is insolvent, and in such a case we assume the debtholders start a bankruptcy procedure that leads to the liquidation of the firms' assets. If the existing law does not give a preferential status to the managers' pay in case the firm is liquidated, we can assume that, in such event, the remuneration of the manager cannot exceed the amount $q_0 - D$.

This legal regime implies then that the wage the agent receives in state zero is directly affected by the amount of debt D.

The presence of risky debt[14] creates two direct effects on the choice of contract (as pointed out by Berkovitch, Israel and Spiegel (2000)):

1) an "incentive effect": higher D reduces the cash-flow in $s = 0$ which in turn reduces the maximum possible w_0. This forces A to exert a higher effort which must be remunerated with a higher w_1 (according to the participation constraint);

2) a "cash-flow" effect: higher D reduces the cash-flow in $s = 1$ available for compensation, that is the maximum possible bonus b. This makes it impossible for P to induce higher effort by the agent paying a higher bonus.

Given that for P is never optimal to implement actions $e > 0$ requiring $q_1 - w_1 < q_0 - w_0$ (Corollary 2), then for any $D \geq 0$, we have $q_1 - w_1 - D \geq q_0 - w_0 - D$. This in turn implies that increasing D we enter successively in the following regions:

(i) either e^0 is such that $q_1 - w_1 - D \geq q_0 - w_0 - D \geq 0$;

(ii) or e^0 would require a payment $w_0(e^0) > q_0 - D$ so that $q_1 - w_1 - D \geq q_0 - w_0 - D < 0$

In the first case, the optimal contract for the principal does not change with D.

In case (ii), the action e^0 is not implementable with any junior wage scheme: even if, as in Proposition 2, the principal would have an incentive to reduce the bonus due to the agent in the good state of the world, and to increase the base salary, this is not possible due to the direct incentive effect played by D. We arrive at the following result.

Proposition 3. *If the agent compensation is subordinated to the debt service at time 2 then* $e^D \geq e^{SB(0)}$ *and* $w_1(e^D) - w_0(e^D) \geq w_1(e^0) - w_0(e^0)$ *for* $D > q_0 - w_0(e^0)$.

With managerial compensation not protected against the debtholders claims in state zero, the optimal bonus is increasing in leverage. This occurs because debt acts as a direct incentive device (as in Innes (1990)), pushing the agent to a higher effort. Leverage and junior power-incentives are then complementary.

If we allow the agent to adjust the capital structure by issuing or retiring debt and equity after the contract has been signed (i.e. at $t = 1$), the problem becomes more complex. Still, we can observe the following: once the contract has been signed, the manager A will try to postpone the debt repayment (provided she has the right to adjust the capital structure), in order to increase the resources $q_i - D$ available for his own compensation. Anticipating this, the principal can afford to offer the manager more expensive contracts. Still, the result in Proposition 3 will hold albeit with a caveat: the debt D represents the final debt service, net of the change of the capital structure the manager performs at $t = 1$.

3.3 The optimal capital structure

Up to now, our analysis has considered as fixed the capital structure of the firm at the moment of the negotiation of the contract. The reason is that we wanted to highlight the effects of pre-existing debt on the new contracts that are stipulated. We motivate the choice of this timing observing that any firm is an ongoing economic entity in which managerial contracts are renewed, renegotiated, or created quite frequently. On the other hand, the decisions about the optimal capital structure play a more strategic role: in this sense, they can be

[14] That is, debt $D > q_0$ which cannot be totally repaid in case q_0 realizes.

considered as given when new contracts are issued. However, it is legitimate to ask what would be the capital structure that maximizes the ex-ante value of the firm if one anticipates the distortion generated by debt on the contract choice we have illustrated above.

Since we assume throughout the paper that the principal acts in the interest of existing shareholders it is immediate that all-equity financing is always optimal in our setup. In fact, in that case the ex-ante value of the firm coincides with the ex-ante value of equities, which is the objective function for P at the moment of the contract choice. The presence of debt in the capital structure can be explained by many reasons well-known in the literature, as tax advantages, but not modelled in the present paper.

Given this caveat, we can point out a difference between the two regimes of seniority. With debt senior to compensation (Proposition 2), the optimal contract reduces the incentive for the management to exert high effort, while in the opposite case (Proposition 3) it increases it. Senior, protected debt is then cheaper than junior debt: everything else being equal, our model predicts that firms operating in this last legal regime have higher leverage.

4 Empirical implications

From our theoretical analysis we derive the following empirically testable predictions, which we analyze in section 6:

1) The relative seniority of managerial remuneration and debt claims determines the managerial compensation schemes: when compensation is senior to debt in case of financial distress, higher leverage reduces the power incentives (performance bonus), but increases the basic salary.

2) If the relative priority of managerial compensation over debtholders' claims is left unspecified, the cost of debt should be higher than in a situation in which such a priority is legally enforced ex-ante.

Before turning to the description of the empirical methodology and its results, a last observation should be made. In the model, firm leverage always referred to risky debt that is to be repaid at the payoff date $t = 2$, that is at the moment the agent receives his compensation. In our setup, we assume that the firms have no liquid assets already in place. However, even if this were the case, our analysis would still hold if one considers D as debt service at $t = 2$ net of the liquidation value of the firm's assets at $t = 2$.

5 The empirical relation between managerial remuneration and leverage

5.1 Description of the samples

The first sample consists of 250 UK firms randomly drawn from the population of all companies quoted on the London Stock Exchange, excluding financial institutions, real estate companies and insurance companies[15]. The data panel extends over the period 1988-93, which is an interesting period for the following reasons: (i) it captures a recession (in which substantial performance-related top management replacement can be observed) and (ii) the data refer to the pre-Cadbury/Greenbury period (which has the advantage that we see more

[15] We are grateful to Julian Franks, Colin Mayer for providing us with pre-Greenbury data.

heterogeneity in new managerial contracts than in later periods)[16]. Thus, this recession period is characterized by lower corporate governance standards than more recent years, and is therefore particularly interesting from an agency-theory point of view. The sample (henceforth labeled the 'pre-Greenbury sample') also includes those firms that were taken over or went bankrupt but have at least 3 years of data available allowing us to capture the dynamics.

As we are particularly interested in managerial compensation contracts in poorly performing and financially distressed firms, we create a poor performance-subsample consisting of those firms in the above sample that are in the lowest decile of performance measured by abnormal returns in at least 2 years of the sample period. We extend this subsample (henceforth labeled the 'pre-Greenbury poor performance sample') by another 50 poorly performing firms according to the same criterion. This bringing the total number of poorly performing firms to ninety[17].

