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Initial Compensation Contracts for New Executives and Financial Distress Risk: An Empirical Investigation of UK Firms

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Abstract: This paper analyses the effect of financial distress risk on the initial compensation contracts of new executives in the UK, where credit markets are more concentrated than in the US. We find that financial distress risk has a negative and statistically significant impact on the level of cash-based compensation and total compensation of executives, who are newly hired from either outside or inside the firm. This negative impact is accentuated in firms with a high fraction of bank debt, suggesting that banks, as creditors, provide monitoring and influence initial executive compensation packages in firms with high financial distress risk. Additionally, we find that financial distress risk has a negative and significant impact on the fraction of equity-based compensation for both externally and internally appointed executives.

Keywords: Executive compensation; financial distress risk; creditor monitoring
JEL classification: G30; G33

1. Introduction

How firms with financial distress risk compensate executives can be important in determining these firms' likelihood of survival. Despite the large body of literature on executive compensation, there are few studies on how financial distress risk influences executive compensation packages.[1] The theoretical model of Berk et al. (2010) shows that firms with high leverage, i.e., high financial distress risk, pay their employees higher wages, as employees cannot insure their human capital risk against potential bankruptcy risk, and therefore demand a risk premium. In the presence of risk-averse employees and risk-neutral investors, an optimal labour contract offers compensation for the expected bankruptcy risk borne by the employees. Chang et al. (2016) use a sample of US firms and show that firms with significant financial distress risk offer larger compensation packages to their CEOs, consistent with the model of Berk et al. (2010). Further, Chemmanur et al. (2013) provide empirical evidence of a positive relation between leverage and executive compensation.

These prior theoretical and empirical studies mainly focus on the US setting. Thus, our knowledge of how financial distress risk influences CEO compensation is limited. Indeed, some fundamental questions concerning how CEOs are paid in firms with financial distress risk remain unanswered: How does financial distress risk influence the level and structure of compensation for newly hired executives in an institutional environment where credit markets are more concentrated than in the US? Do creditors, for instance, banks, influence executive compensation packages in firms with financial distress risk? The aim of this paper is to answer these questions by analysing executive pay packages in the UK. In an institutional set-up such as that in the UK,

[1] Gilson and Vetsuypens (1993) examine executive compensation packages of US firms that filed for Chapter 11 bankruptcy or privately restructured debt. These firms are described as 'currently financially distressed' rather than 'firms with financial distress risk', which are the focus of this paper.

where credit markets are more concentrated, creditors can play an active monitoring role even before a firm experiences financial distress (Armour et al., 2002; McCormack, 2007; Marshall et al., 2014). Although previous studies document that there has been a convergence of CEO compensation practices in the UK toward those followed in the US, there is no empirical work on whether CEO compensation packages in the UK are designed similarly to those in the US when firms have high financial distress risk.[2] Yermack (2006) argues that understanding CEO incentives requires looking beyond routine annual CEO compensation and examining the specific stages of a firm's life cycle, such as how CEO incentives are shaped in a period when the firm has significant financial distress risk.

Extant literature suggests that a state of financial distress can represent a major stage in the life cycle of firms, which can lead to substantial changes in the contracting features of managerial compensation (Senbet and Wang, 2010). Executives take on human capital risk when they accept job offers from firms with high financial distress risk (Berk et al. 2010; Chemmanur, et al., 2013; Chang et al. 2016), suggesting that these firms should offer relatively high levels of compensation to attract executives ('human capital cost effect').[3] However, as financial distress risk increases, creditors would be expected to put pressure on firms to lower the fraction of equity-based compensation to reduce incentives for asset substitution ('monitoring effect of

[2] Conyon et al. (2011) provide evidence on the convergence of UK compensation packages, in terms of level and structure, toward those of the US.

[3] Eckbo et al. (2016) present the estimates of CEO human capital losses from corporate bankruptcy, accounting for CEO post-bankruptcy employment opportunities in US firms. Their findings imply an *ex ante* expected median personal bankruptcy cost of $2.7 million, or three times the typical annual CEO compensation.

creditors').[4] In turn, lower fractions of equity-based compensation lead to lower levels of total compensation (e.g., Fernandes et al., 2013).[5] We also expect to observe a lower level of cash-based compensation if a CEO has limited discretion and his or her main task is to execute the business plan put together by the creditors of a firm with significant financial distress risk. As Palia (2000) argues, when CEOs have less discretion (for instance, CEOs in a regulated sector), returns to ability are lower, and they will receive lower compensation. Overall, we might observe either a positive or negative relation between the level of executive compensation and financial distress risk, depending on which effect dominates, i.e., the 'human capital cost effect' or the 'monitoring effect of creditors'. In this paper, we argue that the institutional set-up in which firms operate could play an important role in determining which of these effects is relatively more important.

For our empirical analysis, we employ a sample of 3,614 newly appointed executives from 1,117 UK-listed non-financial firms over the period 1998 to 2009.[6] We focus on executives who are newly hired, either from outside or inside the firm. We find that financial distress risk has a negative and statistically significant impact on the level of executive total compensation. Further, we observe that a strong creditor presence, i.e., a higher fraction of bank debt, leads to lower levels of executive total compensation in firms with high financial distress risk. This finding is consistent with creditors that provide monitoring as financial distress risk increases, thereby

[4] See John and John (1993). Additionally, for US firms, Baird and Rasmussen (2006) provide qualitative evidence on the monitoring role of creditors outside of bankruptcy, while Gilson (1990) reports that bank lenders influence firm decisions, i.e., appointing new directors when firms enter Chapter 11 and become financially distressed.

[5] Risk-averse CEOs will naturally demand a pay premium for accepting the increased risk of equity-based pay (Hall and Murphy, 2002; Conyon et al., 2011).

[6] Chemmanur et al. (2013) and Chang et al. (2016) also use a sample of newly appointed executives as a way to mitigate endogeneity problems.

putting downward pressure on executive pay packages. Our results also indicate that financial distress risk has a negative and statistically significant impact on the fraction of equity-based compensation, along with other measures of executive incentives, including delta and vega. This finding supports the view that concentrated credit markets in the UK allow creditors to provide monitoring and reduce risk-shifting incentives when firms face high financial distress risk.

This study makes two contributions to the literature. First, it extends the literature on executive compensation by focusing on how financial distress risk influences the level and structure of executive compensation in an institutional set-up with relatively more concentrated credit markets. Bryan et al. (2010) investigate how the legal environment influences the structure of executive compensation, i.e., the fraction of equity-based compensation. Their findings show that firms offer higher equity-based compensation in countries where shareholder protection is stronger, e.g., the UK and US. Chang et al. (2016) find a positive relationship between the total compensation of newly hired CEOs and financial distress risk measures for a sample of US firms. In contrast, our findings show that there is a negative and statistically significant association between executive total compensation and financial distress risk in the UK. Despite the fact that both the UK and the US have strong shareholder protection and a dispersed share ownership structure, they differ in terms of the structure of their credit markets, which can lead to different ways of incentivising executives when firms have high financial distress risk.

Second, we contribute to the literature on the monitoring role of creditors by investigating whether creditors influence initial executive compensation packages in firms with significant financial distress risk. Marshall et al. (2014) show that banks play an important monitoring role in CEO succession in UK firms, which mainly rely on bank financing as a source of debt capital rather than corporate bond financing, as in the US. We extend this literature by providing

evidence on the role of bank monitoring in determining the level of the initial executive total compensation of newly hired executives. Our results also support the theoretical model by Aghion and Bolton (1992), suggesting that creditors exert influence over corporate policies, including executive compensation packages, even in the absence of payment default (that is, in firms with high financial distress risk) under strong creditor protection.[7] In their theoretical model, debt is a mechanism for contingent control. The main intuition is that the creditor has control in the bad state, e.g., a state of high financial distress risk, allowing him or her to receive a relatively higher return as a consequence of the firm now pursuing more creditor-friendly actions. In turn, the creditor relaxes the firm's financial constraints and thereby improves the prospects of recovery.

The remainder of this paper is organized as follows. Section 2 provides the literature review and presents a discussion on the institutional background of the UK. Section 3 discusses the data and empirical methodology. Section 4 presents the results of the empirical analysis. Section 5 presents additional tests, and Section 6 concludes.

2. Literature Review

2.1. Financial distress risk and executive compensation

Existing empirical literature on the relationship between financial distress risk and executive compensation is limited and mainly based on evidence from the US, where debt markets are relatively more dispersed and firms rely on corporate bond markets rather than private debt (e.g., bank debt). Chang et al. (2016) study the relation between financial distress

[7] Roberts and Sufi (2009) provide a literature survey on financial contracting and creditor monitoring. They highlight that prior literature uses covenants as a measure of creditor governance in US firms. In contrast to the rules in the US, the disclosure requirements in the UK are far less comprehensive in terms of providing full information about the details of covenants (Chatterjee, 2006). The syndicate loan data from the Dealscan database are relatively limited for UK firms. Thus, we cannot incorporate covenants in our analysis.

risk and executive compensation using a sample of 2,347 new CEOs in US firms.[8] They find that new CEOs at firms with high levels of financial distress risk receive higher total compensation and equity-based compensation than those at firms with low financial distress risk. This finding of a positive relation between total compensation and financial distress risk is consistent with the view that executives in firms with financial distress risk receive higher compensation, reflecting their human capital risk (Berk et al., 2010; Chemmanur et al., 2013; Titman, 1984). Chang et al. (2016) interpret their finding of higher equity-based compensation in firms with high financial distress risk as firms providing more incentives for CEOs to take a less conservative approach in their decision-making, which could lead to a decline in shareholder wealth.

However, in their empirical analysis, Chang et al. (2016) do not consider the interests of creditors in firms with financial distress risk. As John and John (1993) demonstrate in their theoretical model, the optimal structure of managerial compensation depends not only on the conflicts of interest between shareholders and managers, but also on agency problems that arise from the conflicts of interest between debtholders and shareholders. An increase in equity-based compensation in firms with financial distress risk could create risk-shifting incentives for managers, which would be undesirable for debtholders. If debtholders are active in monitoring executive compensation, the relationship between financial distress risk and equity-based compensation could change. In an environment where debt markets are concentrated, creditors will have more incentives and opportunities to provide monitoring and influence CEO compensation by reducing executives' risk-shifting incentives for firms with financial distress risk. For instance, Fama (1985) argues that banks are more likely to provide effective monitoring

[8] In contrast to Gilson and Vetsuypens (1993), who examine CEO compensation in financially distressed firms, i.e., those that either filed for Chapter 11 or privately restructured their debt, Chang et al. (2016)'s focus is on firms with financial distress risk rather than firms that are currently financially distressed.

than public bondholders due to their concentrated holdings, credible threats and superior access to private information. Monitoring mitigates moral hazard problems, enabling banks to detect a firm's opportunistic behaviour and to start renegotiation or liquidation (Park, 2000). Thus, we expect that financial distress risk has a negative impact on executive equity-based incentives, i.e., equity-based compensation, delta and vega, and total compensation.[9] In the next section, we provide further discussion on the institutional characteristics of the UK setting, which can influence the cash-based components (i.e., salary and bonus) of executive compensation, as well as equity-based compensation.

2.2. Institutional background in the UK and managerial discretion in firms with financial distress risk

The UK offers an interesting environment to study the impact of financial distress risk on executive compensation. The UK and US share similar governance systems, i.e., their public companies have widely dispersed share ownership structures (e.g., La Porta et al., 1999). However, there are considerable differences between the UK and US in terms of corporate debt markets.[10] In the UK, corporate bond issuance in public debt markets is relatively rare, and firms rely more on private debt financing, i.e., bank and non-bank private debt (Marshall et al., 2016).[11]

[9] Lower equity-based compensation leads to lower levels of total compensation, as risk-averse CEOs will naturally demand a lesser pay premium for accepting the reduced risk of equity-based pay (Hall and Murphy, 2002; Conyon et al., 2011).

[10] See Cheffins (2001), Allen and Gale (2001) and Larcker and Tayan (2011) regarding similarities between the UK and US governance systems.

[11] For a sample of 400 non-financial firms listed in the FTSE-350 index of the London Stock Exchange over the period 2000 to 2012, Marshall et al. (2016) report that the mean (median) bank debt-to-total debt ratio is

There is a concentrated creditor structure in the UK, while debt markets are dispersed in the US.[12] When firms in the UK face high financial distress risk, the concentrated structure of debt markets allows creditors to work together and decide whether, and on what terms, a company is worth supporting in the long term.[13]

In the 1980s, the Bank of England developed a private consensual workout procedure for large companies that experience financial problems. This approach has been called 'The London Approach'. The aim was to promote an effective and efficient financial system, and maintain financial stability (Kent, 1997; Armour et al., 2002). A lead bank, which is the bank with the largest exposure to the ailing firm, is designated to facilitate discussions among creditors and come up with a business plan.[14] Creditors could decide to maintain credit lines and extend further financing for the firm, conditional on an agreed business plan. Meanwhile, there might be management changes and a reorganization of the firm's assets, including the sales of assets. A manager hired at this stage will have his or her main responsibility toward creditors, who put together a business plan to be executed as part of the restructuring process, highlighting

approximately 0.60 (0.71), while the mean (median) public debt-to-total debt ratio is 0.24 (0.00), and the mean (median) non-bank private debt-to-total debt ratio is 0.15 (0.00).

[12] Brecht (2015) compares debt capital markets in the US and Europe. He reports that 80 percent of the corporate debt in the US comes from corporate bond markets, while approximately 20 percent is from banks. It is almost the reverse in Europe and the UK, where firms rely mainly on bank debt (approximately 80 percent), and a very small proportion (approximately 20 percent) comes from corporate bond markets. Further, in the US, banks tend to securitize or sell their loans in a well-developed loan market, while in Europe, including the UK, banks hold a much larger proportion of loans on bank balance sheets.

[13] Davydenko and Franks (2008) document that the incidence of formal insolvencies is relatively lower in the UK than in France and Germany, despite strong creditor control rights in the UK. Creditors, i.e., banks, in the UK coordinate informal rescues (Armour and Frisby, 2001). Creditors use mostly informal workouts to help companies survive.

