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Managerial compensation under privately-observed hedging and earnings management☆

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HIGHLIGHTS

- We study managerial compensation in a model where the hedging outcome of a project is privately observable by managers.
- The manager's effort is hidden, and the final revenue can be misreported at a cost.
- More hedging opportunities increase the optimal pay-for-performance in compensation.
- The positive association between incentive pay and hedging is consistent with the existing empirical evidence.

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ABSTRACT

This paper studies how private information in hedging outcomes affects the design of managerial compensation when hedging instruments serve as a double-edged sword in that they may be used for both corporate hedging and earnings management. On the one hand, financial vehicles can offer customized contracts that are closely tailored to manage specific risk and improve hedging efficiency. On the other hand, involvement in hedging may give rise to manipulation through misstatement of the value estimates. We show that the use of privately-observed hedging may actually require greater pay-for-performance in managerial compensation.

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1. Introduction

Firms use various financial vehicles to hedge against changes in prices or against events such as potential defaults on debt. Because of private information involved in the valuation of many hedging vehicles, such as infrequently traded derivatives, hedging also provides executives with the potential to manipulate earnings: Some executives have used derivatives to conceal losses, hide debt, and inflate the value of troubled businesses, as demonstrated in the cases of Fannie Mae, Freddie Mac, and AIG.[1] To study the contracting implications of private information in hedging, we study a model where financial vehicles can be used to hedge the firm's risk exposure as well as facilitate earnings management.

Shareholders in our model view financial vehicles as a double-edged sword in that they may be used both for effective hedging and earnings manipulation. On the one hand, these instruments can be closely tailored to manage specific risk exposures and therefore enhance firm value. On the other hand, there is lack

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[1] The SEC determined in 2004 that Fannie Mae and Freddie Mac overstated earnings by incorrectly accounting for various derivative instruments. In the run-up to the 2008 crisis, Freddie Mac and Fannie Mae overstated the value of their portfolios backed by mortgage-backed securities, which enabled the companies to overstate the value of their capital reserves and business worth, veiling substantial build-up of systemic risk.

of transparency in price discovery and valuation of these hedges, especially because trades can occur in private, creating opportunities for managerial manipulation through misstating the value estimates.[2] Manipulation may lead to excessive managerial compensation that is unjustified by the underlying profitability.

We show that the use of hedging vehicles requires executive pay to be more responsive to reported performance. Because of hedging vehicles' two functions – both their legitimate function to hedge and their potential use in overstating performance – these instruments serve as insurance for managers against a low compensation payoff. To induce productive effort put forth by managers, the use of privately-observed hedging may actually call for a higher-powered compensation.

Our paper is motivated by empirical studies on hedging and executive pay. Adkins et al. (2007) show that greater equity holdings and larger cash bonuses by bank managers are associated with a greater probability of hedging. Geczy et al. (2007) find that firms for which speculation (on interest rates, exchange rates, etc.) is a core business activity tend to use incentive-aligning compensation for their managers. Chernenko and Faulkender (2011) show that firms' use of interest rate swaps to manipulate earnings coincides with higher pay-for-performance in their executive compensation. The literature has interpreted the association as compensation creating incentives to use hedging vehicles. Our explanation for the association, that is, the use of hedging calls for more incentive pay, is different, but the two mechanisms may co-exist.

In the contracting literature with manipulation, Nan (2008) theoretically shows that earnings management by accounting accruals and derivative use are substitutes in smoothing earnings. Our focus on costly manipulation in an agency model has antecedents in Lacker and Weinberg (1989), which examines optimal contracts under costly state falsification and derives optimal no-falsification contracts. Taking a different view, Goldman and Slezak (2006) and Crocker and Slemrod (2007) consider settings in which manipulation actually arises in equilibrium, and yet the firm's performance is adjusted to fully correct for the bias in the manipulated reports. In our problem, however, the principal faces uncertainty over whether hedging instruments can be used for manipulation, and therefore cannot perfectly gauge the true state of the firm.[3]

We lay out the principal–agent model and characterize the optimal contract under privately-observed hedging in Section 2. Section 3 concludes. The proofs are in the Appendix.