Prior to the introduction of the Greenbury code of conduct on remuneration practices in 1995-96, some remuneration data (the non-cash elements like stock- and option-grants) were not available and the detail of reporting was limited (base salary and bonus were not made public separately). That is why we also use a second sample taken from the post-Cadbury/Greenbury period in 1997-98 which consists of the 510 largest UK firms (by market capitalization)[18]. This sample is henceforth labeled 'post-Greenbury sample' and represents about 87% of the market capitalization of the London Stock Exchange.

5.2 Data sources and summary statistics

For the pre-Greenbury sample, all data on managerial compensation, turnover and board composition are retrieved from the Directors' Report and the Notes in the annual reports. The mean and median monetary compensation (salary and bonus) is around GBP 144,000 and GBP 149,000 (panel A of Table 1). The mean capital gearing (defined as long term-debt on total assets) equals 32.65%. Interest coverage (EBIT on interest charges) amounts to 12.4. Yearly ownership data both for existing and new shareholders for each year of the sample period was also collected from the Directors' Report and the Notes in the annual reports[19]. 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 usually exercise the voting rights. The status of the directors (executive/non-executive) and the dates of CEOs joining and leaving the board were also obtained from the annual reports. The mean CEO share stake of a randomly

[16] For the effect of the recommendations in the Cadbury corporate governance code of conduct on performance and turnover, see Dahya et al. (2002). The London Stock Exchange imposed the recommendation on all listed companies as of end of 1993. The Greenbury code of conduct of 1995 consists of a set of recommendations related to the remuneration of top managers.

[17] We also work with alternative subsamples of poorly performing firms which are close to financial distress (interest coverage below 2). We also check the robustness of results using alternative measures of poor performance: earnings losses combined with dividend cuts and omissions, and abnormal returns of less than minus 50% combined with earnings losses and dividends cuts and omissions.

[18] We are grateful to Martin Conyon and Graham Sadler for providing us with post-Greenbury data.

[19] Legal disclosure of ownership applies to all the directors' holdings greater than 0.1% as well as to other shareholders' stakes of 5% and more and of 3% and above (from 1990 when the statutory disclosure threshold was reduced). For equity stakes in Nominees accounts, the identity of the shareholders was found by contacting the listed firms directly. In 97% of these cases, the shareholders of Nominees accounts were institutional investors.

selected pre-Cadbury sample was 2.98%.

Panel B of Table 1 gives a more detailed account of CEO compensation in the post-Greenbury period[20]. Base salary in 1997 amounts to an average of GBP 271,000 (with a median of GBP 240,000). The bonus including other cash compensation averages GBP 143,000 (panel B of Table 1). As option grants and long term incentive plans grants average GBP 178,000 (with a median of zero), the average total CEO remuneration is GBP 591,000 (with a mean of 414,000). The leverage ratio (debt on total assets) is about 47% and the interest coverage averages 14.5. Panel B of Table 1 also shows that the average CEO holds 2.13% of the shares outstanding (with a median 0.05%). In addition, the average CEO has the right to obtain an additional average equity stake of 0.2% (median of 0.06%) by exercising options or long term incentive plans (LTIPs). The percentage of equity that those claims are translated into is calculated by multiplying the options (and of LTIP shares) as a percentage of all shares outstanding with their deltas. The delta reflects the change in the value of an option resulting from a change in the price of the underlying asset. The delta is close to one for deep-in-the money options and close to zero for deep-out-of –the money options[21].

[Insert Table 1 about here]

The median age of a CEO in a randomly selected firm (pre-Greenbury sample) is 52 years (with a mean of 52.6) and a median tenure equals 4 years (the mean equals 5.2)[22]. 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. In approximately 26% of the pre-Greenbury sample, CEO compensation is determined by a remuneration committee. The presence of such committees (postulated by the report) can alter compensation policies and eliminate the situation when the remuneration decision is largely influenced by CEOs themselves (Conyon (1994), Conyon et al. (1995)). The fraction of companies having such a committee is more than 95% in 1997-98.

As is typical for Anglo-American firms, ownership concentration is relatively low. The median Herfidahl-5 index equals only 0.028 (with a mean of 0.057). The median of the combined shareholdings of all executive directors (excluding 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.

Abnormal returns are calculated using the market model and are corrected for thin trading[23]. 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 (EBIT over book value of total assets) as

[20] It should be noted that the data in panels A and B of Table 1 are not directly comparable for two reasons: (i) in section 6.1 was pointed out that the pre-Greenbury sample is a random sample whereas the post-Greenbury sample includes the largest firms only and (ii) the time periods are different; they are 7 years apart (1990 vs 1997.

[21] For a thorough description of the methodology: see Conyon and Murphy (2000). Conyon and Sadler (2001).

[22] Tables with ownership concentration and director characteristics are available upon request.

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

accounting-based performance indicators. In order to control for (potential) size effects, we introduce the logarithm of total assets (in £ thousands) at the end of a given year. Finally, we measure risk by the annual volatility of stock returns, which is gathered from the London Share Price Database. The median and mean values amount to 34.39% and 37.43%, respectively.

5.3 Methodology

Our first sample consists of a data panel, but implementation of panel data econometrics like GMM-in-systems to investigate the relation between managerial remuneration and leverage induces biases as this relation is disturbed by the occasional departure of top management. Therefore, sample selection models are applied to analyze jointly the relations between executive compensation schemes and leverage, and between CEO turnover (c.q. the nomination of a new CEO) and its determinants. The model, often referred to as a type-2 Tobit model, is specified as follows:

$$\begin{aligned} & \left\{ \begin{array}{l} y^*_{1\ it} = X'_{1\ it}\beta_1 + \varepsilon_{1\ it} \\ y^*_{2\ it} = X'_{2\ it}\beta_2 + \varepsilon_{2\ it} \end{array} \right. \\ y_{1\ it} \;=\; & \left\{ \begin{array}{ll} 1 & \text{if } \; y^*_{1\ it} > 0 \\ 0 & \text{if } \; y^*_{1\ it} \leq 0 \end{array} \right. \\ y_{2\ it} \;=\; & \left\{ \begin{array}{ll} y^*_{2\ it} & \text{if } \; y^*_{2\ it} > 0 \\ 0 & \text{if } \; y^*_{2\ it} \leq 0 \end{array} \right. \end{aligned}$$

where $\{\varepsilon_{1\ it}, \varepsilon_{2\ it}\}$ are drawn from a bivariate normal distribution with mean 0, variances σ_1^2 and σ_2^2 , 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 $y^*_{1\ it}$ is observed and that $y^*_{2\ it}$ is observed only when $y^*_{1\ it} > 0$. Moreover, it is assumed that X_{1i} are observed for all i, but X_{2i} need not be observed for i such that $y^*_{1\ it} \leq 0$. Finally the two sets of explanatory variables, i.e. $X_{1\ it}$, and $X_{2\ it}$, 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 i 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.