[14] Recently Yell Group negotiated with its lenders over restructuring its £3.7 billion debt, and creditors were led by HSBC (*Financial Times*, September 22, 2008). The main creditors were RBS, HSBC and Deutsche Bank.

creditors' interests.[15] As part of this process, a company does not have much autonomy, as it is subject to the dictates of its lender banks during the restructuring stage. This approach is based on the view that creditors are likely to achieve better outcomes if they collectively support an orderly rescue of an ailing firm rather than force it into a formal insolvency.

Franks and Sussman (2005) use a sample of small- and medium-sized UK firms and find that banks, as secured creditors, play an important role in encouraging and forcing financially distressed firms to restructure their operations, which might include management changes and downsizing. Thus, an elaborate corporate rescue process, i.e., the London Approach, might take place outside formal procedures.[16]

Another important difference between the UK and US debt markets is the lender liability rule (e.g., Kroszner and Strahan, 2001). This rule operates in the US, but not in the UK; consequently, US banks can suffer major costs in the aftermath of a firm's failure if they are judged to have taken actions that improve their position at the expense of other claimants. The lender liability rule discourages US banks from active engagement in the management of a firm with significant financial distress risk prior to formal bankruptcy (see, e.g., Fischel, 1989). Considering the lack of lender liability in the UK, we would expect banks to be willing to play a monitoring role, as long as they have a large stake in a firm.

Given these institutional characteristics of the UK setting, which emphasize the monitoring role of creditors at firms with high financial distress risk, a CEO's main role in these firms can be viewed as that of a manager executing the business plan of creditors, with limited discretion

[15] Overall, the London Approach is a debtor-in-possession restructuring process.

[16] Marshall et al. (2014) offer further evidence on creditor monitoring in UK firms. They examine whether banks provide monitoring in determining the relation between forced CEO turnover and firm performance in UK firms. They find that the likelihood of a forced CEO turnover increases with bank debt on a firm's balance sheet, while public debt does not have a significant impact on CEO succession.

in corporate decision-making. When CEOs have less discretion, returns to ability are lower, and they will receive lower compensation (Finkelstein and Boyd, 1998; Palia, 2000). As Gilson and Vetsuypens (1994) argue, creditors would not necessarily be interested in hiring a high-quality CEO, since their main interest is to receive their payment, without necessarily maximizing the going-concern value of the firm. Thus, we predict that financial distress risk has a negative impact on the level of cash-based components of compensation, i.e., salary and bonus, and total compensation.

Additionally, Prendergast (2002) argues that in uncertain environments where there is no delegation of responsibility to an agent, and the agent is monitored on the basis of his or her inputs, he will not receive output-based incentive pay. The set-up used by Prendergast's model is similar to the UK set-up for firms with significant financial distress risk, where managers do not have full discretion over their choice of activities as part of corporate policy decision-making. Thus, the lack of managerial discretion reduces the need for performance-based incentives, i.e., CEO equity-based pay, and should again lead to a negative relationship between financial distress risk and equity-based pay.

3. Data and Empirical Methodology

3.1. Data sources and sample selection

To investigate the effect of financial distress risk on executive compensation, we assemble a dataset on executive compensation variables, financial distress risk measures, firm-specific control variables and governance variables. Our sample construction process starts with collecting executive compensation data from the Boardex database. Executive compensation data include salaries, bonuses, values of long-term incentive plans (LTIPs), stock awards and stock

options that are granted within a given year. Our compensation measure is based on the first full year of the new executives' tenure. If the tenure is less than one year, then we include the compensation for the second year in that position, since the first year's compensation may reflect less than a full year's pay for executives with tenure less than one year.[17] Some executives are offered equity-based compensation and bonuses in the year they are hired, but not in their second year. In this situation, equity-based compensation shows up on the Boardex database in the first year that the executive is hired. In our analysis, we include the initial year's equity-based compensation and bonus.

Cash-based compensation is the sum of salary and cash bonuses, while equity-based compensation is the sum of the value of LTIPs, stock awards, and stock options granted during a year. Additionally, we consider delta and vega as alternative measures of an executive's incentives. Delta is defined as the sensitivity of CEO wealth to share price. Thus, CEOs with a high delta will have incentives to take up projects that increase the share price. Vega is defined as the sensitivity of CEO wealth to firm risk. It measures how CEO wealth changes in response to changes in stock return volatility. CEOs with a high vega are expected to make risky investment choices, as they seek to benefit from the higher volatility associated with risky investments.

Our sample consists of 3,614 firm-years with new executive appointments of both CEOs and other executive directors from 1,117 UK-listed non-financial firms over the period 1998 to 2009. We have an unbalanced panel with firms joining only when they hire new executives in a particular year during the sample period. We restrict our sample to newly appointed executives as a means of eliminating the confounding effects of prior performance on executives' current

[17] For a similar approach, please refer to Berry et al. (2006).

compensation.[18] CEO (non-CEO executive) appointments constitute 1,059 (2,555) of the 3,614 new executive appointments. We observe that there are 458 (601) external (internal) CEO appointments. For non-CEO executive appointments, there are 1,204 external appointments, while the number of internal appointments is 1,351.

Further, we collect data on bank debt from the Capital IQ database. Bank debt data are available for 2,622 of the 3,614 new executive appointments in our sample. In examining the relation between executive compensation and financial distress risk, we control for various firm-specific characteristics, including firm performance, size, Tobin's Q, leverage, cash holdings and stock return volatility. In addition, we control for governance variables, including institutional ownership, proportion of independent directors, and executive characteristics. Table A1 in the Appendix provides detailed definitions for the variables used in our empirical analysis.

3.2. Measures of financial distress risk

We employ three alternative measures of financial distress risk. Our first measure is based on the theories of BSM (Black and Scholes, 1973; Merton, 1974), in which the probability that a firm enters bankruptcy is the probability that the (book) value of its liabilities exceeds the (market) value of its assets at a point in time. We employ the method set out in the paper of Hillegeist et al. (2004) to calculate default risk using this model. Our second measure of financial distress risk is a discrete time hazard model taken from Chava and Jarrow (2004), who emphasize the importance of industry effects on bankruptcy prediction. We employ their "public firm model with *industry* effects" (Table 3, page 556). This model incorporates both market and accounting-based variables. Our third measure is the *z*-score model of Altman (1968), in which

[18] Chang et al. (2016) also focus on newly appointed CEOs.

the bankruptcy or failure risk of a firm is based on a linear combination of accounting ratios. The selected ratios reflect a firm's working capital position, profitability, gearing and efficiency (with which assets are used to generate sales).[19]

Our analysis requires us to identify firms with financial distress risk; therefore, we convert probabilities of default into categories of financial distress risk. We employ a 0.25% probability of default/bankruptcy via the BSM model to separate low financial distress risk firms from medium financial distress risk firms, and a 2.5% probability of default/bankruptcy to separate medium and high distress risk firms.[20] These rates (approximately) reflect the probability of default for firms just above (BBB/BBB-) and below (B+/B) the investment grade barrier; between 1981 and 2010, the average annual one-year default rate for European firms with an investment grade S&P rating of BBB (BBB-) was 0.09% (0.32%), while the average rate for sub-investment grade B+ (B) rated firms was 1.77% (4.78%). This gives us a sample of 367 executive appointments to firms with high financial distress risk (*RISKHigh*) and 346 executive appointments to firms with medium financial distress risk (*RISKMed*). Therefore, in total, 713 (367 + 346) appointments are to firms that we deem as having significant financial distress, and 2,901 appointments are to firms that we deem as having no significant financial distress risk. We similarly allocate 367 (346) firms to the high (medium) risk categories based on Chava and Jarrow's and Altman's models. As a robustness check, we adopt alternative cut-offs based on natural break-points in our sample distributions under Chava and Jarrow's and Altman's measures. We find that the results are qualitatively similar.

3.3. Summary statistics

[19] We employ the version of the model reported in Hillegeist et al. (2004) and Shumway (2001), in which all of the coefficients, other than that on Sales/Total assets, are multiplied by 100.
[20] These cut-offs are also employed by Chang et al. (2016).

Table 1 reports the summary statistics for our variables. We observe that Altman's model provides significantly higher estimates of financial distress risk, relative to the BSM and Chava and Jarrow's models. The mean (median) probability of default (bankruptcy) for Altman's model is 15.80% (6.30 %), compared to 1.20% (0.00%) for the BSM model and 0.50% (0.20%) for Chava and Jarrow's model. Hillegeist et al. (2004) report that, for their sample, the actual average bankruptcy rate for solvent firm years is 0.87% vs. an average estimate 13.46% based on the *z*-score model of Altman (1968).[21] Given that our sample consists of UK-listed firms, the estimates of default risk under Altman's model are evidently exaggerated. However, this does not preclude the model from being a useful measure of relative bankruptcy risk (Chen and Hill, 2013).

In our analysis, we use both cash-based, which is the sum of bonuses and salaries, and equity-based components of total compensation. The average (median) total compensation for our sample of newly hired executives is £526,121 (£267, 281), and the average (median) fraction of equity-based compensation is 0.229 (0.171). The large difference between the mean and median for total compensation suggests that our compensation data are skewed to the right. The average value of equity-based compensation is £227,362, while the median value of equity-based compensation is £36,019. The large difference between the mean and median values of equity-based compensation results from the fact that not all firms in our sample pay their executives equity-based compensation. Even firms that use equity-based compensation do not necessarily grant it every year. We observe that the average (median) delta is £19,333 (£4,864), while the average (median) vega is £3,055 (£640).

[21] See Table 3, page 16, Hillegeist et al. (2004).

The average (median) sales is £1,227.4 (£95.3) million, and the difference between the average and median value shows that our sales variable has a skewed distribution. In our empirical analysis, we employ the percentage of bank debt as a measure of bank monitoring. On average, the percentage of total debt made up of bank debt is 66.9. This ratio of bank debt to total debt is comparable to previous studies that use UK data; for example, Marshall et al. (2016) report that the mean (median) bank debt ratio is 0.60 (0.71) for their sample of FTSE-350 firms over the period 2000-2012, while Ozkan and Ozkan (2004) show that the mean (median) bank debt ratio is 0.57 (0.63) for their sample of 839 UK public firms from 1995 to 1999. The average age of newly hired executives is 47.6 years, and 46 % of the new executives in our sample are hired from outside the company. Marshall et al. (2014) find that externally hired CEOs constitute 40.1% of all successions in their sample of UK firms. We also report descriptive statistics for firm-specific characteristics and governance variables in Table 1. On average, 37.1 percent of directors are independent, and the average institutional ownership concentration is 54.7 percent.

[Insert Table 1 about here.]

3.4. Empirical methodology

To examine the relationship between financial distress risk and executive compensation, we employ the following regression model:

$$Compensation_{it} = \alpha + \beta_1 RISKMed_{it} + \beta_2 RISKHigh_{it} + \gamma\ Controls_{it} + \varepsilon_{it}$$

where $Compensation_{it}$ is measured as the natural log of total compensation and its components, including equity-based compensation, cash-based compensation (the sum of salaries and bonuses), and the fraction of equity-based compensation, delta and vega. *Controls* include firms-

specific variables, executive-specific variables, and governance variables, which are used as determinants of compensation by prior studies. We also control for year and industry fixed effects.

Considering the potential concerns regarding the causality between executive compensation and financial distress risk, we follow Chang et al. (2016) and include in our sample only those firms that have a newly hired executive. Thus, we examine how the initial compensation packages of these new executives are influenced by financial distress risk.

Our key explanatory variables are the financial distress risk variables, *RISKHigh*, which is a dummy variable for firms with high financial distress risk, and *RISKMed*, which is a dummy variable for firms with medium (moderate) financial distress risk, as discussed in Section 3.2. Following previous studies on executive compensation, we control for firm-specific variables in our regression model, including sales as a measure of firm size, Tobin's Q as a measure of growth opportunities, stock return and return on assets (ROA) as measures of firm performance, and cash holdings as a measure of liquidity constraints. If firms experience a scarcity of cash, they may use equity-based compensation to preserve it. We also use leverage and stock return volatility, which are viewed as measures of firm risk, as additional firm-specific controls. Moreover, we control for governance variables comprising the proportion of independent directors, ownership of institutional shareholders, and executive-specific characteristics, including executive age, a dummy for CEOs and a dummy for executives hired externally. Further, in our robustness tests, we include some proxies for managerial talent, i.e., college education, MBA, and the number of current board positions (e.g., Fernandes et al., 2013). We also include industry dummies that are based on the 12 Fama-French industries, and year dummies in all of our regressions.

Institutional investors have more incentives to provide intense monitoring as their ownership concentration increases (e.g., Hartzell and Starks, 2003; Ozkan, 2011). In the UK, a large proportion of equity capital is held by institutional investors,[22] typically in block shareholdings. Such ownership concentration provides incentives for institutional investors to engage in monitoring. We consider the holdings of financial institutions that own 3% or more of a firm's equity as a percentage of the total institutional holdings. To compensate for the utility loss that can be created by intense monitoring, CEOs at firms with more independent boards and/or a higher proportion of institutional investors require higher compensation (Fernandes et al., 2013; Ozkan, 2007). Conversely, boards might have an incentive to signal their independence by lowering the level of CEO compensation (Singh, 2006).

Murphy (1985) stresses the importance of controlling for executive-specific variables when studying executive compensation. We employ three executive characteristic variables. Younger executives have higher lifetime human capital at risk, which is captured by *Age,* the age of the executive in years. Career concerns can be an important source of incentives for CEOs, even when they receive incentive contracts as part of their compensation packages (Gibbons and Murphy, 1992). These career concerns would be weakest for CEOs who are close to retirement age. Thus, CEOs approaching retirement age should be offered more explicit incentives than younger CEOs. We also use a dummy variable, *External Hire dummy*, which equals one if the new executive is hired from outside the company, and zero otherwise; while new internal executives have a larger amount of firm-specific managerial capital at stake, new external executives are hired for their (transferable) managerial ability. Gilson and Vetsuypens (1993), Murphy (2002) and Murphy and Zabojnik (2006) all show that executives hired from the outside

[22] The UK Office of National Statistics (ONS, 2012) reports that at the end of 2008, institutional ownership accounted for 74.2% of the share ownership of UK-listed firms.

earn significantly more than those promoted internally. Murphy and Zabojnik (2006) interpret this result by arguing that the relative importance of general over firm-specific managerial ability leads to higher compensation for external versus internal hires. Finally, we use a dummy variable, *CEO dummy*, which equals one for new CEOs, and zero for other new executive directors.

