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Incentive Contracts for Overoptimistic Managers

Yuri Khoroshilov
University of Ottawa

Abstract

This paper analyzes an optimal incentive contract for an overoptimistic manager who overestimates the investment potential of the firm. It shows that, compared with a rational manager, an overoptimistic manager is willing to accept a linear incentive contract with a lower fixed wage. At the same time, overoptimism also leads to overinvestment. Given the trade-off between lower labor cost and investment misallocation, we show that shareholders prefer to hire an overoptimistic manager when production is not capital intensive, when the output is not too volatile and when the manager has a higher reservation utility.

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Contact: Yuri Khoroshilov - khoroshilov@telfer.uottawa.ca.
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1. Introduction

The study of the principal-agent conflict and the design of the optimal executive incentive compensation contract has its roots in the seminal papers of Fama (1980), Grossman and Hart (1983), Holmstrom (1979) and Harris and Raviv (1979). Hart and Holmstrom (1987) and Murphy (1999), provide excellent reviews of incentive contracts and the design of executive compensation respectively. In its original form, the role of the incentive contract is to make the manager (whose utility positively depends on his wage and negatively on his unobservable effort) behave in the best interests of the shareholders. Given this simple framework, the main obstacles to designing the optimal incentive contract are (1) the manager's limited liability (i.e. the fact that the manager cannot earn a negative wage regardless of his performance) and (2) the difference in risk-aversion between the manager and the shareholders. Although both the manager and the shareholders can be viewed as having the same degree of risk-aversion, the shareholders can spread the firm's specific risk while the manager, whose compensation depends on the firm's performance, cannot. As a result, when a manager is offered profit-based compensation, his expected utility of such compensation is lower than its costs to the shareholder. This trade-off between the degree of incentive and its costs due to inefficient risk allocation is the main and most studied aspect of optimal incentive contract design.[1]

Since the boom of behavioral asset pricing research in the 1990s[2], behavioral finance made its way into corporate finance, and, in particular, into optimal incentive contract theory. Goel and Thakor (2005) analyze the behavior of divisional managers who may experience envy and whose utility depends on the wages paid to other managers. Goel and Thakor (2008) analyze the incentive contracts and promotion mechanism for overconfident managers who underestimate project risk. Dodonova and Khoroshilov (2006) look at the choice between linear and option-based incentive contracts for loss-averse managers whose utility is influenced by the contracts of other managers.

In this paper we focus on the incentive contracts for overoptimistic managers, making the assumption that overoptimistic managers have a greater tendency to misinterpret prevailing conditions and overinvest resources and effort. Although this misinterpretation may result in investment misallocation and lower total social surplus, an overoptimistic manager is willing to accept a lower fixed wage in the hope of receiving a higher expected payoff from the incentive part of his compensation. As a result, a part of this investment inefficiency is absorbed by the manager and not by the shareholders. Assuming that any project that needs to be implemented requires both financial investment from the shareholders and effort from the manager, the manager will bear a larger portion of investment misallocation costs when the production process is labor-intensive. Indeed, if the manager of a labor-intensive firm incorrectly interprets a bad project as a good one and invests both effort and resources into a project that generates mediocre revenues, shareholders will bear only a small portion of the cost. As a result, labor-intensive firms will prefer to hire overoptimistic managers.

[1] See Banker and Datar (1989), Bushman and Indjejikian (1993) and Milgrom and Roberts (1992).
[2] See Hirshleifer (2001) and Barberis and Thaler (2003) for excellent reviews of Behavioral Finance research.

Another instance of an overoptimistic manager being preferred to a rational one is when the cost of the investment misallocation is not too severe - namely, in situations where an implemented bad project results in only a small loss. In this case the shareholders' benefit from a lower fixed wage component may outweigh their investment misallocation costs and may lead them to prefer an overoptimistic manager. Finally, when the manager has a higher reservation utility (due to a better external job opportunity), he may require a higher fixed wage component. However an overoptimistic manager will be willing to give up a larger portion of the fixed wage for an additional interest in the firm, which makes him more attractive to the shareholders.

The rest of the paper is organized as follows. In Part 2 we present a simple model with rational and overoptimistic managers, and determine the optimal incentive contract and the expected shareholders' profits. In Part 3 we analyze which factors influence the shareholders' choice between a rational and an overoptimistic manager. We conclude in Part 4.