Equation (1a) is the selection equation, while equation (1b) is referred to as a regression equation. The selection equation explains CEO replacement, i.e. $y_{1\ it} = 1$, corresponds to those firm-years when the CEO kept his position. The regression equation explains the compensation of such CEOs in the subsequent year. As the notion of compensation sensitivity 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)).

6 Remuneration contracts and financial distress

6.1 The managerial remuneration sensitivity to leverage

Table 2 shows the sample selection models explaining the sensitivity of top management remuneration to leverage. We examine this sensitivity for the total pre-Greenbury sample as well as for the subsamples consisting of (i) well performing firms, (ii) poorly performing firms and (iii) poorly performing firms in financial distress. Poor performance is defined as firms in the lowest abnormal return quintile. Financial distress is defined here as companies with an interest coverage below two because investment grade companies "typically have coverage ratios exceeding two times interest expense" (Copeland et al., 1995, p.178). The results of Panel A consist of the regression equations which capture CEO turnover or, in other words, the signing of a contract with a new CEO. Panel B excludes the structural break in remuneration (due to the new contracts) and examines the remuneration sensitivity to leverage for ongoing contracts.

[insert Table 2 about here]

The results of Panel A of Table 2 indicate that high leverage is not significantly related to managerial disciplining (the removal of the CEO) in the average and well performing firms. However, in line with earlier research (e.g. Dahya, McConnell and Travlos (2002)), we find that high leverage leads to CEO departures especially the case for poorly performing and financially distressed firms. Panel A of Table 2 also discloses that CEO turnover is negatively related to poor share price and accounting performance. The composition of the board of directors also has a significant impact on CEO removal: large boards lead to increased CEO turnover in the well performing firms. A high fraction of non-executive directors and separation of the functions of CEO and chairman facilitates the removal of the CEO both in well and poorly performing firms (specifications 1-4). These results are in line with the traditional corporate governance predictions stating that a high fraction of non-executive directors enhances the board's independence and fosters better monitoring. Furthermore, the fact that the CEO does not dominate the board as a chairman also reduces potential conflicts of interest and reduces agency conflicts. Whereas corporate size and risk are not related to CEO turnover, ownership concentration is correlated to turnover. We find evidence of insider entrenchment (as documented by e.g. Franks, Mayer and Renneboog (2001)): when insiders control large share blocks, the removal of top management is less frequent (specifications 1-3). The insignificant interaction terms with accounting returns indicate that insiders with large ownership stakes are able to successfully ward off any attempts to replace the CEO regardless of performance (specifications 1 and 2). Furthermore, there is some evidence that the presence of outside blockholders leads to increased managerial turnover in poorly performing samples (specification 3).

The regression equation (Panel B of Table 2) shows that industry-adjusted remuneration is not correlated to leverage for the total sample. However, we do find a positive relation

between total monetary remuneration and (lagged) leverage for poorly performing firms in financial distress[24]. The lack of detailed disclosure of remuneration contracts in the pre-Greenbury period does not allow us to test the relation between debt and remuneration in detail. If there is a positive relation between debt and base salary which dominates a negative relation between debt and bonus, the results are in line with the case in which remuneration is senior to debt. Vice versa, if that positive relation in Table 2 is the result of the fact that a positive debt-bonus relation dominates a negative debt-salary relation, the results support the case in which remuneration is junior to debt claims. The post-Greenbury period allows us to disaggregate the positive relation between debt and total monetary remuneration (see below).

With regard to the control variables, we find that remuneration increases with good share price performance and industry-adjusted accounting performance (specifications 1-4 in panel B of Table 2). There is no significant relation between board characteristics and the CEO's monetary remuneration with the exception of board size. We also find that, in line with the UK remuneration literature (amongst others; Conyon and Murphy (2000)), CEOs of larger firms enjoy significantly higher industry-adjusted cash compensation. Top management usually tries to justify – rightly so or not – size-related compensation by the fact that to manage larger firms, more managerial skills are needed which may be in short supply. Aggarwal and Samwick (1999), and Jin (2002) argue that in an agency framework, managerial risk aversion implies that firm risk moderates performance sensitivity of executive compensation. For the whole sample and the sample of well performing firms (specifications 1-2), we find some evidence of a risk-remuneration relation, but this is not corroborated for the poor performance samples (specification 3-4).

The remuneration equation (panel B of table 2) shows that when insiders hold large share stakes, the CEO's monetary remuneration is lower. It may be that CEOs deriving substantial wealth from their equity investment in their corporation, care less about their monetary income. Still, when the firm's stock performance (abnormal return) is low and the wealth of a CEO with a large ownership stake therefore decreases, the CEO is paid a relatively higher level of cash compensation (the interaction term in specification 1 of panel B). This implies that CEOs receive a higher monetary compensation in the wake of poor stock performance provided that they have strong voting power. It seems that managerial entrenchment not only eliminates the disciplining of poorly performing management but also introduces a pernicious remuneration incentive scheme. Specifications 3 and 4 show that insider control leads to higher monetary remuneration. This finding is consistent with a recently proposed "managerial power" approach to executive compensation (Bebchuk and Fried, 2003). In well performing companies (specification 2), insider ownership increases remuneration but only when stock prices rise. When outside shareholders hold large stakes, the monetary compensation of the CEO is lower.