We observe that 39% (1,411/3,614) of new executives receive no equity-based compensation. There are also some firm year observations where delta and vega equal zero. Thus, we employ a Tobit estimation method for regressions of the level of equity-based compensation, fraction of equity-based compensation, delta and vega (Ozkan, 2011; Fernandes et al., 2013). Similarly, in our regressions for bonuses, we use Tobit estimation, since executives do not receive a bonus every year, and we have some firm-year observations where the bonus is equal to zero. We observe that 36 % (1,294/3,614) of new executives receive no bonus.

4. Empirical Results

4.1. Preliminary analysis

Table 2 reports a preliminary analysis of the relationship between financial distress risk and executive compensation. We divide our sample into deciles, according to each measure of financial distress risk (BSM, Chava and Jarrow, and Altman). Table 2 presents the mean and median values of salary, bonus, equity-based compensation, total compensation, fraction of equity-based compensation, delta and vega by decile. We observe that the estimated financial distress risk is negligibly small, up to the 8th decile (for the BSM and Chava and Jarrow measures), after which it increases considerably. For the BSM model, for example, the mean (median) value of financial distress risk for the 8th decile is 0.10% (0.10%), which increases to

10.9% (7.7%) for the 10th decile. Under Chava and Jarrow's model, the mean (median) value of financial distress risk for the 8th decile is 0.40% (0.30%), compared to 2.60% (1.2%) for the 10th decile. Under all financial distress risk models (BSM, Chava and Jarrow, and Altman) we observe that as financial distress risk increases from the 8th to 10th decile, the average (median) total compensation level and fraction of equity-based compensation decline. For instance, under the BSM model, the mean (median) level of total compensation for the 8th decile is £535,179 (£263,186), while it is £316,287 (£177,282) for the 10th decile. Thus, we observe that there is a 40.90% (32.64%) reduction in the mean (median) level of total compensation. The fraction of equity compensation follows a similar pattern. In terms of managerial incentives, the results show that, under the BSM model, the mean (median) deltas are £19,578 (£4,152) and £7,432 (£1,101) for the 8th and 10th deciles, respectively. The corresponding figures for vega are £2,695 (£383) and £894 (£115).

[Insert Table 2 here]

4.2. Baseline regressions

Next, we present the results of our baseline regressions. Table 3 reports the results of our regression analyses regarding the impact of financial distress risk on the level and structure of executive compensation for our sample of 3,614 newly hired executives. In Panel A of Table 3, we examine the impact of financial distress risk on the different components of cash-based executive compensation: salary and bonus, and cash-based compensation. We observe that newly hired executives at firms with medium and high financial distress risk receive relatively lower salaries, bonuses and cash-based compensation than those at firms with low financial distress risk, controlling for other firm and executive-specific variables. This finding is consistent with the view that in the UK, executives have less managerial discretion when firms face high

financial distress risk. As argued by prior researchers, lower managerial discretion leads to lower returns to managerial skill, and therefore lower compensation (Finkelstein and Boyd, 1998; Palia, 2000). As financial distress risk increases, creditors increase their monitoring, leading to a decline in managerial discretion, as discussed in Section 2.2. For all three measures of financial distress risk, the coefficient estimates on the high and medium risk variables in columns (1) to (9) are negative and mostly statistically significant.

Panel B of Table 3, columns (1) to (6) report the estimation results for equity-based compensation and total compensation, which mirror our results in Panel A, that is, of a negative relationship between equity-based compensation, total compensation, and financial distress risk, again with more negative coefficients observed for the high financial distress risk group than the medium financial distress risk group. Our results contrast with those of Chang et al. (2016), who find a positive association between new CEO equity-based compensation and financial distress risk. They interpret this finding as CEOs receiving more incentives to act in a less conservative manner, as they would have a tendency to take less risk to avoid corporate failure.

In columns (7) to (9) of Panel B, we test the impact of financial distress risk on the structure of executive compensation. We observe that the coefficient estimate for high financial distress risk is negative and statistically significant in columns (7) to (9). This finding is consistent with the hypothesis that firms with financial distress risk would offer lower equity-based compensation in their attempt to avoid asset substitution problems. Less negative coefficients are observed for medium versus high distress risk firms, as would be expected, given the relatively stronger concerns regarding asset substitution in firms with high financial distress risk.

Overall, our findings support the results from previous studies, which document that firms with severe conflicts of interest between shareholders and debt holders, i.e., firms with high financial distress risk, reduce agency costs of debt by offering their executives lower equity-based compensation and lower incentive alignment with shareholders (e.g., Ortiz-Molina, 2007). In setting managerial compensation packages, firms not only consider the alignment of interests of shareholders and managers, but also the interests of debt holders (John and John, 1993). It is also noteworthy that the impact of financial distress risk on the level and structure of new executive compensation is economically significant. For example, under the BSM model, the coefficients on *RISKHigh* (*RISKMed*) reported in column (4) of Panel B indicate that new executives at firms with high (medium) risk of financial distress earn approximately 30.3% (23.4%) less. Considering the average marginal effects on *RISKHigh* (*RISKMed*), we find that the fraction of equity-based pay in executives' compensation packages in firms with high (medium) financial distress risk is 9.9% (5.4%) lower than such packages at firms with low financial distress risk.

We also observe a positive and significant relation between executive age and the level of total compensation; however, we also note a negative and significant relation between executive age and the fraction of equity-based compensation, i.e., older executives receive more compensation and a lower fraction of equity-based compensation. Our findings do not suggest that externally hired executives receive a higher level of compensation than internally hired executives. This finding is contrary to the results of Brockman et al. (2012), who find that externally hired CEOs receive higher levels of compensation. We observe that a higher proportion of independent directors is associated with higher levels of total compensation and a higher fraction of equity-based compensation.

In Panel C, we first examine the relation between financial distress risk and new executives' pay-performance sensitivity (delta), and then the relation between distress risk and pay-risk sensitivity (vega). We measure the new executive's delta as the sterling change in the executive's wealth for a 1% change in his firm's stock price and vega as the sterling change in wealth associated with a 0.01 change in stock volatility. We find that performance incentives for new executives decrease with financial distress risk, as evidenced by the negative and mostly significant coefficient estimates on the distress risk variables. The results are in line with those of Aggarwal and Samwick (1999) and Jin (2002), suggesting that firms with higher risk might have to trade-off the benefits of incentives against the benefits of risk-sharing (Holmstrom, 1979). Additionally, we show that new executives at firms with higher distress risk also have fewer risk-taking incentives, consistent with the view that these firms provide managers with weaker risk-taking incentives to mitigate the agency cost of debt and to help ensure firm survival. By contrast, Chang et al. (2016) find that US firms with high financial distress risk offer high equity-based compensation to their CEOs, which is interpreted as firms attempting to encourage CEOs to take a less conservative approach, as this approach could lead to a decline in shareholder wealth.

[Insert Table 3 here]

5. Additional Tests

Next, we investigate whether the relation between financial distress risk and executive compensation varies across different types of firms and different types of executives. We also conduct further robustness tests.

5.1. The impact of bank debt on the compensation contracts of newly hired executives in firms with high financial distress risk

In this section, we investigate whether a strong creditor presence, i.e., a higher fraction of bank debt, can influence the relation between executive compensation and financial distress risk. Previous studies argue that banks, as creditors, provide more effective monitoring than public bondholders (Fama, 1985). However, creditor strength also depends on the level of leverage, since creditors have more incentives to monitor highly leveraged firms (Milidonis and Stathopoulos, 2014). These highly levered firms have greater agency costs of debt, as they are more likely to have underinvestment and asset substitution problems. Thus, banks as creditors would have more incentives to monitor firms that are highly levered.

For our sample of firms, we collect data for the ratio of bank debt to total debt. Following Lin et al. (2013), we compute bank debt as the sum of term loans and revolving credit. We then sort our firms, first into two groups with leverage above and below the median, and second into four groups with the bank debt ratio above and below the median. Thus, the *high bank debt* group includes firms with both leverage and the ratio of bank debt to total debt above the median, while the *low bank debt* group consists of firms with both leverage and the ratio of bank debt to total debt below the median. We expect the negative impact of financial distress risk on executive total compensation to be stronger in the *high bank debt* group than the *low bank debt* group. As discussed in Section 2, creditors will reduce equity-based incentives, as they would be concerned about asset-substitution incentives. Further, a relatively strong creditor presence in the *high bank debt* group will limit managerial discretion and reduce the returns to managerial skill, which would lead to lower cash-based compensation, i.e., sum of salary and bonus.

Consequently, we expect total compensation in firms with high distress risk to be lower in the *high bank debt* group than in the *low bank debt* group.

Table 4 presents the regressions of total compensation, cash-based compensation, and fraction of equity-based compensation for firms in the *low bank debt* and *high bank debt* groups. Columns (1) and (2) show the estimation results of total compensation. In column (1), we observe that the coefficients for *RISKMed* and *RISKHigh* are mostly negative but statistically insignificant for *low bank debt* firms. However, in column (2), when we consider *high bank debt* firms, we find a negative and statistically significant coefficient for *RISKMed* and *RISKHigh* under BSM and C&J. For the Altman's measure of financial distress risk, the coefficients for *RISKMed* and *RISKHigh* are still negative but statistically insignificant. We conclude that our primary result of a negative and statistically significant impact of financial distress risk on total compensation is driven by *high bank debt* firms. Overall, the 'monitoring effect of creditors' seems to dominate rather than the 'human capital cost effect' in our sample of *high bank debt* firms, leading to a negative and statistically significant relation between financial distress risk and the total compensation of newly appointed executives. Our findings are consistent with the view that banks can play an important monitoring role in UK firms, as they rely much more on bank lending rather than public corporate bond markets.[23]

Columns (3) and (4) of Table 4 examine the effect of financial distress risk on cash-based compensation for *low bank debt* and *high bank debt* firms, respectively. We observe that the impact of financial distress risk on cash-based compensation is statistically insignificant for *low*

[23] We also test whether the coefficient estimates for *RISKMed* and *RISKHigh* are statistically significantly different between the *high bank debt* and *low bank debt* subsamples for the total compensation regressions. For the distress measures BSM and C&J, we reject the null hypothesis that the coefficient for *RISKHigh* is greater (or equal) in the *high bank debt* subsample than that in the *low bank debt* subsample, showing that the negative impact of high financial distress risk on total compensation is statistically significantly greater in the *high bank debt* subsample.

bank debt firms. In column (3), the coefficients for *RISKMed* and *RISKHigh* are mainly negative and statistically insignificant under the BSM and C&J models. In column (4), the coefficients for *RISKMed* and *RISKHigh* are negative and statistically significant for *high bank debt* firms under the BSM and C&J models.[24] Thus, we observe that our primary finding of a negative and statistically significant impact of financial distress risk on cash-based compensation is driven by *high bank debt* firms. Similar to the findings in columns (1) and (2) for total compensation, our results for cash-based compensation suggest that creditors can provide monitoring and influence compensation levels of newly appointed executives in UK firms.

Columns (5) and (6) show the results of regressions in which the dependent variable is the fraction of equity-based compensation. Column (5) presents regressions for *low bank debt* firms. We find that the coefficients for *RISKMed* and *RISKHigh* are mostly negative, but statistically insignificant for *low bank debt* firms. One exception is the coefficient estimate for *RISKMed* under the C&J model, which is negative and statistically significant at 10% level. Column (6) presents the results for *high bank debt* firms. We observe that the coefficients for *RISKMed* and *RISKHigh* are all negative but statistically insignificant, however, the coefficient for *RISKHigh* under the BSM model is statistically significant at a 5% level. Thus, we have some evidence that *high bank debt* firms reduce the fraction of equity-based compensation when they face high financial distress risk. This finding suggests that creditors provide monitoring and reduce the fraction of equity-based compensation, which could increase incentives for risk-shifting in firms

[24] We also test whether the coefficient estimates for *RISKMed* and *RISKHigh* are statistically significantly different between the *high bank debt* and *low bank debt* subsamples for the cash-based compensation regressions. For the distress measures BSM and C&J, we reject the null hypothesis that the coefficient for *RISKHigh* is greater (or equal) in the *high bank debt* subsample than that in the *low bank debt* subsample, showing that the negative impact of medium and high financial distress risk on cash-based compensation is statistically significantly greater in the *high bank debt* subsample.

with high financial distress risk. While both the UK and US belong to the Anglo-Saxon governance system, they have considerable differences in their corporate debt markets. These differences in the debt markets seem to lead to different ways of compensating CEOs when firms face financial distress risk. For our sample of UK firms, we find that newly appointed executives receive a lower fraction of equity-based compensation in firms with high financial distress risk, while Chang et al. (2016) document a positive and significant relationship between equity-based compensation and financial distress risk in US firms, where credit markets are relatively more dispersed. These findings suggest that the structure of debt markets can play an important role in determining how executives at firms with high financial distress risk are incentivized.

[Insert Table 4 here]

5.2. The impact of executive type on the compensation contracts of newly hired executives in firms with high financial distress risk

In this section, we investigate whether the relationship between financial distress risk and executive compensation holds across different executive types. Specifically, we examine CEOs versus non-CEO executives, internally versus externally hired executives, and young versus old executives.[25] Bebchuk et al. (2002) suggest that CEOs may have more influence on their compensation than other directors, suggesting that there may be a difference between the impact of financial distress risk on CEO compensation and the compensation of non-CEO executives. Murphy and Zabojnik (2006) argue that an increase in the relative importance of general managerial skills (rather than firm-specific skills) has led to a pay premium for executives hired

[25] For brevity, we report only the coefficient estimates for medium and high financial distress risk dummies.

externally, relative to those promoted internally. Thus, we would expect higher compensation for executives hired externally than those promoted internally.

