



# Managerial risk incentives and investment related agency costs



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## ABSTRACT

We assess the impact of compensation based incentives together with monitoring mechanisms on investment related agency costs. The results indicate that well structured compensation based incentives significantly reduce agency costs. Managerial firm based wealth delta has a significant, negative effect on agency costs for firms in all size categories. The significance of managerial firm based wealth vega in reducing agency costs is concentrated in small firms, suggesting that vega exposure is more effective where risk is higher. The significance of cash compensation in reducing agency costs is concentrated in the large firms. This result implies that higher cash compensation reduces agency costs by allowing risk-averse managers the opportunity to diversify outside the firm.

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## 1. Introduction

This study provides evidence that well structured compensation based incentives significantly reduce investment related agency costs. The potential conflict of interest between shareholders and professional managers in large publicly traded corporations is a major issue in the study of corporate governance. Rooted in the separation of power between the shareholders that own the firm and the managers that control the firm's assets, this well known agency conflict arises from fundamental differences in the positions of shareholders and managers. Whereas shareholders are in a position to readily diversify their wealth, managers typically have most of their human capital tied up in the firm and often hold a large proportion of their financial wealth within the firm as well (Fama, 1980; Stulz & Smith, 1985). This principal-agent conflict gives rise to agency costs that lead to the sub-optimal use of a firm's resources. Under-diversified, risk-averse managers have an incentive to reduce their personal exposure by undertaking investments that reduce firm risk or by foregoing risky positive net present value projects at the expense of shareholders in the form of reduced wealth creation. As Jensen (1986) has noted, this problem is likely to be acute in firms with low growth opportunities and high free cash flow.

The conventional remedy for this conflict is to align managerial interests with those of shareholders by tying the manager's compensation to firm value or firm performance (e.g. Jensen & Meckling, 1976). Option based compensation is well suited to this end because the convex payout profile of stock options can offset the concavity in the manager's utility function. In practice, the use of option based compensation has been increasingly employed since the latter part of the twentieth century (Brockman, Martin, & Unlu, 2010; Murphy, 1999). For example, Murphy (1999) observes that stock options have become the largest single component of compensation over the last fifteen years and Hall and Murphy (2002) note that stock options constitute the single largest part of the compensation packages of US CEOs. Similarly, Conyon, Core, and Guay (2011) find that during the period 1997–2003 the importance of salaries in total compensation has declined for UK CEOs, while bonuses and equity related pay, such as options have become more important. As discussed in the following section, there is a long and growing literature examining the determinants and incentive effects of managerial compensation on agency costs. Surprisingly, despite this and the growing use of stock and stock option compensation, there has been no attempt in the literature to measure investment related agency costs directly and test if and how they are impacted by option based compensation incentives.

This paper addresses this gap by first explicitly measuring the investment related agency costs on a broad sample of UK firms, and then assessing if and how managerial compensation based incentives affect them. A UK sample is of particular interest because prior UK

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studies have documented that internal corporate governance monitoring mechanisms, such as board structure, are not effective in reducing agency costs (e.g. Goergen & Renneboog, 2001). In the absence of effective internal monitoring mechanisms, compensation based incentives offer themselves as a credible alternative. They have the potential to mitigate suboptimal managerial behaviour and, hence, to reduce agency costs. To test this argument, we employ two analytical parameters of option-based compensation risk-taking incentives, namely delta and vega. Delta measures the sensitivity of the manager's firm based wealth to the firm's stock price while vega captures the manager's firm based wealth sensitivity to the firm's stock return volatility.<sup>1</sup>

Another important feature of this paper is that it recognizes that firm size can affect the effectiveness of compensation incentives on managerial behaviour. It is generally held that due to greater complexity and difficulty in monitoring, managerial actions are less observable in large firms (Doukas, McKnight, & Pantzalis, 2005; McKnight & Weir, 2009). Where managerial actions are less observable, managers could utilize this cover to pursue conservative corporate policies at the expense of shareholders. In this kind of environment compensation based incentives could be very effective in mitigating the agency conflict. Managers in small firms do not have this cover, but the agency conflict is exacerbated by the financial vulnerability of small firms due to their limited access to human and financial resources (e.g. Titman & Wessels, 1988). Thus, if larger firms are conducive to covering managerial actions and smaller firms are more financially fragile, the effect of compensation incentives may vary across the large-small environment.

In the main contribution of this paper the results show that managerial compensation incentives do have a significant effect on investment related agency costs, and that the effects do vary with respect to firm size. Managerial wealth delta is significantly, negatively related to agency costs for both large and small firms. This suggests that managerial compensation packages with high sensitivity to the firm stock price reduce agency costs. The results also show that cash compensation is significantly, negatively related to agency costs for large firms but not small ones. This is consistent with Guay's (1999) argument that higher cash compensation reduces agency costs by affording risk-averse managers in large firms the opportunity to diversify outside the firm. Finally, managerial wealth vega significantly reduces agency costs in small firms but not in large ones, suggesting that vega exposure is more effective where risk is higher.