[Insert Table 3 about here]

As we do not dispose of a data panel for the post-Greenbury period, we investigate the relation between leverage and the detail of remuneration (base salary in panel A of Table 3),

[24] Gilson and Vetsuypens (1993), Dial and Murphy (1995), and more extensively Murphy (1999) provide empirical evidence documenting that significant increases in junior bonuses arise in companies with high leverage.

bonus in panel B, and options and long term incentive grants in panel C) by testing differences in means for the samples of poorly performing, and of poorly performing and financially distressed firms by leverage quartile. While the first 3 panels are based on data from the post-Greenbury period, we use pre-Greenbury data (from Table 2) in panel D. The predictions of the theoretical model state that (1) when compensation is senior to debt in case of financial distress, higher leverage reduces the performance bonus, but increases the basic salary, and (2) for compensation junior to debt in case of financial distress, higher leverage increases the bonus and decreases the base salary. While the left hand side of panels A-C shows little relation between the differences in means of the base salary for different subsamples of poorly performing firms with similar leverage, more interesting findings are presented for poorly performing firms in financial distress (the right hand side). In line with prediction (1), we find that the base salary in the highest leverage sample is significantly higher than in the quartiles with lower leverage (panel A) but that the bonus in the lowest leverage quartile is significantly higher than that in quartiles 3 and 1. These results (and prediction (1)) are in line with a regime in which remuneration-related claims are more senior to debt related claims. This situation does not take place in case of liquidation receivership) but is the case when a firm enters the administration procedure or when management succeeds in making their claims de facto senior as described in Appendix B (transfer of undertakings protection of employees, contract renewal in the wake of insolvency, profit transfer to subsidiaries etc.). It is not surprising that we find results in line with prediction (1) for the right hand side of panels A and B as we focus there on firms for which the seniority structure of claims is likely to become a major issue as insolvency is near. Panel C shows no difference in option and LTIP values by leverage quartiles. Finally, the results of the pre-Greenbury data in panel D confirm those of Table 2: the total cash compensation is higher in distressed firms with high leverage, but the difference in means is weakly statistically significant at the 10% level. This marginal significance is not surprising as the relation between leverage, and - respectively - base salary and bonus is inverse (as shown in panels A and B).

7 Conclusion

This paper studies the effect of debt financing on managerial remuneration contracts assuming that the financing decision is taken at a point in time preceding the contract negotiation. While in previous theoretical research, the seniority of debt with regard to remuneration contracts in case of insolvency is a standard assumption, this paper contributes to the literature by questioning this issue. This paper documents that the relative seniority depends on the choice of bankruptcy procedures in case of insolvency and that there are several ways by which management can ensure its monetary compensation is de facto senior to debt even when insolvency is likely. Furthermore, we theoretically show that the effect of leverage on managerial compensation and effort depends on the relative seniority of compensation versus debt.

We show that changing the capital structure of the firm changes the incentive for a shareholder-principal to "give incentives" to the management ("*contract substitution*" effect). In particular, our model predicts that pay-for-performance sensitivity is negatively related with leverage (while the base salary increases with leverage) if managerial compensation has priority over the debt claims. The intuition of this result is that, whenever risky debt is

issued, the principal does not completely internalize the benefits of a higher incentive bonus (with respect to the bonus he would propose in a firm with 100 % equity financing) because these benefits are shared with the debtholders. This implies that in highly levered firms, we do expect a much weaker pay-for-performance relation and hence lower bonuses, than in low leverage firms. In contrast, when managerial remuneration is junior to debt claims, leverage has a direct incentive effect on the managerial effort, and is then complementary to an increase in the junior power-incentives, and to a reduction of the base salary. The reason is that an increase in senior debt financing triggers higher managerial effort, in turn requiring a higher performance-related managerial compensation in good states of the world.

Moreover, we argue that (risky) debt financing is more likely to be optimal when it is senior to the compensation claims. The intuition of this result is similar to Innes (1990) and Hart and Moore (1995) who claim that debt financing is a good instrument to enforce high effort by a residual claimant entrepreneur subject to limited liability.

We test the theoretical predictions using of two samples of UK data, one from the pre-Greenbury period (prior to 1996) and one post-Greenbury sample. In the first period, limited disclosure does not allow us to distinguish between the various components of managerial remuneration, but we observe a positive relation between leverage and total monetary remuneration. In the post-Greenbury sample, however, we dissect this relation into a positive relation between leverage and base salary and a negative one between leverage and performance bonus. These findings confirm the theoretical predictions in a world where managerial compensation is (de facto) senior to debt claims. We have documented that both bankruptcy regulation (c.q. administration or Chapter 11) and managers' ability to (re)write contracts making their pay senior to debt even in the wake of poor performance, apply to this case.

8 Appendix A (proofs)

Result A: *If $p(a)$ is weakly increasing and weakly concave, then it satisfies (MLRP) and (CFDC).*

Proof. Order the actions in $[0, \overline{e}]$ according to their reservation price $C^{FB}(e)$, higher effort requiring higher cost: for any couple $e', e \in [0, \overline{e}]$, let $e > e' \Leftrightarrow C^{FB}(e) > C^{FB}(e')$. By definition (see Grossman and Hart (1983)) such a cost is given by the minimum payment P has to guarantee to make A choosing the effort e when the effort choice is observable (first best):

$$C^{FB}(e) = u^{-1}(c(e) + \overline{U})$$

Restate (MLRP) for our two-states framework: $\forall e, e' \in \Lambda$ if $C^{FB}(e') \leq C^{FB}(e)$ then $\frac{p_i(e')}{p_i(e)}$ is non increasing in the state i (weakly decreasing; the states i have been ordered for increasing payoffs q_i). In a simple 2-states framework this means that for any couple $e', e \in [e_{\min}, e_{\max}]$, $e > e'$ we have $\frac{1-p(e')}{1-p(e)} \geq \frac{p(e')}{p(e)} \Rightarrow \frac{1-p(e)}{p(e)} \leq \frac{1-p(e')}{p(e')}$ that is verified for $p(e)$ (weakly) increasing in e.