Gibbons and Murphy (1992) suggest that career concerns are stronger for young executives (lifetime earnings at risk are greater), who are further from retirement than older executives. Chang et al. (2016) find that younger CEOs receive higher compensation than older CEOs when they are hired by a firm with high financial distress risk. This finding is consistent with the view that younger CEOs have more concerns about their career prospects and demand a higher premium for their human capital risk. Overall, the impact of financial distress risk on executive compensation can vary, depending on these executives' characteristics. To investigate the impact of executive characteristics on the relation between financial distress risk and executive compensation, we re-estimate our baseline model for each subsample of observations, which are grouped as CEO and non-CEO executives, internally and externally hired executives, and young and old executives.

[Insert Table 5 here]

Table 5 reports the regression results for different subsamples classified according to executive characteristics. Panel A of Table 5 presents the estimation results for total compensation. The findings in columns (1) and (2) show that firms with high and medium levels of financial distress risk offer both CEOs and non-CEO executives relatively lower levels of total compensation. We observe that the coefficient estimates for high financial distress risk are negative and statistically significant for both CEOs and non-CEO executives, except for Altman's distress risk measures, for which the coefficients are statistically insignificant.[26] For

[26] We test whether there are statistically significant differences in the coefficient estimates for financial distress risk between CEO and non-CEO subsamples, internal promotions and external hire subsamples, and executive age above and below the median subsamples. We fail to reject the null hypothesis that these coefficient estimates are equal.

internal and external executives, the subsamples in columns (3) and (4), respectively, our findings show that the coefficient estimates for high financial distress risk are negative and statistically significant, except for Altman's distress risk measure. Overall, we observe that both internally and externally hired executives receive lower total compensation in firms with high distress risk.

In columns (5) and (6), we test whether the impact of financial distress risk on total compensation changes, depending on an executive's age. We classify our sample of newly hired executives into those whose age is above the median ('old' executives), and those whose age is below the median ('young' executives). Our results show that both young and old executives receive lower total compensation in firms with high financial distress risk. For Altman's distress risk measure, the coefficient estimates are negative, but statistically insignificant.

Panel B of Table 5 reports the estimation results for cash-based compensation. Similar to the findings in Panel A for total compensation, we observe that the coefficient estimates for *RISKMed* and *RISKHigh* are negative and statistically significant under the BSM and C&J models. Overall, these results show that in the case of newly appointed CEOs and non-CEO executives, who are internally or externally appointed, young and old executives at firms with high financial distress risk receive lower levels of cash-based compensation than those in firms with low financial distress risk.

Panel C of Table 5 presents the results of the fraction of equity-based compensation for different groups of executives. We observe that financial distress risk has a negative impact on the fraction of equity-based compensation for executives across the different subsamples. From columns (1) to (6), the coefficient estimates for high financial distress risk are negative and statistically significant, except for Altman's distress risk measure. In contrast to the findings of

Chang et al. (2016) for US firms, we find a significantly negative relation between financial distress risk and the fraction of equity-based compensation in UK firms. Despite the fact that both the UK and US share common characteristics of the Anglo-Saxon governance system, they seem to differ in how they provide incentives for executives in firms facing high financial distress risk.

5.3. The impact of diversification on the compensation contracts of newly hired executives in firms with high financial distress risk

Next, we investigate whether diversification influences the relation between financial distress risk and executive compensation. Prior studies argue that corporate diversification can increase the complexity of the CEO's job, as resource allocation decisions become more complex (e.g., Berry et al., 2006). A CEO at a diversified firm would be required to understand several potentially disparate product markets, and therefore needs greater ability (Rose and Shepard, 1997). Thus, we can argue that the negative impact of financial distress risk on executive compensation would be less pronounced for diversified firms, given that these firms will try to attract more talented executives.

However, firms with diversification would require more monitoring from creditors when they face high financial distress risk, as they are more complex and likely to be subject to greater information asymmetry, and in turn, more severe moral hazard problems than non-diversified firms. We can therefore predict that the negative effect of financial distress risk on compensation is stronger for diversified firms. Our results in Table 6 provide evidence supporting this view. In columns (1) and (2) of Table 6, we observe that the coefficient estimates for *RISKMed* and *RISKHigh* (for the BSM and C&J risk measures) are mostly more strongly negative for our

group of diversified firms than non-diversified firms. Our results show that high financial distress risk has a negative and statistically significant impact on executive total compensation in groups of both diversified and non-diversified firms; however, this negative impact is more pronounced for diversified firms. Further, we find that the coefficient estimates for *RISKMed* and *RISKHigh* (for the Altman risk measure) are mostly negative and statistically insignificant. Columns (3) and (4) show the cash-based estimation results. Similar to the results in columns (1) and (2) for total compensation, we observe that the negative impact of high financial distress risk on cash-based compensation is mostly stronger in diversified firms than non-diversified firms.

We also find similar results for the fraction of equity-based compensation. Columns (5) and (6) report the estimation results for the fraction of equity-based compensation for groups of diversified and non-diversified firms. We observe that the coefficient estimates for *RISKMed* and *RISKHigh* (for the BSM and C&J risk measures) are all negative and statistically significant. Further, similar to the findings for executive total compensation in columns (1) and (2), the magnitudes of the coefficients are greater for diversified firms than non-diversified firms. Moreover, we find that the difference in the coefficient estimates for *RISKMed* and *RISKHigh* (for the BSM and C&J risk measures) between diversified and non-diversified firms is statistically significant.

[Insert Table 6 here]

5.4. Proxies for managerial talent

The existing literature documents that manager heterogeneity, in particular managerial talent, accounts for a significant portion of the variation in executive compensation (e.g., Fernandes et al., 2013; Falato et al., 2015). Thus, as part of our robustness tests, we include various additional controls that capture managerial talent and labour market competitiveness to

mitigate the likelihood that our results are driven by potential omitted-variable bias. We therefore include *Current board positions*, *College degree*, and *MBA degree* as proxies for managerial talent. Table 7 shows that our results are robust to the inclusion of the above controls.[27]

[Insert Table 7 here]

5.5. Median Regressions

In this section, we check the robustness of our main finding of a negative impact of financial distress risk on executive compensation using a median regression model. Table 1 indicates that the mean total compensation is more than twice as large as the median. We therefore re-estimate the baseline model using a median regression, which is widely used in the literature to control for outliers in compensation levels (Aggarwal and Samwick, 1999; Conyon and Murphy, 2000). Table 8 presents our results from the median regressions. We observe that these results are qualitatively similar to those in Table 3.

[Insert Table 8 here]

5.6. Matching Estimation

Even though we focus on the initial compensation packages of newly hired executives, there is still the possibility that our results of a negative impact of financial distress risk on executive compensation could be driven by a potential endogeneity problem. For instance, our sample of firms with high or medium distress risk could be different from those with low distress

[27] Additionally, we focus on our sample of newly hired CEOs and try some alternative CEO-specific variables, i.e., *Age first CEO position*, *media hits*, *past experience as CEO*, which have been used by previous researchers as proxies for managerial talent (e.g., Falato et al., 2015). *Age first CEO position* denotes the age at which the executive had his/her first job as a CEO; *Media hits* is the logarithm of the number of articles that contain the CEO's name and company affiliation in UK and international newspapers in the year before the CEO's appointment, which is used only for externally hired CEOs; *CEO previous experience* is a dummy variable equal to 1 if the executive had a CEO position in the past, and equal to 0 otherwise. Our results remain qualitatively similar when we control for these variables. For brevity, we do not tabulate these results.

risk in a systematic manner. In other words, there could be some underlying factors influencing both initial executive compensation and firms' financial distress risk. To alleviate this concern, we use a propensity score matching estimation as an additional robustness test. We compare the compensation variables for firms with high and medium financial distress risk with those in matched firms with low distress risk. Specifically, we first estimate the probability that a firm is in the high distress risk or medium distress risk group. This probability (i.e., the propensity score) is the predicted value from a logit regression using the same controls as those included in our baseline model.

We then construct a treatment and control group of observations using the one-to-one nearest-neighbour matching method with replacement based on the estimated propensity scores. That is, each firm-year observation with high or medium distress risk (the treatment group) is matched with a firm-year observation with low distress risk (the control group) using the closest propensity score. Overall, as Table 9 demonstrates, our results from the propensity score matching estimation confirm the findings from pooled OLS estimation.[28] The negative and statistically significant values of average treatment effects (ATEs) and the average treatment effects on the treated (ATETs) show that newly hired executives at firms with high (and medium) financial distress risk receive lower total compensation, cash-based compensation and fraction of equity-based compensation than those at firms with low financial distress risk.

As an alternative to this estimation method, we also consider a one-to-one covariate matching method with replacement and rely on the bias-corrected nearest-neighbour matching

[28] In Panel A of Table 9, we drop some observations because they violate the overlap assumption of the propensity score matching estimator, which states that each firm-year should have a positive probability of being subject to each treatment level.

estimator developed by Abadie and Imbens (2011). Our results are qualitatively similar when we use this alternative estimation method (see Table A2).

[Insert Table 9 here]

5.7. Further robustness test

Forced executive turnovers can have a positive impact on compensation, as executives would demand a risk premium for the potential risk of dismissal (Peters and Wagner, 2014). In untabulated tests, we control for forced turnovers in our baseline regression model. Thus, we check whether the executive appointed is replacing an incumbent who has been fired. For this analysis, we restrict our sample to CEOs and CFOs, and include a dummy for forced turnovers, *Forced Turnover*, which is equal to 1 for those CEOs and CFOs who are under 60 and did not take another comparable position within one year of their departure.[29] Our finding that financial distress risk has a negative and statistically significant impact on CEO/ CFO compensation remains robust. We also observe that the coefficient estimate on *Forced Turnover* is positive, but statistically insignificant in total compensation and fraction of equity-based compensation regressions. This evidence mitigates concerns that *Forced Turnover* is a significant omitted variable in our model.

6. Conclusion

This paper investigates the relationship between financial distress risk and the initial executive compensation contracts in UK firms. One distinctive characteristic of the UK setting is that it has highly concentrated debt markets, which can have implications in terms of the

[29] Further, we checked some media reports from Factiva to see whether we could distinguish 'forced' versus 'voluntary' turnovers. However, as prior researchers mention, it is difficult to differentiate clearly between them based on media reports (e.g., Jenter and Lewellen, 2017). We thank the referee for suggesting this alternative definition of forced turnover.

monitoring that creditors can provide for firms with high financial distress risk. Creditors in the UK can play an active role and can come up with a business plan to execute in rescuing firms under high financial distress risk (McCormack, 2007). The main objective is to rescue the firm in a way that best serves the interests of creditors. Thus, executives at firms with high financial distress risk are expected to play a relatively limited strategic role in comparison to those in US firms. It is conceivable that the role of executives is reduced to that of a bureaucrat with low managerial discretion, responsible for executing the business plan put together by creditors (Armour et al., 2002). As Palia (2000) argues, lower managerial discretion reduces returns to managerial skill, and leads to lower compensation.

Employing a sample of 3,614 newly hired executives from 1,117 UK listed non-financial firms, we examine how financial distress risk influences the level and structure of the initial compensation of newly hired executives. We find that newly hired executives in firms with high financial distress risk receive lower levels of total compensation and cash-based compensation. This negative impact of financial distress risk is more pronounced in firms with high bank debt. Our results are consistent with increased monitoring by creditors as financial distress risk increases, putting downward pressure on the level of executive pay. Further, our results show that financial distress risk has a negative and statistically significant impact on the fraction of equity-based compensation. This finding provides support for the view that concentrated credit markets in the UK allow creditors to provide monitoring and reduce risk- shifting incentives when firms face high financial distress risk.

Overall, our findings of a negative relation between financial distress risk and executive total compensation for UK firms complement the findings of a positive relation documented by existing US-based studies. The contrasting findings point to the possibility that the effect of

financial distress risk on executive compensation depends on the institutional environment in which firms operate. In the UK, where debt markets are more concentrated, the effect of bank monitoring on executive compensation seems to be stronger than the effect of human capital risk. Executives at firms with high financial distress risk receive relatively lower compensation, as creditors play an active monitoring role. In the US, however, where debt markets are dispersed, the effect of human capital risk seems to dominate, as newly hired executives at firms with high financial distress risk receive larger compensation than those at firms with low financial distress risk. Given that debt markets are mostly concentrated around the world, our results of the negative relationship between executive compensation and financial distress risk can be generalized to those countries where creditors would be expected to take an active monitoring role at firms with high financial distress risk. Future research could further our understanding of how concentrated credit markets influence the matching between executives and firms in a competitive assignment framework, considering the potential conflicts of interest between different debt holders and equity holders, and the implications of a matching equilibrium for executive compensation in firms with high financial distress risk.

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Appendix

Table A1
Definitions of variables.

Variable	Definition
BSM	Probability of default based on Hillegeist et al. (2004)'s BSM model. (*Source*: Worldscope-Datastream)
C&J	Probability of bankruptcy based on Chava and Jarrow (2004)'s hazard model. (*Source*: Worldscope-Datastream)
Altman	Probability of bankruptcy based on Altman (1968)'s *z*-score model. (*Source*: Worldscope-Datastream)
RISKMed	Dummy variable that equals one for firms with medium levels of estimated distress risk using various models, and zero otherwise. (*Source*: Worldscope-Datastream)
RISKHigh	Dummy variable that equals one for firms with high levels of estimated distress risk using various models, and zero otherwise. (*Source*: Worldscope-Datastream)
Salary	Annual executive salary. (*Source:* Boardex)
Bonus	Annual executive bonuses. (*Source:* Boardex)
Cash-based Compensation	Sum of salary and bonus. (*Source:* Boardex)
Equity-based Compensation	Value of stock awards, long-term incentive plans and Black-Scholes value of options granted during the year. (*Source*: Boardex)
Total Compensation	Sum of cash- and equity-based compensation. (*Source*: Boardex)
Equity-based /Total Compensation	Ratio of equity-based compensation to total compensation.

(*Source*: Boardex)

Delta

GB pound change in the CEO's (or non-CEO executive's) total wealth for a 1% change in the stock price.
(*Source*: Boardex and Worldscope-Datastream).