## 2. Previous related work

Jensen (1986) argues that firms with free cash flow and low growth prospects are prone to agency costs. Within the free cash flow hypothesis, it is generally assumed that managers pursue self interest at the expense of shareholders. As such, the presence of cash flow in excess of that required to finance new value investments creates the potential for those funds to be wasted (Richardson, 2006). There is evidence in the compensation literature that managerial compensation incentives affect corporate policy by aligning the managers' interests with those of the shareholders (Brockman et al., 2010; Coles, Daniel, & Naveen, 2006; Guay, 1999; Knopf, Nam, & Thornton, 2002). The implication is that the compensation incentives reduce agency costs. This compensation literature has used one form or another of three variables to capture managerial compensation incentives: delta, vega, and cash compensation.

<sup>1</sup> The delta of outright share ownership is 1 and the vega is 0. The delta and vega of cash are both equal to 0. The delta and vega of managerial total firm based wealth are weighted averages of the deltas and vegas of the individual shareholdings and options:  $delta = \sum_i x_i delta_i$   $vega = \sum_i x_i vega_i$ , where  $i$  refers to the individual shareholdings and options and  $x_i$  is the proportion of asset  $i$  in total firm based wealth. For example, consider a manager with 50% of his wealth in shares and 50% in an option with a delta of 0.5. The delta of his portfolio will be equal to  $0.5 \times 1 + 0.5 \times 0.5 = 0.75$ .

**Table 1**  
Variable empirical definition and data sources.

Variables	Empirical definition	Source
CEO Delta	CEO Delta is the pound change in CEO firm based wealth* for a 1% change in stock price, in thousands. * CEO firm based wealth includes all equity holdings (share ownership), unexpired stock and LTIPs options accumulated and held by the CEO to date (£, thousands).	Boardex
CEO Vega	CEO Vega is the pound change in the CEO's firm based wealth* for a 1% change in stock return standard deviation, in thousands.	Boardex
CEO Cash	The sum of all cash based compensation received by the CEO during the year (salary, bonus, pension, and other).	Boardex
FCF	Operating income before depreciation minus the sum of taxes, interest expenses and dividends paid, standardized by total assets.	Worldscope
MKTBV	The ratio of book value of total assets minus the book value of equity plus the market value of equity to the book value of total assets	Worldscope
Q_Ratio	The ratio of market capitalization plus total debt divided by total assets.	Worldscope
MCAP	The ratio of market capitalization to total assets	Worldscope
Audit fees	The natural logarithm of audit fees for the fiscal year	Worldscope
Bsize	The natural logarithm of total directors on the board.	Boardex
Bindep	Bindep is the ratio of total independent directors on the board to total directors on the board	Boardex
LEV	The ratio of long-term total debt to total assets.	Worldscope
Fsize	The natural logarithm of total assets	Worldscope
DIV	The ratio of total cash dividends paid to total assets	Worldscope

### 2.1. Delta and agency costs

Coles et al. (2006) highlight that delta may serve to align the interests of shareholders and managers by providing management with incentives to work harder or more effectively in order to share gains/losses with shareholders. Therefore, a negative relationship would be expected between delta and agency costs. Alternatively, Chava and Purnanandam (2010) argue that the incentive to share gains with shareholders imposes a cost on management. This cost is inherent in the form of increased exposure to the firm's total risk, which would be of concern to an undiversified risk-averse manager, as a manager's wealth is typically concentrated in the firm. Furthermore, managerial human capital is closely associated with firm performance (Chava & Purnanandam, 2010; Fama, 1980; Stulz and Smith, 1985). Therefore, managers with higher delta exposure would be expected to favour low risk corporate policies and disregard risky positive net present value projects, thus leading to acute agency problems.

Belghitar and Clark (2014) have shown that the relationship between delta and risk taking depends on whether the CEO's utility function has increasing, decreasing, or constant absolute risk aversion.<sup>2</sup> A negative relationship implies decreasing absolute risk aversion. Thus, for managers with decreasing absolute risk aversion delta is negatively related to investment related agency costs. Similarly for managers with increasing absolute risk aversion delta is positively related to investment related agency costs and there is no delta effect for managers with constant absolute risk aversion. Most studies either implicitly or explicitly assume decreasing absolute risk aversion, which leads to our first hypothesis.

**Hypothesis 1.** *There is a negative relationship between delta and investment related agency costs.*

<sup>2</sup> Risk aversion means that each manager has a utility function  $u(w)$  satisfying the following conditions:  $u'(w) \geq 0$ ,  $u''(w) \leq 0$ ,  $\forall w$ , where primes denote first and second derivatives with respect to wealth, denoted as  $w$ . Utility functions such as these are strictly concave. Pratt (1964) showed that maximizing the expected utility of a risk averse economic agent is approximately equal to:  $A = -\frac{u''(w)}{u'(w)}$ . DARA implies  $\frac{dA}{dw} < 0$ ; IARA implies  $\frac{dA}{dw} > 0$ ; and CARA implies  $\frac{dA}{dw} = 0$ .

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