2. The Model

2.1. Rational manager

Consider a one-period model in which a risk-neutral manager is hired to implement a project. The project can be either good (G) with probability p, or bad (B) with probability $(1-p)$. If the manager decides to implement the project, he must put in his own effort in the amount of λ (where $0<\lambda<1$) and request a capital investment from the shareholders in the amount of $\$(1-\lambda)$. The manager puts \$1 value for each unit of his effort, i.e. it costs him $\$\lambda$ in effort to implement the project. It is assumed that the type of project (good or bad) is observed only by the manager and that the shareholders always follow the manager's request for capital investment. If the good project is implemented, it results in a gross revenue of $\$H$. Implementation of the bad project results in $\$L$ revenue, where $0 \le L < 1 < H$, i.e. it is socially optimal to implement the good project and not the bad one. If the manager decides not to implement the project, neither effort nor capital investment is required and the firm's revenue is zero. The manager's reservation utility is determined by his external employment opportunities and is given by $u_r \ge 0$. Hence, to make it profitable for the shareholders to hire the manager, we assume that $p(H-1) > u_r$.

Assume the incentive contract is linear and is given by $w = c + \alpha\pi$, where $c \ge 0$ is the fixed wage component, $0 \le \alpha \le 1$ is the incentive component parameter and π is the gross revenue realized from the project implementation. We will assume that parameters of the model and the incentive contract are such that the manager decides to implement the project if and only if he believes the project is good and his expected utility from accepting the contract is equal to his reservation utility u_r.

Given the incentive contract, the manager decides to implement the good project if and only if $c + \alpha H \ge \lambda$. Since $c \ge 0$, it follows that the incentive component of the contract must satisfy

$$\alpha \geq \frac{\lambda}{H}. \tag{1}$$

The individual rationality constraint that stipulates that the manager's expected utility from accepting the contract must be equal to his reservation utility can be written as

$$c + p(\alpha H - \lambda) = u_r \tag{2}$$

which, using simple algebra, can be rewritten as $\alpha = \frac{\lambda}{H} + \frac{u_r - c}{pH}$. Since $c \geq 0$, the above expression together with (1) results in the following condition:

$$\frac{\lambda}{H} \leq \alpha \leq \frac{\lambda}{H} + \frac{u_r}{pH}. \tag{3}$$

Hence, any incentive contract in the form $w = c + \alpha\pi$ where α satisfies (3) and c is given by (2) will result in the socially efficient outcome, deliver the manager his reservation utility and lead to the maximum expected profit for the shareholders. The shareholders' expected profit can be written as $S = p(H - (1-\lambda) - (c + \alpha H)) + (1-p)(-c)$, which, using (2) and simple algebra, can be written as

$$S = p(H - 1) - u_r. \tag{4}$$

2.2. Overoptimistic manager

Now assume that the manager is overoptimistic and sometimes mistakes the bad project for a good one. In other words assume that with probability p the good project is realized and the manager correctly identifies it; with probability q the bad project is realized but the manager incorrectly interprets it as a good project; and with probability $(1-p-q)$ the bad project is realized and the manager correctly recognizes it. Consistent with this premise, assume that the manager, before he accepts the contract, believes that the probability of the good project is $(p+q)$.

Given the above assumption, the manager's expected utility from a contract is $w = c + \alpha\pi$, and bearing in mind that his subjective belief is equal to $c + (p+q)(\alpha H - \lambda)$, the individual rationality constraint (2) can be rewritten as

$$c + (p+q)(\alpha H - \lambda) = u_r. \tag{5}$$

Assuming that the parameters of the model are such that it is still beneficial for the shareholders to implement the project when the manager believes that the project is good (e.g. it is true when the degree of overoptimism q is sufficiently small), the incentive compatibility constraint (1)

remains the same. Combining (1), (5) and the fact that $c \geq 0$, the condition on the incentive contract parameter (3) becomes

$$\frac{\lambda}{H} \leq \alpha \leq \frac{\lambda}{H} + \frac{u_r}{(p+q)H}. \tag{6}$$

Since shareholders cannot observe the quality of the project and the manager sometimes misinterprets a bad project as a good one, the incentive contract cannot achieve the social optimal outcome. The incentive contract in the form $w = c + \alpha\pi$, where α satisfies (6) and c is given by (5), will deliver the second-best outcome in which the manager believes that his expected utility from accepting the contract is equal to his reservation utility (although it is lower than his reservation utility, given the true probability of good project realization) and the shareholders receive the maximum possible expected profit. The shareholders' expected profit can be written as $\tilde{S} = p(H - (1-\lambda) - (c + \alpha H)) + q(L - (1-\lambda) - (c + \alpha L)) + (1 - p - q)(-c)$, which, using (5) and simple algebra, can be written as