Deltas and vegas are calculated following the method of Core and Guay (2002) and using the Black–Scholes model. Boardex collects the details of executives' holdings of equity-based incentives from company annual reports. As Ozkan (2011) explains, UK annual reports provide information on the grant date, exercise price, vesting period for the stock option holdings, stock awards and LTIP (Long-term incentive plans), which are available in the Boardex database. We obtain the risk-free rate, the stock return volatility and the dividend yield from Worlscope-Datastream. The time-to-exercise is assumed to be equal to the time-to-maturity of the option. In the rare cases when this variable is not available, it is assumed to be five years. The risk-free rate is the rate on government bonds with a time-to-maturity that matches the time-to-maturity of the option (source: Worldscope-Datastream). The annualized stock return volatility is computed using monthly returns over the previous five years (source: Worldscope-Datastream). At least 12 monthly returns must be non-missing to compute this variable. The dividend yield is based on the average value of the dividends/market value over the past three years. At least one observation of this variable must be non-missing to calculate the dividend yield.

Vega

GB pound change in the CEO's (or non-CEO executive's) option portfolio value for a 0.01 change in stock return volatility.
(*Source*: Boardex and Worldscope-Datastream)

Sales
Sales adjusted for inflation.
(*Source*: Worldscope-Datastream)

Leverage

The ratio of total debt to total assets.
(*Source*: Worldscope-Datastream)

Tobin's Q
Ratio of the market value of a firm's assets to the book value of its assets.
(*Source*: Worldscope-Datastream)

ROA
Ratio of net income before extraordinary items plus interest expenses to the book value of total assets.
(*Source*: Worldscope-Datastream)

Cash Holding
The ratio of cash and short-term investments to the book value of total assets.
(*Source*: Worldscope-Datastream)

Stock Return

Stock return over a one-year period.
(*Source*: Worldscope-Datastream)

Stock Volatility

Standard deviation of monthly stock returns in the past two fiscal years (excluding the current year).
(*Source:* Worldscope-Datastream)

Bank Debt
Ratio of bank debt, which is the sum of term loans and revolving credit, to total debt.
(*Source:* Capital IQ)

Independent Directors

Ratio of the number of independent directors to the total number of board members.
(*Source:* Boardex)

3% or above /Total Institutional Ownership
Share holdings of institutional investors who own 3% or more of the firm's equity divided by total institutional share holdings.
(*Source:* Thomson One Banker)

CEO dummy
Dummy that equals one for new CEOs, and zero otherwise.
(*Source:* Boardex)

Age
Age of the new executive at the time of appointment.
(*Source:* Boardex)

External Hire dummy
Dummy that equals one if the new executive is hired from outside the company, and zero otherwise.
(*Source:* Boardex)

Current Board Positions
Number of current board positions of the executive, including the sample firm.
(*Source:* BoardEx)

College Degree dummy
Dummy that equals one if the executive has a bachelor's degree or higher, and zero otherwise.
(*Source:* BoardEx)

MBA Degree dummy
Dummy that equals one if executive has an MBA degree, and zero otherwise.
(*Source:* Boardex)

Table A2

Bias-corrected nearest-neighbour matching estimator.

This table reports the bias-corrected nearest-neighbour matching estimation results. Panels A, B, and C report the nearest-neighbour matching estimates based on Hillegeist et al. (2004)'s BSM model, Chava and Jarrow (2004)'s hazard model, and Altman (1968)'s *z*-score model, respectively. The outcome variables include: the logarithm of salary, *Ln(Salary)*, logarithm of bonuses, *Ln(Bonus+1)*, logarithm of cash-based pay, *Ln(Cash-based Compensation)*, logarithm of equity-based pay, *Ln(Equity-based Compensation+1)*, logarithm of total compensation, *Ln(Total Compensation)*, fraction of equity-based compensation, *Equity-based/Total Compensation*, executive performance incentives, *Ln(Delta+1)*, and risk-taking incentives, *Ln(Vega+1)*. Both the average treatment effects (ATEs) and the average treatment effects on the treated (ATETs) are reported together with their respective p-values. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

	No. of observations	ATE	*p*-value	ATET	*p*-value
Panel A. High and medium distress risk vs. low distress risk using the BSM model					
Ln(Salary)	3,614	-0.160***	0.000	-0.108***	0.000
Ln(Bonuses+1)	3,614	0.827***	0.004	-0.472	0.206
Ln(Cash-based Compensation)	3,614	-0.157***	0.000	-0.140***	0.000
Ln(Equity-based Compensation+1)	3,614	-1.032***	0.002	-2.481***	0.000
Ln(Total Compensation)	3,614	-0.316***	0.000	-0.490***	0.000
Equity-based /Total Compensation	3,614	-0.086***	0.000	-0.146***	0.000
Ln(Delta+1)	3,614	-1.019***	0.000	-1.467***	0.000
Ln(Vega+1)	3,614	-1.243***	0.000	-1.528***	0.000
Panel B. High and medium distress risk vs. low distress risk using the C&J model					
Ln(Salary)	3,614	-0.054**	0.028	-0.050**	0.046
Ln(Bonuses+1)	3,614	-0.043	0.874	-0.937***	0.003
Ln(Cash-based Compensation)	3,614	-0.057**	0.045	-0.093***	0.005
Ln(Equity-based Compensation+1)	3,614	-0.685**	0.037	-1.134***	0.001
Ln(Total Compensation)	3,614	-0.115***	0.003	-0.153***	0.001
Equity-based /Total Compensation	3,614	-0.032**	0.016	-0.040***	0.001
Ln(Delta+1)	3,614	-0.348***	0.007	-0.725***	0.000
Ln(Vega+1)	3,614	-0.445*	0.050	-0.459**	0.028
Panel C. High and medium distress risk vs. low distress risk using the Altman model					
Ln(Salary)	3,614	0.061**	0.016	-0.020	0.449
Ln(Bonuses+1)	3,614	-0.854**	0.011	-0.816***	0.009
Ln(Cash-based Compensation)	3,614	0.039	0.191	-0.053	0.105
Ln(Equity-based Compensation+1)	3,614	1.132***	0.000	-0.400	0.251
Ln(Total Compensation)	3,614	0.061	0.117	-0.093*	0.050
Equity-based /Total Compensation	3,614	0.023*	0.068	-0.018	0.205
Ln(Delta+1)	3,614	-0.561***	0.000	-0.786***	0.000
Ln(Vega+1)	3,614	-0.018	0.935	-0.522**	0.013

Table 1
Descriptive statistics.
This table reports summary statistics of the variables used in this study. Our sample consists of 3,614 new executive appointments from 1,117 UK listed non-financial companies. All variables are defined in Table A1.

	No. of observations	Mean	Median	Std Dev	Min	Max
Financial Distress Risk Measures						
BSM	3,614	0.012	0.000	0.042	0.000	0.289
C&J	3,614	0.005	0.002	0.012	0.000	0.095
Altman	3,614	0.158	0.063	0.242	0.000	1.000
Executive Compensation						
Salary (£000)	3,614	208.304	162.455	143.361	43.935	770.140
Bonus (£000)	3,614	87.551	28.460	149.953	0.000	873.239
Cash-based Compensation (£000)	3,614	295.735	204.352	267.118	47.170	1,470.968
Equity-based Compensation (£000)	3,614	227.362	36.019	506.578	0.000	3,362.000
Total Compensation (£000)	3,614	526.121	267.281	717.812	49.853	4,444.898
Equity-based/Total Compensation	3,614	0.229	0.171	0.243	0.000	0.842
Delta (£000)	3,614	19.333	4.864	43.834	0.000	293.292
Vega (£000)	3,614	3.055	0.640	6.541	0.000	42.123
Firm-Specific Variables						
Sales (£m)	3,614	1,227.385	95.277	3,279.338	0.000	21,411.950
Leverage	3,614	0.180	0.143	0.178	0.000	0.829
ROA	3,614	-0.036	0.042	0.255	-1.366	0.259
Tobin's Q	3,614	2.104	1.516	1.769	0.601	11.399
Cash Holding	3,614	0.185	0.100	0.218	0.000	0.932
Stock Return	3,614	0.062	0.026	0.514	-0.876	1.967
Stock Volatility	3,614	0.433	0.374	0.236	0.122	1.337
Bank Debt	2,622	0.669	0.919	0.401	0.000	1.000
Governance Variables						
Independent Directors	3,614	0.371	0.400	0.191	0.000	0.929
3% or above/Total Institutional Ownership	3,614	0.547	0.592	0.263	0.000	0.987
Executive-Specific Characteristics						
CEO dummy	3,614	0.293	0.000	0.455	0.000	1.000
Age	3,614	47.617	47.000	7.544	26.000	79.000
External Hire dummy	3,614	0.460	0.000	0.498	0.000	1.000
Current Board Positions	2,423	1.235	1.000	0.618	1.000	7.000
College Degree dummy	2,423	0.789	1.000	0.408	0.000	1.000
MBA Degree dummy	2,423	0.136	0.000	0.343	0.000	1.000

Table 2

Descriptive statistics for compensation variables by decile of financial distress risk.

This table presents the means (medians) of the executive compensation variables by decile for the three distress risk measures (probability of default/bankruptcy) employed. The compensation variables include salary, bonus, cash-based compensation, equity-based compensation, total compensation, fraction of equity-based compensation, delta and vega. The results in each panel are based on different models for determining the probability of default/bankruptcy. Panel A is based on Hillegeist et al. (2004)'s BSM model; Panel B is based on Chava and Jarrow (2004)'s hazard model; and Panel C is based on Altman (1968)'s *z*-score model.

Panel A: *BSM* by decile

Decile	No. of observations	*BSM*	*Salary*	*Bonus*	*Cash-based Compensation*	*Equity-based Compensation*	*Total Compensation*	*Equity-based /Total Compensation*	*Delta*	*Vega*
1	362	0.000	179.508	71.128	250.825	201.627	453.133	0.218	27.194	2.834
		(0.000)	(144.613)	(24.958)	(185.503)	(9.376)	(229.858)	(0.074)	(7.826)	(0.869)
2	363	0.000	207.978	102.176	310.195	327.683	637.605	0.297	25.935	4.053
		(0.000)	(160.313)	(55.843)	(224.490)	(91.887)	(341.826)	(0.291)	(8.126)	(1.140)
3	360	0.000	219.607	115.091	334.868	285.593	632.732	0.265	28.082	3.232
		(0.000)	(169.082)	(62.987)	(243.201)	(76.763)	(357.715)	(0.275)	(8.121)	(1.039)
4	361	0.000	221.810	110.087	331.464	268.333	600.663	0.241	22.914	3.550
		(0.000)	(173.469)	(45.113)	(230.361)	(51.363)	(301.866)	(0.208)	(5.894)	(0.766)
5	362	0.000	204.638	96.963	300.890	235.244	536.953	0.241	19.705	3.436
		(0.000)	(166.573)	(39.297)	(218.853)	(41.837)	(261.370)	(0.185)	(6.080)	(0.848)
6	361	0.000	237.021	112.448	350.378	275.633	620.376	0.267	18.640	4.448
		(0.000)	(192.571)	(43.433)	(247.959)	(82.949)	(353.503)	(0.258)	(6.401)	(1.368)
7	361	0.000	217.375	85.171	301.958	196.566	502.539	0.214	14.320	3.054
		(0.000)	(169.110)	(25.415)	(205.279)	(32.909)	(259.928)	(0.134)	(4.369)	(0.668)
8	362	0.001	217.980	83.095	299.746	224.020	535.179	0.214	19.578	2.695
		(0.001)	(169.851)	(12.579)	(198.556)	(31.923)	(263.186)	(0.145)	(4.152)	(0.383)
9	361	0.009	192.253	60.315	251.952	168.067	425.567	0.185	9.492	2.349
		(0.008)	(150.000)	(2.123)	(178.606)	(7.373)	(210.289)	(0.065)	(2.422)	(0.230)
10	361	0.109	184.962	39.061	225.199	90.518	316.287	0.149	7.432	0.894
		(0.077)	(145.812)	(0.000)	(156.682)	(0.922)	(177.282)	(0.007)	(1.101)	(0.115)

Panel B: *C&J* by decile

Decile	No. of observations	*C&J*	*Salary*	*Bonus*	*Cash-based Compensation*	*Equity-based Compensation*	*Total Compensation*	*Equity-based /Total Compensation*	*Delta*	*Vega*
1	363	0.001	220.213	106.690	327.624	433.778	770.110	0.285	39.235	5.509
		(0.001)	(151.992)	(28.000)	(204.301)	(55.202)	(302.999)	(0.250)	(11.380)	(1.168)
2	362	0.001	195.557	95.198	292.129	244.950	543.652	0.245	25.139	3.254
		(0.001)	(157.831)	(36.918)	(203.705)	(51.904)	(271.258)	(0.224)	(5.971)	(0.878)
3	360	0.001	221.869	104.995	325.531	243.615	575.669	0.246	18.875	3.478
		(0.001)	(172.214)	(40.61)	(213.894)	(47.564)	(302.009)	(0.197)	(6.497)	(1.402)
4	362	0.002	225.319	99.102	324.550	234.655	558.127	0.257	23.014	3.539
		(0.002)	(185.666)	(47.980)	(240.942)	(76.288)	(332.366)	(0.252)	(6.244)	(1.051)
5	360	0.002	219.475	99.875	318.087	298.315	615.554	0.273	17.720	3.451
		(0.002)	(167.357)	(41.272)	(220.105)	(69.678)	(316.038)	(0.236)	(5.544)	(0.901)
6	362	0.002	214.239	92.798	305.595	194.665	504.424	0.223	18.268	2.633
		(0.002)	(166.550)	(40.614)	(223.373)	(42.164)	(281.720)	(0.207)	(4.754)	(0.833)
7	362	0.003	207.325	84.004	290.834	195.629	486.991	0.213	16.467	2.686
		(0.003)	(169.759)	(35.866)	(207.518)	(39.916)	(252.283)	(0.160)	(3.892)	(0.756)
8	361	0.004	207.226	85.563	291.014	167.278	464.406	0.203	14.591	2.366
		(0.003)	(163.265)	(20.964)	(203.324)	(30.564)	(264.565)	(0.168)	(4.166)	(0.462)
9	362	0.005	197.191	66.317	266.095	161.479	427.107	0.195	11.028	2.345
		(0.005)	(156.075)	(12.659)	(193.224)	(10.138)	(239.979)	(0.083)	(3.434)	(0.296)
10	360	0.026	174.538	40.814	215.633	98.292	313.92	0.151	8.855	1.276
		(0.012)	(138.249)	(0.000)	(151.968)	(0.000)	(170.046)	(0.000)	(1.477)	(0.087)