(CDFC) requires that the cumulative distribution function is convex in e. With only two-states, calling $F(0; e) = \Pr(q_i = q_0; e) = 1 - p(e)$ and $F(0; \lambda e + (1-\lambda)e') = 1 - p(\lambda e + (1-\lambda)e')$, while $\lambda F(0; e) + (1-\lambda)F(0; e') = 1 - \lambda p(e) - (1-\lambda)p(e')$. Then (CDFC)$\Longleftrightarrow$ $F(0; \lambda e + (1-\lambda)e') \leq \lambda F(0; e) + (1-\lambda)F(0; e') \Longleftrightarrow \lambda p(e) + (1-\lambda)p(e') \leq p(\lambda e + (1-\lambda)e')$ that is guaranteed by (weak) concavity of $p(e)$. *Q.E.D*

Proof of Lemma 1: (i) Order the set $[0,\overline{e}]$ in the sense that the higher e has a higher $C^{FB}(e)$. Grossman and Hart (1983) (see their Proposition 11) prove that in a two-outcomes moral hazard problem the participation constraint is binding for all e: hence, putting together (IR) and (1):

$$w_0 = u^{-1}\left(\overline{U} + c(e) - \frac{c'(e)}{p'(e)}p(e)\right) \tag{5}$$

$$w_1 = u^{-1}\left(\overline{U} + c(e) + \frac{c'(e)}{p'(e)}(1-p(e))\right) \tag{6}$$

and since

$$\frac{\partial w_0}{\partial e} = \frac{1}{u'}\frac{\partial\left(c(e)-\frac{c'(e)}{p'(e)}p(e)\right)}{\partial e} = \frac{1}{u'}\left(c' - c' - p\frac{c''p'-c'p''}{p'^2}\right) = -\frac{p}{u'}\frac{c''p'-c'p''}{p'^2} \leq 0$$

$$\frac{\partial w_1}{\partial e} = \frac{1}{u'}\frac{\partial\left(c(e)+\frac{c'(e)}{p'(e)}(1-p(e))\right)}{\partial e} = \frac{1}{u'}\left(c' - c' + (1-p)\frac{c''p'-c'p''}{p'^2}\right) = \frac{1-p}{u'}\frac{c''p'-c'p''}{p'^2} \geq 0$$

if we require $\overline{U} + c(\overline{e}) - \frac{c'(\overline{e})}{p'(\overline{e})}p(\overline{e}) > 0 \Rightarrow \overline{U} > \frac{c'(\overline{e})}{p'(\overline{e})}p(\overline{e}) - c(\overline{e})$ we have that the agent will always receive a strictly positive payment in state q_0. All lower actions require a base salary (weakly) higher than $\overline{U} + c(\overline{e}) - \frac{c'(\overline{e})}{p'(\overline{e})}p(\overline{e})$, since w_0 is decreasing in e.

To induce $e = 0$ a performance-independent salary is required (P provides full insurance to the agent): $w_0(0) = w_1(0) = w^{fi} = u^{-1}\left(\overline{U} + c(0)\right) = u^{-1}\left(\overline{U}\right)$. This is the highest base salary (and the lowest w_1) the agent can receive: imposing $q_0 - w^{fi} > 0$ guarantees that the resources created by the firm in state 0 are enough to fully insure the agent.

Finally, since w_1 weakly increases in e, the maximum payment the agent receives in state 1 corresponds to $w_1^{\max} = u^{-1}\left(\overline{U} + c(\overline{e}) + \frac{c'(\overline{e})}{p'(\overline{e})}(1-p(\overline{e}))\right)$: letting $q_1 - w_1^{\max} > 0$ guarantees that the principal can always afford to implement $\overline{e}$.

(ii) Consider again (1): $\frac{c'(e)}{p'(e)}$ is increasing in e by Assumptions 1-2. Hence, the difference $u(w_1) - u(w_0)$ required to implement any given e is increasing in e.

Given the concavity of u, for any $w_1 - w_0$, $u(w_1) - u(w_0)$ is higher the lower is w_0. For P it is always convenient to reduce w_0 at the minimum level and then fix w_1 such that $u(w_1) - u(w_0) = \frac{c'(e)}{p'(e)}$. Formally, if we denote with $b = w_1 - w_0$ the performance bonus, from(1) we have: $u(w_0 + b(w_0)) - u(w_0) = \frac{c'(e)}{p'(e)} = k(e)$ so that, keeping e constant and varying w_0 we get that

$$u'(w_1)(1 + \frac{\partial b}{\partial w_0}) - u'(w_0) = 0$$

$$\frac{\partial b}{\partial w_0} = \frac{u'(w_0)}{u'(w_1)} - 1 > 0$$

by strict concavity of $u(w)$. *Q.E.D.*

Proof of Proposition 1: The result $q_0 - w_0(e^0) \geq q_1 - w_1(e^0)$ derives directly from Corollary 2, noticing that, if $e = 0$ is optimal for P, then $w_0 = w_1 = w^{fi}$ while, for any $e > 0$, $w_1(e) > w_0(e)$ by Lemma 1. From Assumption 4, the f.o.c. (3) is necessary and sufficient to

characterize the solution in e; then computing explicitly $\frac{\partial C^{SB}(e)}{\partial e}$:

$$\begin{aligned}
\frac{\partial C^{SB}(e)}{\partial e} &= p'w_1 + p\frac{\partial w_1}{\partial e} - p'w_0 + (1-p)\frac{\partial w_0}{\partial e} \\
&= p'(h(\overline{u}) - h(\underline{u})) + p\left(h'(\overline{u})(1-p)\frac{\partial \overline{u}}{\partial e} - h'(\underline{u})p\frac{\partial \underline{u}}{\partial e}\right) + h'(\underline{u})\frac{\partial \underline{u}}{\partial e} \\
&= p'(w_1 - w_0) + p\frac{c''(e)p'(e) - c'(e)p''(e)}{(p'(e))^2}\left(h'(\overline{u})(1-p) + h'(\underline{u})p\frac{\partial \underline{u}}{\partial e}\right) - ph'(\underline{u})\frac{c''(e)p'(e) - c'(e)p''(e)}{(p'(e))^2} \\
&= p'(w_1 - w_0) + p(1-p)\frac{c''(e)p'(e) - c'(e)p''(e)}{(p'(e))^2}\left(h'(\overline{u}) - h'(\underline{u})\right)
\end{aligned}$$

where for brevity $p = p(e)$, $h(\overline{u}) = w_1$, $h(\underline{u}) = w_0$ denoting with $h = u^{-1}$ and $\overline{u} \equiv \overline{U} + c(e) + \frac{c'(e)}{p'(e)}(1 - p(e))$, and $\underline{u} \equiv \overline{U} + c(e) - \frac{c'(e)}{p'(e)}p(e)$. *Q.E.D.*