$$\tilde{S} = (p+q)(H-1) - q(1-\alpha)(H-L) - u_r. \tag{7}$$

3. The Analysis

3.1. The role of the incentive component

The main role of the incentive component α in the contract is to ensure that the manager is willing to expend time and effort implementing the good project. As long as incentive is high enough (so that (1) is satisfied), the manager will always do so. The upper limit on α, set by equations (3) and (6), is required in order to limit the manager's expected compensation from the incentive part of his contract, thereby keeping the fixed wage component c non-negative. When the manager is rational, any α that satisfies (3) will deliver the shareholders the maximum expected profit. When the manager is overoptimistic, the incentive component α can also be used by shareholders to explore this overoptimism and reduce the manager's expected wage (although the manager does not realize that his expected wage is reduced since his expectation is based on his subjective probabilities). As a result, higher α allows shareholders to shift more of the expected cost of investment misallocation to the manager. Indeed, as equation (7) shows, shareholders's expected profit $\tilde{S}$ positively depends on the incentive component parameter α.

3.2. The role of the reservation utility

The manager's reservation utility u_r affects the size of the fixed wage and the incentive component of the manager's contract. Since the fixed wage is assumed to be non-negative, higher reservation utility allows the shareholders to offer the manager higher incentive component α (i.e. the upper bound on α in equations (3) and (6) increases with u_r). While u_r has a direct negative affect on the shareholders' expected profit, it also has a positive indirect effect on the shareholders' profit through higher α when the manager is overoptimistic. Indeed,

from (4) and (7) the difference between shareholders' expected profit with overoptimistic and rational managers can be written as

$$\Delta S = \tilde{S} - S = q(H-1) - q(1-\alpha)(H-L). \quad (8)$$

This difference positively depends on α, and the upper limit on α, given by (3) and (6), positively depends on u_r. Since the expected profit of shareholders does not depend on α when the manager is rational, shareholders are more willing to hire the overoptimistic manager when the manager's reservation utility is high.

3.3. Labor vs. capital incentive project

To simplify further analysis, assume that the manager's reservation utility $u_r = 0$. In this case, equations (3) and (6) imply that the only linear incentive contract that delivers the manager his perceived reservation utility while keeping his fixed wage component non-negative, is the one with $\alpha = \frac{\lambda}{H}$. Using simple algebra, one can show that equation (8) implies that shareholders prefer to hire overoptimistic manager (i.e. $\Delta S > 0$) if and only if

$$\frac{H-1}{H-\lambda} > \frac{H-L}{H}. \quad (9)$$

Note that the choice between rational and overoptimistic managers is ambiguous and depends on the parameters of the model. For example, when the project is labor intensive and requires a great deal of effort and only a small amount of capital to implement, i.e. when λ is high and close to zero, inequality (9) is satisfied and shareholders prefer to hire an overoptimistic manager. On the other hand, when the required effort is low but required capital is high (i.e. λ is low and close to zero), inequality (9) is violated and the shareholders prefer to hire a rational manager. In fact, the left-hand side of (9) increases with λ. The intuition behind this result is simple. When the manager incorrectly identifies a bad project as a good one and decides to implement it, both effort and investment are required. When the amount of required investment is small, most of the cost of investment misallocation is borne by the manager. At the same time, since the manager does not realize that he is implementing a bad project, he does not require extra fixed compensation to cover his expected effort.

3.4. Similar vs. different projects

The degree by which a bad project is different from a good one is illustrated by the difference in their outcomes. When a bad project is really bad, i.e. when L is very small and close to zero, the cost of investment misallocation in the bad project is high. In this case inequality (9) is violated and shareholders prefer to hire a rational manager. When a bad project is not significantly different from a good one, i.e. when L is relatively high and close to zero (note that, by assumption, a bad project must result in a loss, and, hence, $L < 1$), the cost of investment misallocation is relatively low and outweighed by the lower expected wage that the

overoptimistic manager is willing to accept. Indeed, when L is high and close to zero, inequality (9) is satisfied and the shareholders prefer to hire an overoptimistic manager.

4. Conclusion

This paper presents a one-period model in which a risk-neutral manager must decide whether to implement a project. We show that when the manager is overoptimistic and incorrectly identifies a bad project as a good one, he is willing to accept a lower wage without realizing it. The shareholders can take advantage of such a manager by offering him an incentive contract with the lowest fixed and the highest incentive component. We show that the choice between the rational and the overoptimistic manager is ambiguous. In particular, we show that the shareholders are more willing to hire an overoptimistic manager when the manager has a high reservation utility determined by outside job opportunities, when the project that needs to be implemented depends more on managerial effort while requiring little capital, and when the difference between bad and good projects is not too high.

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