Panel C: *Altman* by decile

Decile	No. of observations	*Altman*	*Salary*	*Bonus*	*Cash-based Compensation*	*Equity-based Compensation*	*Total Compensation*	*Equity-based /Total Compensation*	*Delta*	*Vega*
1	362	0.000	151.424	59.426	210.342	202.855	420.815	0.220	30.176	2.776
		(0.000)	(117.302)	(9.888)	(141.486)	(0.000)	(178.264)	(0.000)	(7.624)	(0.803)
2	361	0.003	173.350	62.631	235.987	163.000	400.873	0.204	25.457	2.581
		(0.003)	(146.628)	(22.449)	(186.246)	(9.775)	(225.367)	(0.052)	(6.677)	(1.052)
3	362	0.013	207.090	91.748	297.879	225.981	521.800	0.221	30.691	2.629
		(0.013)	(161.255)	(43.608)	(209.793)	(37.327)	(269.710)	(0.162)	(8.297)	(0.354)
4	361	0.029	230.981	120.711	351.032	294.369	644.249	0.246	26.524	3.892
		(0.028)	(188.211)	(51.000)	(243.187)	(64.516)	(328.679)	(0.240)	(6.962)	(1.014)
5	361	0.051	225.223	112.790	336.867	274.312	611.074	0.257	20.108	3.921
		(0.051)	(178.700)	(45.648)	(239.917)	(73.040)	(327.551)	(0.245)	(4.945)	(0.883)
6	362	0.079	227.732	93.961	323.162	229.043	560.864	0.246	14.764	3.097
		(0.077)	(189.036)	(41.063)	(235.003)	(77.466)	(317.207)	(0.233)	(4.673)	(0.816)
7	362	0.123	234.732	97.661	332.814	291.720	629.000	0.263	14.240	3.632
		(0.122)	(196.100)	(44.007)	(253.188)	(65.479)	(331.589)	(0.240)	(5.789)	(1.050)
8	361	0.180	244.166	115.464	359.550	255.545	617.276	0.249	13.107	3.526
		(0.178)	(191.705)	(46.931)	(244.000)	(67.347)	(363.134)	(0.229)	(4.469)	(0.722)
9	361	0.301	228.296	83.322	311.580	221.905	543.071	0.235	12.603	3.185
		(0.295)	(178.904)	(15.924)	(230.415)	(37.000)	(302.304)	(0.175)	(2.985)	(0.406)
10	361	0.800	160.075	37.815	198.186	114.782	312.110	0.151	5.624	1.311
		(0.892)	(127.000)	(0.000)	(135.000)	(0.000)	(151.862)	(0.000)	(0.997)	(0.141)

Table 3

Baseline regressions of executive compensation on financial distress risk, firm, executive, and governance characteristics.

This table examines the relation between various measures of executive compensation and financial distress risk. Dependent variables are the logarithm of salary, *Ln(Salary)*, logarithm of bonuses, *Ln(Bonus+1)*, and logarithm of cash-based compensation, *Ln(Cash-based Compensation)*, for Panel A; the logarithm of equity-based compensation, *Ln(Equity-based Compensation+1)*, logarithm of total compensation, *Ln(Total Compensation)*, and fraction of equity-based compensation, *Equity-based /Total Compensation*, for Panel B; measure of executive performance incentives, *Ln(Delta+1)*, and risk-taking incentives, *Ln(Vega+1)*, for Panel C. We use OLS regressions to estimate salary, cash-based compensation, and total compensation and Tobit regressions for bonus, equity-based compensation, fraction of equity-based compensation, delta, and vega. The independent variables of main interest are *RISKMed* and *RISKHigh*, which are dummy variables equal to one for firms with medium and high levels of financial distress risk, respectively. The three financial distress risk measures are computed using Hillegeist et al. (2004)'s BSM model, Chava and Jarrow (2004)'s hazard model, and Altman (1968)'s z-score model, respectively. Variable definitions are provided in Table A1 of the Appendix. *t* -Statistics (in parentheses) are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. All regressions include industry dummies that are based on the 12 Fama-French industries, and year dummies.

Panel A: Components of executive compensation and financial distress risk

	Dependent Variable: *Ln(Salary)*			Dependent Variable: *Ln(Bonus+1)*			Dependent Variable: *Ln(Cash-based Compensation)*		
	BSM	*C&J*	*Altman*	*BSM*	*C&J*	*Altman*	*BSM*	*C&J*	*Altman*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
RISKMed	-0.094***	-0.084***	-0.024	-1.403**	-0.900	-1.989***	-0.142***	-0.111***	-0.0754
	(-2.586)	(-2.776)	(-0.616)	(-2.120)	(-1.503)	(-2.803)	(-3.143)	(-2.918)	(-1.540)
RISKHigh	-0.101**	-0.154***	-0.007	-1.730*	-2.324***	-0.745	-0.147**	-0.214***	-0.0212
	(-2.038)	(-4.023)	(-0.193)	(-1.849)	(-3.132)	(-1.024)	(-2.472)	(-4.627)	(-0.450)
Ln(Sales)	0.061***	0.061***	0.060***	0.583***	0.575***	0.553***	0.074***	0.074***	0.072***
	(11.850)	(12.100)	(11.810)	(6.413)	(6.375)	(6.098)	(11.400)	(11.590)	(11.270)
Leverage	0.319***	0.368***	0.304***	3.390***	4.102***	3.887***	0.435***	0.500***	0.429***
	(4.536)	(5.233)	(4.268)	(3.114)	(3.551)	(3.502)	(4.965)	(5.624)	(4.877)
ROA	0.082**	0.064	0.078*	1.598*	1.357	1.217	0.161***	0.136***	0.149***
	(1.986)	(1.531)	(1.773)	(1.716)	(1.460)	(1.275)	(3.159)	(2.643)	(2.730)
Tobin's Q	-0.008	-0.005	-0.005	0.086	0.138	0.0761	0.001	0.005	0.003
	(-1.121)	(-0.668)	(-0.793)	(0.748)	(1.232)	(0.675)	(0.082)	(0.628)	(0.364)
Cash Holding	0.243***	0.254***	0.255***	3.956***	4.184***	4.155***	0.318***	0.335***	0.336***
	(3.585)	(3.841)	(3.840)	(3.333)	(3.562)	(3.530)	(3.698)	(3.983)	(3.972)
Stock Return	-0.024	-0.034*	-0.013	2.338***	2.230***	2.426***	0.069***	0.057**	0.084***
	(-1.202)	(-1.690)	(-0.661)	(6.082)	(5.769)	(6.472)	(2.641)	(2.185)	(3.209)
Stock Volatility	0.044	0.004	-0.064	-6.257***	-7.133***	-7.726***	-0.050	-0.115*	-0.202***
	(0.594)	(0.086)	(-1.244)	(-4.311)	(-6.266)	(-6.952)	(-0.538)	(-1.785)	(-3.155)
Independent Directors	0.829***	0.812***	0.834***	5.794***	5.582***	5.807***	1.005***	0.982***	1.010***
	(12.140)	(11.860)	(12.220)	(5.076)	(4.871)	(5.074)	(11.740)	(11.440)	(11.820)
3% or above /Total Institutional	-0.321***	-0.322***	-0.326***	-1.340*	-1.361*	-1.456*	-0.421***	-0.423***	-0.429***

Ownership									
	(-6.286)	(-6.391)	(-6.360)	(-1.738)	(-1.775)	(-1.899)	(-6.367)	(-6.492)	(-6.460)
CEO dummy	0.356***	0.361***	0.357***	0.534**	0.601**	0.557**	0.380***	0.388***	0.382***
	(25.830)	(26.110)	(25.850)	(2.235)	(2.514)	(2.332)	(22.040)	(22.420)	(22.110)
Age	0.008***	0.008***	0.008***	-0.059***	-0.061***	-0.059***	0.007***	0.007***	0.007***
	(6.955)	(6.910)	(7.016)	(-3.074)	(-3.148)	(-3.087)	(5.159)	(5.077)	(5.216)
External Hire dummy	0.007	0.009	0.005	0.215	0.224	0.171	0.005	0.007	0.002
	(0.402)	(0.504)	(0.312)	(0.733)	(0.763)	(0.581)	(0.218)	(0.315)	(0.104)
Intercept	10.480***	10.490***	10.550***	-4.408*	-3.834	-3.299	10.350***	10.380***	10.480***
	(63.030)	(64.630)	(63.790)	(-1.661)	(-1.458)	(-1.253)	(49.140)	(50.080)	(50.300)
No. of observations	3,614	3,614	3,614	3,614	3,614	3,614	3,614	3,614	3,614
Adjusted R^2	0.533	0.536	0.531	–	–	–	0.518	0.521	0.516

Panel B: Equity-based compensation, total compensation and financial distress risk

	Dependent Variable: *Ln(Equity-based Compensation)*			Dependent Variable: *Ln(Total Compensation)*			Dependent Variable: *Equity-based /Total Compensation*		
	BSM	*C&J*	*Altman*	*BSM*	*C&J*	*Altman*	*BSM*	*C&J*	*Altman*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
RISKMed	-1.663**	-1.539**	-0.766	-0.234***	-0.169***	-0.081	-0.085***	-0.062**	-0.013
	(-2.223)	(-2.259)	(-1.021)	(-3.686)	(-3.171)	(-1.166)	(-2.913)	(-2.287)	(-0.440)
RISKHigh	-3.428***	-3.114***	-0.935	-0.303***	-0.323***	-0.078	-0.154***	-0.124***	-0.054*
	(-3.388)	(-3.799)	(-1.156)	(-3.693)	(-4.968)	(-1.202)	(-3.965)	(-3.797)	(-1.668)
Ln(Sales)	0.438***	0.421***	0.398***	0.088***	0.087***	0.084***	0.016***	0.015***	0.014***
	(4.664)	(4.550)	(4.268)	(9.909)	(9.988)	(9.627)	(3.894)	(3.729)	(3.493)
Leverage	4.642***	5.479***	4.455***	0.611***	0.698***	0.587***	0.181***	0.210***	0.166***
	(3.815)	(4.292)	(3.579)	(4.975)	(5.598)	(4.733)	(3.609)	(4.029)	(3.199)
ROA	0.0574	-0.360	-0.421	0.150**	0.111	0.113	0.000	-0.017	-0.025
	(0.063)	(-0.402)	(-0.441)	(1.969)	(1.439)	(1.424)	(-0.002)	(-0.451)	(-0.646)
Tobin's Q	0.145	0.215	0.183	0.015	0.023*	0.020	0.011*	0.015**	0.014**
	(1.041)	(1.574)	(1.314)	(1.162)	(1.791)	(1.537)	(1.853)	(2.421)	(2.216)
Cash Holding	0.165	0.530	0.519	0.332***	0.366***	0.366***	-0.006	0.010	0.010
	(0.119)	(0.384)	(0.375)	(2.890)	(3.241)	(3.221)	(-0.111)	(0.185)	(0.173)
Stock Return	1.014**	0.932**	1.268***	0.155***	0.144***	0.182***	0.066***	0.066***	0.078***
	(2.339)	(2.156)	(2.958)	(3.977)	(3.704)	(4.688)	(3.591)	(3.559)	(4.260)
Stock Volatility	2.378	0.369	-0.663	0.082	-0.092	-0.210**	0.115*	0.016	-0.021
	(1.566)	(0.331)	(-0.598)	(0.616)	(-0.998)	(-2.261)	(1.841)	(0.345)	(-0.459)
Independent Directors	11.100***	10.800***	11.190***	1.419***	1.388***	1.428***	0.457***	0.446***	0.461***
	(8.800)	(8.507)	(8.905)	(12.230)	(11.910)	(12.280)	(8.873)	(8.592)	(8.942)
3% or above /Total Institutional Ownership	-0.667	-0.775	-0.882	-0.507***	-0.515***	-0.522***	-0.050	-0.055	-0.059
	(-0.727)	(-0.844)	(-0.962)	(-5.685)	(-5.834)	(-5.794)	(-1.351)	(-1.500)	(-1.600)
CEO dummy	-0.671**	-0.579**	-0.666**	0.378***	0.389***	0.380***	-0.023**	-0.020*	-0.023*
	(-2.283)	(-1.974)	(-2.258)	(15.910)	(16.300)	(15.920)	(-1.976)	(-1.653)	(-1.944)
Age	-0.095***	-0.097***	-0.094***	0.005**	0.005**	0.005**	-0.004***	-0.004***	-0.004***
	(-4.174)	(-4.220)	(-4.085)	(2.498)	(2.421)	(2.540)	(-4.060)	(-4.103)	(-3.968)
External Hire dummy	0.132	0.147	0.071	0.016	0.018	0.010	0.013	0.013	0.010
	(0.393)	(0.437)	(0.211)	(0.536)	(0.613)	(0.337)	(0.958)	(0.986)	(0.732)
Intercept	-3.745	-2.553	-2.137	10.310***	10.390***	10.520***	-0.222*	-0.167	-0.152
	(-1.232)	(-0.855)	(-0.704)	(36.630)	(37.700)	(37.590)	(-1.751)	(-1.338)	(-1.205)
No. of observations	3,614	3,614	3,614	3,614	3,614	3,614	3,614	3,614	3,614
Adjusted R^2	–	–	–	0.455	0.458	0.451	–	–	–