Proof of Proposition 2: For levels of debt $D \leq q_0 - w_0(e^0)$ the solution of (4) coincides with the solution of (2) since $Ben(e; D) = Ben(e; 0)$. For $D > q_0 - w_0(e^0)$ the objective function for the principal changes: shareholders get zero in state q_0. The objective for P when $D \in [q_0 - w_0(e^0), q_1 - w_1(e^0)[$ becomes:

$$p(e)(q_1 - w_1(e) - D)$$

that, at $e = e^0$ values $p(e^0)(q_1 - w_1(e^0) - D)$. Since both $p(e)$ and $w_1(e)$ are continuous and differentiable in e, check

$$\frac{\partial p(e^0)(q_1 - w_1(e^0) - D)}{\partial e} = p'(e)(q_1 - w_1(e^0) - D) - p(e^0)\frac{dw_1(e^0)}{de} \tag{7}$$

and by optimality of e^0 we have (Proposition 1):

$$\begin{aligned}
p'(e)(q_1 - q_0) &= p'(e^0)w_1(e^0) + p(e^0)\frac{dw_1(e^0)}{de} - p'(e^0)w_0(e^0) + \left(1 - p(e^0)\right)\frac{dw_0(e^0)}{de} \\
p(e^0)\frac{dw_1(e^0)}{de} &= p'(e)(q_1 - q_0 - w_1(e^0)) + p'(e^0)w_0(e^0) - \left(1 - p(e^0)\right)\frac{dw_0(e^0)}{de}
\end{aligned}$$

and substituting into (7):

$$\frac{\partial p(e^0)(q_1 - w_1(e^0) - D)}{\partial e} = p'(e)(q_0 - D) - p'(e^0)w_0(e^0) + \left(1 - p(e^0)\right)\frac{dw_0(e^0)}{de}$$

which is negative for $D > q_0$ since, by Lemma 1, $\frac{dw_0(e^0)}{de} < 0$. Then, the profit function of P at $e = e^0$ is decreasing, that ensures that the new solution $e^D < e^0$.

For $D > q_1 - w_1(e^0)$ the principal gets an expected payoff of zero inducing effort e^0. He can improve upon it inducing an effort e^D s.t. $q_1 - w_1(e^D) > D > q_1 - w_1(e^0)$. Hence a contract with $w_1(e^D) < w_1(e^0)$ is preferred by P. But this, by Lemma 1, implies $e^D < e^0$. *Q.E.D.*

Proof of Proposition 3: For $D > q_0 - w_0(e^0)$ the solution e^0 cannot be induced because the remuneration the manager receives at state 0 is only $q_0 - D$. Even if P has an interest to reduce the power-incentives (as shown in the proof of Proposition 2), the new solution must be that $e^D > e^0$ because, by Lemma 1, with $q_0 - D < w_0(e^0)$ only efforts than e^0 can be induced. In contrast, if $w_0(e^0) \leq q_0 - D$ then e^0 can still be implemented in the presence of D and it is optimal by definition. The result on the bonus $w_1(e) - w_0(e)$ follows from Lemma 1. *Q.E.D.*

9 Appendix B: Bankruptcy regulation in the UK

In case a UK firm is insolvent, it may enter either a receivership or administration. In the UK, the former procedure is creditor-oriented and in most cases leads to full or partial liquidation of the firm's assets. The latter procedure is debtor-oriented, resembles the US Chapter 11-procedure and formalizes a workout with the aim of corporate survival (Franks and Torous (2002) and Franks and Nyborg (1996))[25]. When a firm is in receivership (and is bankrupt), the following claims have preferential status: payroll taxes, VAT (from the period before the receivership) and the arrears in wages (including accrued holiday pay and occupational pension fund contributions). It should be noted that the preferential status of the arrears in wages is limited to the gross amount of GBP 800 per employee (excluding directors). This modest amount was never adjusted – not even for inflation - since the 1986 Company Act. All other unpaid remuneration is not preferential and unsecured and hence will be paid out on a pro -rata basis like all other unsecured creditors. Thus, under a liquidation code, the remuneration claims based on salary and bonuses in arrears are junior with regard to all secured debt and is put at the same seniority level of all other unsecured claims.

When a firm enters receivership, a receiver is appointed by the party holding a floating charge debenture. Essentially, a debenture is a claim over specific assets and, in case of corporate default, crystallizes into a fixed or floating charge. The former charge applies directly to a specific asset like a building or vital machinery. The latter applies to the category of 'floating assets' like e.g. inventory. The holder of a debenture is usually a bank, an asset financier, a private individual or a major supplier who advanced money against inventory or against plant, property or equipment (ppe) or who extended the credit period. The receiver (appointed by the holder of the floating charge) can liquidate the assets of the floating charge (e.g. the inventory) and the proceeds of the sale (including the potential surplus), net of costs, will go to the preferential creditors (c.q. debenture holder with floating charge)[26]. The remainder of the assets will be sold by a liquidator on behalf of the unsecured claimholders. In this category belong the arrears in remuneration of managers. There are many cases in which top management can still claim remuneration (including bonuses) which is in arrears. First, instead of selling the floating charge assets, the receiver can continue the business if the proceeds of continuation are expected to exceed those of a liquidation. If this were the case, he can take the business out of the corporate shell and, if he retains the management, the managerial remuneration contracts (and the arrears remuneration and bonuses) may remain valid. This is called the 'Transfer of undertakings protection of employment' regulation (TUPE). Second, receiver can sell one line of business, to pay the secured creditors off. At that point, the receiver ceases to act (he only works on behalf of the holders of the floating charge) and the company is again in the hands of the directors whose remuneration contracts remain valid. Third, an alternative to the creditor-oriented receivership process is the debtor-oriented 'administration' procedure. The court supervises a formal workout (financial and asset reorganization) aiming at the survival of the restructured firm. If the incumbent

[25] This concise description of seniority of remuneration and leverage in the UK bankruptcy process is based on schedule 6 of the Insolvency Act (1986) and has benefited from discussions with Mr. Ralph Paterson (who frequently acts as a receiver for a major audit firm), to Mr. Nigel Boobier (who is a bankruptcy lawyer for Osborne & Clark) and to Prof. Julian Franks (London Business School).

[26] If is possible that the party holding a fixed charge will also appoint a receiver whose only aim is to sell secured fixed assets (from plant, property and equipment).

management is essential for the firm and is maintained after the implementation of the reorganization plan, the employment contracts and hence the claims of past remuneration may remain valid. The recent changes in bankruptcy legislation[27] are moving the UK procedures closer to a US-style 'debtor-in-possession' concept[28]. Fourth, as documented in section 1, top management is frequently able to safeguard bonuses (even if 'performance'-related) by timing the payment well or by signing new contracts with substantial severance payments even when the firm is very close to insolvency.