2. Contracting with privately-observed hedging

2.1. Assumptions

A risk-neutral principal (shareholders) hires a risk-averse agent (manager) for one period. The manager's utility function is denoted by $u(\cdot)$, where $u(0) = 0$, $u'(\cdot) > 0$, and $u''(\cdot) \leq 0$. The firm's earnings are stochastic and influenced by the manager's effort. The unobserved effort level of the manager, e, can take two values, low (l) and high (h), that is, $e \in \{l, h\}$ where $l < h$. The manager incurs disutility from exerting effort, denoted by the cost function $a(e)$. In particular, high effort is associated with a cost of $a(h) = c$, while low effort involves no cost: $a(l) = 0$. Earnings y take two possible values, $y \in \{L, H\}$, where $L < H$. Let p_e be the probability that earnings are equal to H when the effort is e, where $e \in \{l, h\}$ with $p_h > p_l$.

The timeline of Fig. 1 chronicles the sequence of events in the model. After the manager exerts effort, a hedging opportunity stochastically realizes. With probability $1-\theta$, there is no opportunity to hedge. With probability θ, a hedging opportunity arrives: The hedge has zero payoff if earnings are high and may deliver value, which would be privately observed by the manager, if earnings are low (that is, to hedge). With the hedging opportunity, the payoff on the hedge follows the distribution below:

$$\text{Hedging payoff} = \begin{cases} H - L & \text{with probability } q, \\ 0 & \text{with probability } (1-q). \end{cases}$$

That is, with probability q, the payoff on the hedge can bring earnings from low (L) to high (H); with probability $(1-q)$, the payoff on the hedge is insufficient to cover the earnings shortfall and is assumed to be zero for simplicity. In the latter case, manipulation may occur. That is, the value estimate of the hedge can be intentionally manipulated by the manager (to be $H-L$) to falsely report high earnings.[4]

We interpret θ as the probability of having a hedging opportunity and q as the probability of successful hedging (given the hedging opportunity). The realization of the hedging opportunity is publicly observable, but the outcome of actual success or failure of hedging is only privately observed by the manager. A larger probability of having a hedging opportunity (θ) increases both the likelihood of successful hedging (i.e., θq) and the likelihood of manipulation (i.e., $\theta(1-q)$).

The probabilistic hedging success (that occurs with probability q) captures the ambiguity in valuation, which renders manipulation possible. That is, the stochastic hedging payoff breaks down a direct mapping between reported earnings and true earnings — the payoff from hedging remains the manager's private information, and the principal can make inferences about true earnings but cannot perfectly gauge the value.

If the manager manipulates earnings by overstating the value of the hedge, the manager incurs a personal cost, denoted by $\phi(\cdot)$. When the manager overstates earnings by inflating the hedging payoff (to be $H - L$ when it is zero), there is a positive cost $\phi(H-L) = \psi > 0$. Reporting honestly involves no cost: $\phi(0) = 0$. We define that earnings management (manipulation) emerges in this environment if the manager announces high earnings (H) when the actual realization of earnings (combined with the hedge's payoff) is low (L). We can see that opportunities for manipulation, that is, reporting the hedging payoff to be $(H-L)$ when it is actually zero, arise when the following conditions are met: (i) low earnings realize, (ii) the hedging opportunity realizes, and (iii) the payoff on the hedge is zero. As the contract must be designed based on mutually observed variables, compensation must be based on the manager's report.

2.2. The contracting problem

The contract between the risk-neutral principal and the risk-averse manager includes a set of wages contingent on the reports, denoted as w_i, $i \in \{L, H\}$. Under Assumption 1, the cost of manipulation is sufficiently small that the manager will inflate earnings by overstating the hedging payoff whenever possible.

[2] The over-the-counter derivative market, for example, has been largely unregulated with respect to disclosure of information between the contracting parties. Surveys show that while traders may be in close agreement on the value of actively traded derivatives, their view may be wide apart on less liquid securities, making derivatives easy targets to be misused for manipulation.

[3] Sun (2014) analyzes a model in which manipulation is also not fully unraveled in equilibrium, which does not study the use of hedging instruments that is at the heart of our analysis.

[4] Actual hedging can involve hedging costs, which can be assumed away if they are paid before the realization of the hedging opportunity.