Panel C: Delta, vega and financial distress risk

	Dependent Variable: *Ln(Delta+1)*			Dependent Variable: *Ln(Vega+1)*		
	BSM (1)	*C&J* (2)	*Altman* (3)	*BSM* (4)	*C&J* (5)	*Altman* (6)
RISKMed	-0.328*	-0.429***	-0.598***	-0.874**	-0.237	0.079
	(-1.839)	(-2.648)	(-3.075)	(-2.516)	(-0.765)	(0.222)
RISKHigh	-1.080***	-0.875***	-1.196***	-1.954***	-1.407***	-0.840**
	(-4.221)	(-3.936)	(-5.673)	(-4.179)	(-3.620)	(-2.238)
Ln(Sales)	0.087***	0.082***	0.075***	0.049	0.035	0.029
	(4.511)	(4.376)	(4.037)	(1.322)	(0.968)	(0.782)
Leverage	0.131	0.376	0.397	0.681	0.939	0.466
	(0.405)	(1.098)	(1.174)	(0.997)	(1.362)	(0.670)
ROA	0.955***	0.833***	0.429*	0.221	0.032	-0.147
	(4.314)	(3.700)	(1.814)	(0.524)	(0.075)	(-0.327)
Tobin's Q	0.179***	0.198***	0.170***	0.009	0.051	0.039
	(4.932)	(5.608)	(4.687)	(0.142)	(0.786)	(0.584)
Cash Holding	1.108***	1.225***	1.196***	0.648	0.888	0.856
	(3.704)	(4.122)	(4.009)	(1.089)	(1.488)	(1.436)
Stock Return	0.637***	0.614***	0.638***	0.066	0.093	0.203
	(6.217)	(6.092)	(6.438)	(0.340)	(0.475)	(1.056)
Stock Volatility	-0.633*	-1.253***	-1.177***	0.561	-0.754	-1.082**
	(-1.739)	(-4.453)	(-4.279)	(0.825)	(-1.419)	(-2.120)
Independent Directors	2.040***	1.961***	2.002***	2.365***	2.259***	2.393***
	(6.492)	(6.165)	(6.377)	(3.730)	(3.523)	(3.731)
3% or above /Total Institutional Ownership	-0.674***	-0.715***	-0.715***	-0.031	-0.144	-0.127
	(-2.860)	(-3.056)	(-3.064)	(-0.075)	(-0.344)	(-0.301)
CEO dummy	0.881***	0.903***	0.884***	0.207	0.242	0.210
	(10.940)	(11.220)	(11.050)	(1.390)	(1.615)	(1.394)
Age	0.027***	0.027***	0.027***	-0.027**	-0.027**	-0.026**
	(4.214)	(4.207)	(4.160)	(-2.251)	(-2.222)	(-2.183)
External Hire dummy	-0.170*	-0.167*	-0.212**	-0.347*	-0.357**	-0.391**
	(-1.847)	(-1.822)	(-2.298)	(-1.951)	(-2.022)	(-2.194)
Intercept	4.411***	4.750***	4.970***	3.626**	4.291***	4.481***
	(6.523)	(7.250)	(7.447)	(2.461)	(2.968)	(3.074)
No. of observations	3,614	3,614	3,614	3,614	3,614	3,614

Table 4

Regressions of executive compensation on financial distress risk, firm, executive, and governance characteristics for *low bank debt* and *high bank debt* firms.

This table examines the relation between various measures of executive compensation and financial distress risk for *low bank debt* firms and *high bank debt* firms, respectively. Dependent variables are the logarithm of total compensation, *Ln(Total Compensation)*, logarithm of cash-based compensation, *Ln(Cash-based Compensation)*, and fraction of equity-based compensation, *Equity-based/Total Compensation*. We use OLS regressions to estimate total compensation and cash-based compensation, and Tobit regressions for the fraction of equity-based compensation. *RISKMed* and *RISKHigh* are dummy variables equal to one for firms with medium and high levels of distress risk, respectively. The three financial distress risk indicators are based on Hillegeist et al. (2004)'s BSM model, Chava and Jarrow (2004)'s hazard model and Altman (1968)'s *z*-score model. The *high bank debt* group includes firms with both the ratio of bank debt to total debt and leverage above the sample median, while the *low bank debt* group consists of firms that have both the ratio of bank debt to total debt and leverage below the median. For brevity, we report only the coefficients for the financial distress risk variables. The same set of controls as in Table 3 is included. Variable definitions are provided in Table A1 of the Appendix. *t* -Statistics are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. All regressions include industry dummies that are based on the 12 Fama-French industries, and year dummies.

	Dependent Variable: *Ln(Total Compensation)*		Dependent Variable: *Ln(Cash-based Compensation)*		Dependent Variable: *Equity-based /Total Compensation*	
	Low bank debt (1)	High bank debt (2)	Low bank debt (3)	High bank debt (4)	Low bank debt (5)	High bank debt (6)
RISKMed (BSM)	-0.137	-0.328***	-0.054	-0.289***	-0.137	-0.038
	(-0.932)	(-3.406)	(-0.524)	(-4.196)	(-1.417)	(-0.814)
RISKHigh (BSM)	0.034	-0.452***	0.056	-0.324***	-0.109	-0.137**
	(0.155)	(-3.285)	(0.372)	(-2.961)	(-0.725)	(-2.253)
No. of observations	656	760	656	760	656	760
Adjusted R^2	0.302	0.525	0.383	0.556	–	–
RISKMed (C&J)	-0.173	-0.142*	-0.069	-0.123**	-0.200*	-0.031
	(-1.190)	(-1.692)	(-0.649)	(-1.980)	(-1.920)	(-0.825)
RISKHigh (C&J)	-0.103	-0.347***	-0.071	-0.256***	-0.087	-0.066
	(-0.832)	(-3.366)	(-0.882)	(-3.429)	(-0.907)	(-1.327)
No. of observations	656	760	656	760	656	760
Adjusted R^2	0.302	0.522	0.383	0.552	–	–
RISKMed (Altman)	0.162	-0.080	0.094	-0.052	0.096	-0.028
	(0.773)	(-0.897)	(0.659)	(-0.758)	(0.939)	(-0.572)
RISKHigh (Altman)	-0.040	-0.053	0.029	0.016	-0.059	-0.077
	(-0.357)	(-0.402)	(0.351)	(0.177)	(-0.792)	(-1.089)
No. of observations	656	760	656	760	656	760
Adjusted R^2	0.302	0.512	0.383	0.542	–	–

Table 5

Regressions of executive compensation for different subsamples based on executive characteristics.

This table examines the relation between various measures of executive compensation and financial distress risk for different subsamples based on executive characteristics. Dependent variables are the logarithm of total compensation, *Ln(Total Compensation)*, logarithm of cash-based compensation, *Ln(Cash-based Compensation)*, and fraction of equity-based compensation, *Equity-based/Total Compensation*. Panels A and B present the results of OLS regressions of *ln (Total Compensation)* and *ln (Cash-based Compensation)*, respectively, and Panel C presents the results of Tobit regressions of *Equity-based /Total Compensation*. *RISKMed* and *RISKHigh* are dummy variables equal to one for firms with medium and high levels of distress risk, respectively. The three financial distress risk indicators are based on Hillegeist et al. (2004)'s BSM model, Chava and Jarrow (2004)'s hazard model and Altman (1968)'s *z*-score model. For brevity, we report only the coefficients for the financial distress risk variables. The same set of controls as in Table 3 is included. Variable definitions are provided in Table A1 of the Appendix. *t*-Statistics are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. All regressions include industry dummies that are based on the 12 Fama-French industries, and year dummies.

	CEOs only	Non-CEO executives only	Internal promotions	External hires	Executive age above median	Executive age below median
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Dependent variable: *Ln(Total Compensation)*						
RISKMed (BSM)	-0.227**	-0.233***	-0.311***	-0.151*	-0.245***	-0.233***
	(-2.491)	(-3.537)	(-3.744)	(-1.945)	(-2.969)	(-3.010)
RISKHigh (BSM)	-0.349***	-0.275***	-0.331***	-0.263**	-0.336***	-0.291***
	(-3.116)	(-3.177)	(-3.264)	(-2.484)	(-3.221)	(-3.056)
No. of observations	1,059	2,555	1,952	1,662	1,930	1,684
Adjusted R^2	0.440	0.457	0.495	0.433	0.480	0.433
RISKMed (C&J)	-0.169**	-0.167***	-0.244***	-0.082	-0.198***	-0.167***
	(-2.073)	(-2.882)	(-3.658)	(-1.207)	(-2.632)	(-2.794)
RISKHigh (C&J)	-0.328***	-0.308***	-0.335***	-0.293***	-0.397***	-0.265***
	(-4.020)	(-4.420)	(-3.658)	(-3.967)	(-4.552)	(-3.690)
No. of observations	1,059	2,555	1,952	1,662	1,930	1,684
Adjusted R^2	0.442	0.459	0.497	0.437	0.485	0.435
RISKMed (Altman)	-0.209**	-0.020	-0.093	-0.028	-0.108	-0.043
	(-2.387)	(-0.271)	(-1.084)	(-0.354)	(-1.277)	(-0.538)
RISKHigh (Altman)	-0.048	-0.091	-0.095	-0.030	-0.105	-0.056
	(-0.517)	(-1.308)	(-1.099)	(-0.362)	(-1.173)	(-0.759)
No. of observations	1,059	2,555	1,952	1,662	1,930	1,684
Adjusted R^2	0.437	0.452	0.489	0.430	0.476	0.428

Panel B. Dependent variable: *Ln(Cash-based Compensation)*

	CEOs only (1)	Non-CEO executives only (2)	Internal promotions (3)	External hires (4)	Executive age above median (5)	Executive age below median (6)
RISKMed (BSM)	-0.140**	-0.139***	-0.198***	-0.077	-0.154***	-0.143**
	(-2.077)	(-2.982)	(-3.377)	(-1.370)	(-2.766)	(-2.438)
RISKHigh (BSM)	-0.179**	-0.130**	-0.158**	-0.127	-0.163**	-0.149**
	(-2.125)	(-2.037)	(-2.131)	(-1.640)	(-2.286)	(-1.963)
No. of observations	1,059	2,555	1,952	1,662	1,930	1,684
Adjusted R^2	0.503	0.507	0.540	0.511	0.544	0.484
RISKMed (C&J)	-0.108*	-0.110***	-0.168***	-0.046	-0.133***	-0.116**
	(-1.718)	(-2.757)	(-3.307)	(-0.970)	(-2.922)	(-2.216)
RISKHigh (C&J)	-0.214***	-0.205***	-0.216***	-0.199***	-0.197***	-0.254***
	(-3.480)	(-4.146)	(-3.325)	(-3.748)	(-3.972)	(-3.954)
No. of observations	1,059	2,555	1,952	1,662	1,930	1,684
Adjusted R^2	0.506	0.510	0.543	0.515	0.548	0.487
RISKMed (Altman)	-0.176***	-0.029	-0.115*	-0.010	-0.044	-0.097
	(-2.807)	(-0.560)	(-1.834)	(-0.181)	(-0.788)	(-1.592)
RISKHigh (Altman)	0.026	-0.046	-0.045	0.025	-0.013	-0.039
	(0.377)	(-0.883)	(-0.732)	(0.420)	(-0.246)	(-0.614)
No. of observations	1,059	2,555	1,952	1,662	1,930	1,684
Adjusted R^2	0.504	0.504	0.538	0.510	0.543	0.481

Panel C. Dependent variable: *Equity-based /Total Compensation*

	CEOs only (1)	Non-CEO executives only (2)	Internal promotions (3)	External hires (4)	Executive age above median (5)	Executive age below median (6)
RISKMed (BSM)	-0.053	-0.094***	-0.088***	-0.087**	-0.108***	-0.051
	(-1.150)	(-3.064)	(-2.584)	(-1.996)	(-2.680)	(-1.437)
RISKHigh (BSM)	-0.166***	-0.144***	-0.148***	-0.161***	-0.198***	-0.109**
	(-2.978)	(-3.389)	(-3.354)	(-2.761)	(-3.949)	(-2.296)
No. of observations	1,059	2,555	1,952	1,662	1,930	1,684
RISKMed (C&J)	-0.066	-0.061**	-0.068**	-0.041	-0.106***	-0.017
	(-1.542)	(-2.050)	(-2.167)	(-1.028)	(-2.639)	(-0.554)
RISKHigh (C&J)	-0.130***	-0.118***	-0.113***	-0.129***	-0.203***	-0.048
	(-2.705)	(-3.354)	(-2.657)	(-2.975)	(-4.795)	(-1.199)
No. of observations	1,059	2,555	1,952	1,662	1,930	1,684
RISKMed (Altman)	-0.074	0.011	0.024	-0.040	-0.028	0.008
	(-1.635)	(0.360)	(0.702)	(-0.938)	(-0.749)	(0.198)
RISKHigh (Altman)	-0.097*	-0.031	-0.050	-0.041	-0.058	-0.040
	(-1.864)	(-0.937)	(-1.207)	(-0.902)	(-1.269)	(-1.012)
No. of observations	1,059	2,555	1,952	1,662	1,930	1,684

Table 6

Regressions of executive compensation for subsamples based on corporate diversification.

This table examines the relation between various measures of executive compensation and financial distress risk for diversified firms and non-diversified firms, respectively. Diversified firms are firms that operate in two or more four-digit SIC code industries and non-diversified firms are those operate in only one four-digit SIC code industry. Dependent variables are the logarithm of total compensation, *Ln(Total Compensation)*, logarithm of cash-based compensation, *Ln(Cash-based Compensation)*, and fraction of equity-based compensation, *Equity-based/Total Compensation*. We use OLS regressions to estimate total compensation and cash-based compensation, and Tobit regressions for the fraction of equity-based compensation. *RISKMed* and *RISKHigh* are dummy variables equal to one for firms with medium and high levels of distress risk, respectively. The three financial distress risk indicators are based on Hillegeist et al. (2004)'s BSM model, Chava and Jarrow (2004)'s hazard model and Altman (1968)'s *z*-score model. For brevity, we report only the coefficients for the financial distress risk variables. The same set of controls as in Table 3 is included. Variable definitions are provided in Table A1 of the Appendix. *t*- Statistics are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. All regressions include industry dummies that are based on the 12 Fama-French industries, and year dummies.