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[27] See the Enterprise Act (2002), applicable since September 2003. The changes in administration are in the first place geared towards the survival of the company and, failing that, towards the survival of the business. If these two objectives cannot be realised, the charged assets will be disposed off.

[28] For a discussion of the US bankruptcy procedures and a comparison with the UK and Germany: see Franks and Torous (2002). The recent changes in bankruptcy legislation (of September 2003) are more geared towards the survival of the company (rather than the business) moving the UK procedures closer to the 'debtor-in-possession' concept of US Chapter 11.

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Table 1. Data description.

This table presents summary statistics for CEO compensation (salary, bonus, other cash payment, options and long term incentive plans). Capital gearing is the ratio of debt to total assets (in %). Interest coverage is EBIT over interest payments. The CEOs' ownership stakes and other equity related holdings are shown. The pre-Greenbury sample consists of a random sample of firms listed on the London Stock Exchange and covers the years 1988-93. The post-Greenbury sample consists of the 510 largest UK firms and covers the years for 1997-98.

	Mean	Median	Std. deviation
Panel A: pre-Greenbury sample (250 firms, 1453 observations)			
CEO compensation and ownership			
Salary and Bonus (GBP 000)	144	149	46.57
CEO stake (%)	2.98	0.00	8.10
Leverage			
Capital gearing	32.65	29.72	24.78
Interest coverage	12.38	9.43	8.84
Panel B : Post-Greenbury sample (510 firms and observations)			
CEO compensation (GBP 000)			
Salary	271	240	62.70
Bonus	118	69	47.36
Other cash	25	14	26.91
Total cash	414	340	74.11
Option grants	96	0	39.84
Long term incentive plan grants	82	0	33.79
Total pay	591	414	110.15
Leverage (%)			
Capital gearing	47.32	40.16	20.78
Interest coverage	14.52	13.72	7.83
CEO ownership			
Share stake (%)	2.13	0.05	1.97
Option holdings (% of equity x option delta)	0.18	0.06	0.14
Long term incentive holdings (% x delta)	0.02	0.00	0.01
Total equity related holdings (%)	2.33	0.25	1.21

Table 2. Sample selection models: CEO replacement and industry-adjusted monetary compensation.

The table presents the estimates of the sample selection models for top executive replacement (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. Capital gearing is expressed in percentage terms and is lagged by one year. The industry-adjusted ROA is defined as industry-year median adjusted return on equity (in percentage terms) lagged by one year. Likewise, abnormal stock return is lagged one year. Board size is defined as a natural logarithm of the total number of directors. Fraction of outside directors is expressed as a percentage of outsiders on the board. The last of the board characteristics is a dummy variable that equals one for CEOs serving at the same time the function of board chairmen. Firm size is proxied by a natural logarithm of the total book value of assets. Company risk is measured as an annual volatility of stock returns. The blockholding variables consist of insider stakes (the amalgamation of the shareholdings of the CEO, executive and non-executive directors). The outsider blockholdings are the amalgamation of the stakes held by financial institutions, families and individuals, the government and corporations, respectively, provided the individual stakes are 5% or above. In the regression equations (Panel B) the dependent variable is an industry-adjusted CEO cash compensation in the subsequent year. The explanatory variables are 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. ***, **, * stand for statistical significance at the 1%, 5% and 10% level, respectively.

	(1) All firms		(2) Average and Well performing firms		(3) Poorly performing firms		(4) Poorly performing firms in financial distress	
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	3.7292***	0.000	0.8363*	0.094	7.9987***	0.006	10.3180**	0.012
Leverage								
Capital gearing	-0.0005	0.626	0.00032	0.722	-0.0062	0.121	-0.0025*	0.076
Capital gearing. * insider stake	-0.0013	0.811	0.00037	0.721	0.0044	0.725	---	
Capital gearing* outsider stake	0.0008	0.526	0.00040	0.351	0.0048	0.361	---	
Performance indicators								
Industry-adjusted ROA in year ***t***-1	0.0122*	0.052	0.0241	0.351	0.0211**	0.047	0.0452**	0.048
Abnormal stock returns in year ***t***-1	0.0053**	0.034	0.0073	0.251	0.0039*	0.062	0.0083**	0.050
Board composition								
Board size	-0.9892***	0.000	-0.8311**	0.021	-0.6110	0.219	-0.2316	0.516
Fraction of non-executive directors	-0.0089**	0.044	-0.0121*	0.068	-0.0201	0.078	-0.0161	0.155
CEO is also the chairman	0.4261***	0.005	0.5161***	0.001	0.2810*	0.077	0.5191*	0.053
Firm size, and risk								
Firm size	0.0617	0.142	0.0373*	0.089	0.0351	0.361	0.0311	0.365
Risk	-0.0072	0.461	-0.0015	0.372	0.0079	0.360	-0.0072	0.425
Ownership concentration								
Insiders' blockholdings	0.0132**	0.041	0.0627*	0.077	0.0566**	0.041	0.0788	0.200
Accounting perform. * insider stake	-0.0001	0.648	0.0215	0.256	---		---	
Stock Price perform. * insider stake	-0.0003	0.220	0.0259**	0.050	---		---	
Outside block holdings	-0.0052	0.291	-0.0025	0.566	-0.0351*	0.082	-0.0673	0.182
Account. perform. * outsider stake	-0.00002	0.811	0.0067	0.368	---		---	
Stock Price perf. * outsider stake	0.00001	0.942	0.0028	0.210	---		---	
Year and industry control variables								
Year dummies	Yes		Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes		Yes	
Wald χ^2	$\chi^2(31) = 105.63$		$\chi^2(31) = 79.22$		$\chi^2(27) = 47.25$		$\chi^2(25) = 29.88$	
P-value for χ^2	< 0.01		< 0.01		< 0.01		< 0.01	

Table 2

Table 2 - continued.