	Dependent Variable: *Ln(Total Compensation)*		Dependent Variable: *Ln(Cash-based Compensation)*		Dependent Variable: *Equity-based/Total Compensation*	
	Diversified (1)	Non-diversified (2)	Diversified (3)	Non-diversified (4)	Diversified (5)	Non-diversified (6)
RISKMed (BSM)	-0.208**	-0.261***	-0.104*	-0.171***	-0.092**	-0.091**
	(-2.330)	(-3.351)	(-1.815)	(-2.964)	(-2.270)	(-2.254)
RISKHigh (BSM)	-0.625***	-0.135	-0.325***	-0.051	-0.245***	-0.096*
	(-4.565)	(-1.354)	(-3.578)	(-0.679)	(-4.282)	(-1.783)
No. of observations	1,606	2,008	1,606	2,008	1,606	2,008
Adjusted R^2	0.538	0.365	0.625	0.418	–	–
RISKMed (C&J)	-0.203***	-0.096	-0.117**	-0.067	-0.093**	-0.025
	(-2.724)	(-1.523)	(-2.355)	(-1.336)	(-2.437)	(-0.718)
RISKHigh (C&J)	-0.428***	-0.228***	-0.271***	-0.147***	-0.166***	-0.102**
	(-4.150)	(-2.846)	(-3.723)	(-2.582)	(-3.552)	(-2.245)
No. of observations	1,606	2,008	1,606	2,008	1,606	2,008
Adjusted R^2	0.536	0.364	0.627	0.417	–	–
RISKMed (Altman)	-0.082	-0.057	-0.055	-0.083	-0.038	0.028
	(-0.896)	(-0.622)	(-0.919)	(-1.255)	(-1.022)	(0.578)
RISKHigh (Altman)	0.120	-0.078	-0.162*	-0.032	-0.033	-0.043
	(0.820)	(-1.178)	(-1.664)	(-0.636)	(-0.538)	(-1.081)
No. of observations	1,606	2,008	1,606	2,008	1,606	2,008
Adjusted R^2	0.526	0.360	0.621	0.415	–	–

Table 7

Baseline regressions with additional executive characteristics.

This table examines the relation between various measures of executive compensation and financial distress risk, controlling for additional executive characteristics, i.e., number of current board positions, college degree, and MBA degree. Dependent variables are the logarithm of total compensation, *Ln(Total Compensation)*, logarithm of cash-based compensation, *Ln(Cash-based Compensation)*, and fraction of equity-based compensation, *Equity-based/Total Compensation*. We use OLS regressions to estimate total compensation and cash-based compensation, and Tobit regressions for the fraction of equity-based compensation. The independent variables of main interest are *RISKMed* and *RISKHigh*, which are dummy variables equal to one for firms with medium and high levels of financial distress risk, respectively. The three financial distress risk indicators are based on Hillegeist et al. (2004)'s BSM model, Chava and Jarrow (2004)'s hazard model and Altman (1968)'s *z*-score model. Variable definitions are provided in Table A1 of the Appendix. *t*- Statistics are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. All regressions include industry dummies that are based on the 12 Fama-French industries, and year dummies.

	Dependent Variable: *Ln(Total Compensation)*			Dependent Variable: *Ln(Cash-based Compensation)*			Dependent Variable: *Equity-based/Total Compensation*		
	BSM	*C&J*	*Altman*	*BSM*	*C&J*	*Altman*	*BSM*	*C&J*	*Altman*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
RISKMed	-0.243***	-0.204***	-0.053	-0.176***	-0.127***	-0.074	-0.071**	-0.081***	0.009
	(-3.353)	(-3.238)	(-0.654)	(-3.230)	(-2.804)	(-1.262)	(-2.058)	(-2.645)	(0.264)
RISKHigh	-0.300***	-0.283***	-0.100	-0.162**	-0.195***	-0.051	-0.122***	-0.103***	-0.046
	(-3.056)	(-3.992)	(-1.342)	(-2.254)	(-3.834)	(-0.947)	(-2.626)	(-2.946)	(-1.287)
Ln(Sales)	0.081***	0.080***	0.078***	0.071***	0.070***	0.069***	0.013***	0.012***	0.012***
	(8.785)	(8.973)	(8.719)	(10.140)	(10.340)	(10.140)	(2.946)	(2.928)	(2.750)
Leverage	0.604***	0.668***	0.560***	0.516***	0.562***	0.498***	0.135**	0.161***	0.114**
	(4.696)	(5.074)	(4.253)	(5.523)	(5.832)	(5.340)	(2.495)	(2.909)	(2.031)
ROA	0.245***	0.206**	0.205**	0.203***	0.178***	0.184***	0.037	0.020	0.016
	(2.952)	(2.392)	(2.230)	(3.389)	(2.891)	(2.777)	(0.883)	(0.472)	(0.365)
Tobin's Q	0.016	0.022	0.021	-0.001	0.003	0.001	0.014**	0.016**	0.016**
	(1.111)	(1.547)	(1.465)	(-0.140)	(0.311)	(0.148)	(2.159)	(2.487)	(2.477)
Cash Holding	0.212*	0.240**	0.248**	0.290***	0.305***	0.310***	-0.077	-0.066	-0.065
	(1.763)	(2.041)	(2.108)	(3.206)	(3.442)	(3.517)	(-1.285)	(-1.117)	(-1.086)
Stock Return	0.166***	0.158***	0.193***	0.078**	0.072**	0.095***	0.066***	0.063***	0.076***
	(3.777)	(3.603)	(4.428)	(2.510)	(2.301)	(3.081)	(3.249)	(3.154)	(3.792)
Stock Volatility	0.071	-0.114	-0.209*	-0.052	-0.144*	-0.211***	0.094	0.019	-0.015
	(0.434)	(-1.019)	(-1.833)	(-0.462)	(-1.902)	(-2.796)	(1.243)	(0.362)	(-0.282)

Independent Directors	1.232***	1.207***	1.232***	0.851***	0.837***	0.855***	0.364***	0.353***	0.363***
	(9.318)	(9.058)	(9.291)	(8.494)	(8.246)	(8.517)	(6.364)	(6.146)	(6.341)
3% or above / Total Institutional Ownership	-0.571***	-0.570***	-0.587***	-0.506***	-0.501***	-0.513***	-0.024	-0.025	-0.033
	(-5.924)	(-6.037)	(-6.101)	(-7.138)	(-7.172)	(-7.235)	(-0.574)	(-0.612)	(-0.782)
CEO Dummy	0.361***	0.368***	0.361***	0.373***	0.379***	0.375***	-0.024	-0.022	-0.025*
	(11.700)	(11.920)	(11.670)	(17.050)	(17.350)	(17.130)	(-1.617)	(-1.462)	(-1.654)
Age	0.006**	0.006**	0.006**	0.009***	0.009***	0.009***	-0.003***	-0.003***	-0.003***
	(2.450)	(2.424)	(2.448)	(4.863)	(4.830)	(4.859)	(-3.055)	(-3.094)	(-2.997)
External Hire dummy	0.029	0.032	0.024	0.018	0.020	0.015	0.010	0.012	0.008
	(0.865)	(0.981)	(0.712)	(0.729)	(0.832)	(0.612)	(0.669)	(0.772)	(0.541)
Current Board Positions	0.206***	0.208***	0.212***	0.136***	0.138***	0.141***	0.052***	0.052***	0.053***
	(6.194)	(6.208)	(6.269)	(5.815)	(5.850)	(5.934)	(4.030)	(4.070)	(4.128)
College Degree dummy	0.231***	0.225***	0.233***	0.166***	0.162***	0.166***	0.062***	0.061***	0.063***
	(6.234)	(6.066)	(6.232)	(5.985)	(5.815)	(5.971)	(3.349)	(3.294)	(3.384)
MBA Degree dummy	0.076	0.077	0.082	0.019	0.021	0.025	0.032	0.031	0.033
	(1.538)	(1.543)	(1.633)	(0.592)	(0.621)	(0.739)	(1.562)	(1.541)	(1.611)
Intercept	9.874***	9.967***	10.020***	10.020***	10.070***	10.100***	-0.226*	-0.188	-0.179
	(31.760)	(32.700)	(33.050)	(44.370)	(45.180)	(45.370)	(-1.729)	(-1.480)	(-1.405)
No. of observations	2,423	2,423	2,423	2,423	2,423	2,423	2,423	2,423	2,423
Adjusted R^2	0.502	0.504	0.498	0.569	0.571	0.566	–	–	–

Table 8

Baseline estimation results using median regressions.

This table examines the relation between various measures of executive compensation and financial distress risk using median regressions. Dependent variables are the logarithm of total compensation, *Ln(Total Compensation)*, logarithm of cash-based compensation, *Ln(Cash-based Compensation)*, and fraction of equity-based compensation, *Equity-based/Total Compensation*. We use OLS regressions to estimate total compensation and cash-based compensation, and Tobit regressions for the fraction of equity-based compensation. *RISKMed* and *RISKHigh* are dummy variables equal to one for firms with medium and high levels of financial distress risk, respectively. The three financial distress risk measures are computed using Hillegeist et al. (2004)'s BSM model, Chava and Jarrow (2004)'s hazard model, and Altman (1968)'s *z*-score model, respectively. For brevity, we report only the coefficients for the financial distress risk variables. The same set of controls as in Table 3 is included. Variable definitions are provided in Table A1 of the Appendix. *t* -Statistics (in parentheses) are based on robust standard errors clustered at the firm level. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. All regressions include industry and year dummies. Industry dummy variables are based on the 12 Fama-French industries.

	Dependent Variable: *Ln(Total Compensation)*			Dependent Variable: *Ln(Cash-based Compensation)*			Dependent Variable: *Equity-based/Total Compensation*		
	BSM	*C&J*	*Altman*	*BSM*	*C&J*	*Altman*	*BSM*	*C&J*	*Altman*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
RISKMed	-0.225***	-0.142***	-0.098*	-0.135***	-0.114***	-0.097***	-1.241***	-1.321***	-0.513
	(-4.831)	(-3.451)	(-1.877)	(-4.707)	(-3.830)	(-3.329)	(-3.236)	(-2.599)	(-1.427)
RISKHigh	-0.204***	-0.300***	-0.069	-0.090***	-0.160***	-0.009	-2.467***	-3.252***	-1.295**
	(-3.380)	(-6.300)	(-1.243)	(-2.725)	(-5.491)	(-0.278)	(-5.438)	(-6.824)	(-2.560)
No. of observations	3,614	3,614	3,614	3,614	3,614	3,614	3,614	3,614	3,614

Table 9

Propensity score matching estimation.

This table reports the propensity score matching estimation results. Panels A, B, and C report the propensity score matching estimates based on Hillegeist et al. (2004)'s BSM model, Chava and Jarrow (2004)'s hazard model, and Altman (1968)'s *z*-score model, respectively. The outcome variables include: the logarithm of salary, *Ln(Salary)*, logarithm of bonuses, *Ln(Bonus+1)*, logarithm of cash-based pay, *Ln(Cash-based Compensation)*, logarithm of equity-based pay, *Ln(Equity-based Compensation+1)*, logarithm of total compensation, *Ln(Total Compensation)*, fraction of equity-based compensation, *Equity-based /Total Compensation*, executive performance incentives, *Ln(Delta+1)*, and risk-taking incentives, *Ln(Vega+1)*. Both the average treatment effects (ATEs) and the average treatment effects on the treated (ATETs) are reported together with their respective p-values. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

	No. of Observations for ATE	ATE	*p*-value	No. of observations for ATET	ATET	*p*-value
Panel A. High and medium distress risk vs. low distress risk using the BSM model						
Ln(Salary)	3,580	-0.435***	0.000	3,602	-0.063	0.373
Ln(Bonuses+1)	3,580	-3.389***	0.000	3,602	-0.847**	0.035
Ln(Cash-based Compensation)	3,580	-0.573***	0.000	3,602	-0.151*	0.060
Ln(Equity-based Compensation+1)	3,580	-4.358***	0.000	3,602	-3.185***	0.000
Ln(Total Compensation)	3,580	-0.891***	0.000	3,602	-0.597***	0.000
Equity-based /Total Compensation	3,580	-0.195***	0.000	3,602	-0.199***	0.000
Ln(Delta+1)	3,580	-3.801***	0.001	3,602	-1.425***	0.000
Ln(Vega+1)	3,580	-2.621**	0.036	3,602	-1.550***	0.000
Panel B. High and medium distress risk vs. low distress risk using the C&J model						
Ln(Salary+1)	3,614	-0.091***	0.004	3,614	-0.030	0.370
Ln(Bonuses+1)	3,614	-0.799***	0.007	3,614	-0.788**	0.044
Ln(Cash-based Compensation)	3,614	-0.131***	0.000	3,614	-0.066	0.114
Ln(Equity-based Compensation+1)	3,614	-0.965**	0.010	3,614	-0.412	0.316
Ln(Total Compensation)	3,614	-0.204***	0.000	3,614	-0.109*	0.058
Equity-based /Total Compensation	3,614	-0.045***	0.007	3,614	-0.023	0.137
Ln(Delta+1)	3,614	-0.781***	0.000	3,614	-0.452**	0.042
Ln(Vega+1)	3,614	-0.695***	0.002	3,614	-0.436*	0.064
Panel C. High and medium distress risk vs. low distress risk using the Altman model						
Ln(Salary)	3,614	0.044	0.272	3,614	-0.004	0.943
Ln(Bonuses+1)	3,614	-1.160***	0.000	3,614	-1.084**	0.013
Ln(Cash-based Compensation)	3,614	0.016	0.768	3,614	-0.04	0.579
Ln(Equity-based Compensation+1)	3,614	-0.184	0.742	3,614	-0.224	0.611
Ln(Total Compensation)	3,614	0.006	0.937	3,614	-0.059	0.493
Equity-based /Total Compensation	3,614	-0.011	0.562	3,614	-0.008	0.660
Ln(Delta+1)	3,614	-0.654***	0.000	3,614	-0.709***	0.000
Ln(Vega+1)	3,614	-0.171	0.648	3,614	-0.160	0.512

Highlights

- We investigate the relationship between financial distress risk and the initial executive compensation contracts in UK firms.

- One distinctive characteristic of the UK setting is that it has highly concentrated debt markets, which can have implications in terms of the monitoring that creditors can provide for firms with high financial distress risk.

- We find that newly hired executives in firms with high financial distress risk receive lower levels of total compensation and cash-based compensation. This negative impact of financial distress risk is more pronounced in firms with high bank debt.

- Further, our results show that financial distress risk has a negative and statistically significant impact on the fraction of equity-based compensation. This finding provides support for the view that concentrated credit markets in the UK allow creditors to provide monitoring and reduce risk- shifting incentives when firms face high financial distress risk.