	(1) All firms		(2) Average and well performing firms		(3) Poorly performing firms		(4) Poorly performing firms in financial distress	
Panel B: Regression equations	**Dependent variable is the industry-adjusted CEO cash remuneration**							
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	-3.2517***	0.000	1.4627***	0.000	-1.356***	0.008	-3.5265**	0.014
Leverage	0.0010	0.356	0.0156	0.176	0.0327	0.126	0.0236**	0.046
Performance indicators								
Industry-adjusted ROA in year ***t***-1	0.0032*	0.059	0.0083**	0.022	0.00627*	0.067	0.0256**	0.011
Abnormal stock returns in year ***t***-1	0.0018***	0.001	0.0145***	0.001	0.0316*	0.062	0.0036	0.256
Board composition								
Board size	0.1892**	0.015	0.0527*	0.062	0.0526	0.256	0.0354	0.873
Fraction of non-executive directors	0.0019	0.271	0.0025	0.738	0.0131	0.346	0.0132	0.236
CEO is the board chairman	0.0302	0.525	0.0389	0.121	0.0556	0.512	0.0265	0.379
Remuneration committee presence	-0.0192	0.659	0.0168	0.572	0.0483	0.361	-0.0215	0.251
Firm size, leverage, and risk								
Firm size	0.2085***	0.000	0.1455*	0.073	0.1839*	0.062	0.4636*	0.072
Risk	0.0077***	0.009	0.0132**	0.032	0.0085	0.579	0.0423	0.289
Ownership concentration								
Insiders' blockholdings	-0.0045***	0.007	0.0084	0.157	0.0077*	0.075	0.0115*	0.083
Accounting perform. * insider stakes	0.0001	0.329	0.0035	0.236	---		---	
Stock Price perform. * insider stakes	-0.0001**	0.024	0.0028**	0.044	---		---	
Outside block holdings	-0.0031**	0.046	-0.0073	0.258	-0.0067*	0.093	-0.0055	0.112
Account. perform. * outsider stakes	-0.00004	0.506	-0.0001	0.258	---		---	
Stock Price perf. * outsider stakes	0.00001	0.942	0.0004*	0.062	---		---	
Year control variables								
Year dummies	Yes		Yes		Yes		Yes	
Wald χ^2	$\chi^2(19) = 467.12$		$\chi^2(19) = 165.63$		$\chi^2(15) = 44.64$		$\chi^2(15) = 34.61$	
P-value for χ^2	< 0.01		< 0.01		< 0.01		< 0.01	
Panel C: Model statistics and tests								
Total no. of observations	847		677		208		114	
No. of censored observations	101		74		69		54	
No. of uncensored observations	746		603		139		60	
Log-likelihood	-623.95		-257.99		-94.33		-63.01	
Wald χ^2 (joint signific. of equations)	$\chi^2(50) = 801.73$		$\chi^2(50) = 256.12$		$\chi^2(42) = 68.74$		$\chi^2(42) = 55.23$	
P-value for χ^2	< 0.01		< 0.01		< 0.01		< 0.01	
Estimate of ρ	-0.549		-0.166		-0.206		-0.298	
Wald χ^2 test of ρ=0: equations' independ.	$\chi^2(1) = 8.030$		$\chi^2(1) = 7.371$		$\chi^2(1) = 6.382$		$\chi^2(1) = 5.909$	
P-value for χ^2	<0.01		<0.01		<0.01		<0.01	

Table 3: The relation between leverage and remuneration

The sample of poorly performing firms consist of the firms within the lowest quintile of abnormal returns. Poorly performing companies in financial distress are within that lowest quintile of performance but also have interest coverage below 2. Panels A-C use data of the post-Greenbury period (1997) whereas panel D is based on pre-Greenbury data (1988-1993). ***, **, * stand for statistical significance at the 1%, 5% and 10% level, respectively.

	Poorly performing companies					Poorly performing companies in financial distress				
Leverage	Sample size	Mean (GBP 000)	Difference in means (t-test)			Sample size	Mean (GBP 000)	Difference in means (t-test)		
Panel A: Fixed salary by leverage quartile (Post-Greenbury sample)										
Quartile 1 (highest)	41	241	Q1 vs Q2	0.703		20	231	Q1 vs Q2	0.255	
Quartile 2	41	227	Q1 vs Q3	1.007		20	224	Q1 vs Q3	1.896	*
Quartile 3	40	222	Q1 vs Q4	1.371		20	182	Q1 vs Q4	1.963	**
Quartile 4 (lowest)	40	214	Q2 vs Q3	0.274		19	181	Q2 vs Q3	1.586	
			Q2 vs Q4	0.681				Q2 vs Q4	1.647	*
			Q3 vs Q4	0.444				Q3 vs Q4	0.040	
Panel B: Bonus by leverage quartile (Post-Greenbury sample)										
Quartile 1 (highest)	32	78	Q1 vs Q2	0.096		15	70	Q1 vs Q2	-2.288	**
Quartile 2	32	77	Q1 vs Q3	-1.373		15	98	Q1 vs Q3	-1.457	
Quartile 3	32	92	Q1 vs Q4	-1.794	*	14	90	Q1 vs Q4	-2.406	***
Quartile 4 (lowest)	31	96	Q2 vs Q3	-1.396		14	102	Q2 vs Q3	0.592	
			Q2 vs Q4	-1.794	*			Q2 vs Q4	-0.306	
			Q3 vs Q4	-0.385				Q3 vs Q4	-0.829	
Panel C: Option and long term incentive grants by leverage quartile (Post-Greenbury sample)										
Quartile 1 (highest)	30	35	Q1 vs Q2	-0.727		18	33	Q1 vs Q2	-0.641	
Quartile 2	30	41	Q1 vs Q3	0.835		18	40	Q1 vs Q3	1.295	
Quartile 3	30	29	Q1 vs Q4	-0.918		18	23	Q1 vs Q4	-1.115	
Quartile 4 (lowest)	30	42	Q2 vs Q3	1.593		17	44	Q2 vs Q3	1.575	
			Q2 vs Q4	-0.125				Q2 vs Q4	-0.322	
			Q3 vs Q4	-1.898				Q3 vs Q4	-2.161	
Panel D: Total cash remuneration (Pre-Greenbury sample)										
Quartile 1 (highest)	23	141	Q1 vs Q2	1.423		14	118	Q1 vs Q2	0.659	
Quartile 2	23	122	Q1 vs Q3	0.757		13	108	Q1 vs Q3	0.714	
Quartile 3	23	130	Q1 vs Q4	1.562		13	107	Q1 vs Q4	1.664	*
Quartile 4 (lowest)	22	120	Q2 vs Q3	-0.608		13	95	Q2 vs Q3	0.073	
			Q2 vs Q4	0.167				Q2 vs Q4	1.086	
			Q3 vs Q4	0.755				Q3 vs Q4	0.979	

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