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Status Incentives with Discrete Effort: A Note

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Abstract

Using a moral hazard framework with limited liability with discrete effort levels we show that status incentives help in partially reducing the burden on monetary incentives. Yet, the disutility accruing from failure to achieve status dampens the efficiency of status as an incentive. The optimal bonus is independent of the return of the firm. Again, the optimal expected payoff of the agent decreases with an increase in the utility from status whereas exactly opposite happens when disutility from disgrace of failing to achieve status, increase. Thus this paper re-examines Besley and Ghatak (2008) when effort level is discrete.

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1. Introduction

Economists have generated a substantial amount of research in organization theory which have identified and studied the role of monetary incentives in eliciting desirable effort by economic agents. Though monetary payment is considered to be the key component of the actual incentive package often organizations use a range of non- pecuniary incentives, like status incentives. For instance, it is a common practice to award top sales people with medals, rings, sculptures, and so on, at grand ceremonies organized by firms (see Nelson 2012). Instead of offering pecuniary payments, organizations like the military, make extensive use of medals which conveys status to the recipients. In this paper, we try to identify the role of such status incentives in eliciting desired effort, when the effort level is discrete. Our analysis will proceed close to Besley and Ghatak (2008) but in a discrete effort framework.

Incentives are, by definition, scarce[1] (Clark and Wilson 1961). Together with this scarcity value, status owes a trophy value, which reminds the recipient of her past glory. Wood (1998) quotes Will Haffer, vice president of sales with Bowne Publishing, reminiscing about winning a large-screen TV: "Actually the main reason I wanted it was that it was the top prize. I could afford to buy a big screen but it was not the same as winning it." According to sociologists, status captures individuals' need for social recognition. The social comparison theory by social psychologist Leon Festinger (1954) states that individuals make comparison to evaluate their own opinions and desires with respect to others. The importance of social comparison has also been widely documented in shaping individual utility by subjective well-being literature[2]. There are neurophysiological evidences, in the area of neuroeconomics, on the fact that human beings make social comparison while assessing the value of their remuneration (see Fleissbach *et al.* 2007).

Our study contributes to the influential and emerging literature which studies the importance of use of status within organizations and its implication in economic theory. The significant role of status as a non-pecuniary incentive to elicit the desired outcome has gained importance in recent studies (see Frank 1985, Fehr and Schmidt 1999, Dubey and Geanakoplos 2010, Moldovanu *et al.* 2007, Brown *et al.* 2007, Besley and Ghatak 2008, Auriol and Renault 2008, Dhillon and Herzog-Stein 2009 among others). Huberman *et al.* (2004) through a psychological experiment have shown that individuals are also willing to trade off some material gain to obtain status. Their result has been asserted by Besley and Ghatak (2008), where it has been shown that to elicit effort status incentive works as partial substitute of monetary incentive. Our paper uses a moral hazard framework with limited liability to echo this result and find that even when the effort is discrete (i.e., the agent can either put 'high' or 'low' effort) status incentive helps in partially reducing the burden on monetary incentive. Weber (1922) defines social status as "an effective claim to social esteem in terms of negative or positive privileges." This feature of status has been incorporated in this paper by assigning positive utility from achieving status and disutility (or negative utility) from not achieving it. The positive utility from status accrues from its trophy value and a disutility arises out of agent's disgrace from her inability of achieving it. Here, we find that the expected utility of the principal increase with the degree of satisfaction from achieving the status and decreases with the negative utility from not getting it. But, unlike Besley and Ghatak (2008) the optimum expected payoff of the agent falls when the utility from

[1] Unless a commodity or, a status, or an activity is relatively rare, it provides no inducement to anyone.

[2] For further details refer Easterlin (1974), Clark and Oswald (1996), McBride (2001), Hopkins and Kornienko(2004), Luttmer (2005) and Clark *et al.* (2008).

status increases whereas exactly opposite happens with the increase in disutility arising out of failure of achieving status. In spite of this counterfactual result the principal can actually offer the agent a combination of status and monetary incentive and yet make her accept the contract. The only constraint of the principal in this framework is that the return of the firm has to be sufficiently large to elicit high effort. Again, in contrast to Besley and Ghatak (2008), the optimal bonus is invariant with the return of the firm.

The rest of the paper is organized as follows. In Section 2 we describe the model and analyze the optimal form of the contract. The effect of informativeness of the signal on principal's expected utility is studied in section 3. Section 4 provides some concluding remarks and throws some light on intended future works.

2. The Model

Let us assume that a firm consists of a risk neutral principal and a risk neutral status conscious agent. The principal hires the agent to carry out a project. The project can either succeed or fail. Outcome is high when the project succeeds and we denote it by $q_H = 1$. When the project fails the outcome is low which is denoted by $q_L = 0$. Therefore, without loss of generality we focus on $0 - 1$ outcome. The agent can choose to put in either high or low effort from $e = \{e_H, e_L\}$. When effort level e_i is chosen the agent incurs a private cost denoted by c_i, $i = H, L$. It is assumed that $c_H > c_L = 0$. For simplicity we further assume that $c_H = c$. The project succeeds with probability P_i, $i = H, L$ where $P_H > P_L$ and this is in the sense of first order stochastic dominance. If the project succeeds the principal gets a fixed payoff of π and 0 if the project fails. The stochastic part of the principal's payoff is unobservable and also not third party verifiable. Since the outcome of the project is non-verifiable; it is not ex-post incentive compatible for the principal to reward the agent even when the project succeeds and therefore it weakens the ability of the principal to structure an incentive scheme which can overcome the moral hazard problem. However, there exists a weakly informative and contractible signal $\sigma \in \{0,1\}$ on which contracts can be conditioned, where $\sigma = 1$ is 'good news' and $\sigma = 0$ is 'bad news'. When the signal is good the agent is offered monetary incentive $b(\sigma = 1)$ which is greater than the bonus offered under bad signal, i.e. $b(\sigma = 0)$. Let v_1 be the probability that the project is successful conditional on the signal being 1 and v_0 is the probability that the project is successful conditional on the signal being 0. We assume that the signal is weakly informative in the sense that $v_1 \geq v_0$[3]. We define, $\Delta = v_1 - v_0$. When $v_1 = 1$ and $v_0 = 0$ the signal is perfectly informative. Since the contract is conditioned upon σ, the monetary payoff $b(1)$ is offered to the agent with probability $p(\sigma = 1|e_i) = P_i v_1 + (1 - P_i)v_0$ and $b(0)$ is paid with probability $p(\sigma = 0|e_i) = 1 - [P_i v_1 + (1 - P_i)v_0]$. Observe that when the signal is perfectly informative the probability of success of the project equals P_i, where $i = H, L$. The following table explicitly explains the conditional probability of success under different situations.

Outcome / Signal	$q_H = 1$	$q_L = 0$
$\sigma = 1$	v_1	$1 - v_1$
$\sigma = 0$	v_0	$1 - v_0$

[3] For more on weakly informative signals refer to Laffont and Martimort (2001).

We assume that the principal confers status (positional good) to the agent, in addition to the incentive bonus, in case the output is high. In line with Besley and Ghatak (2008) we assume that offering the positional good can in principle be conditioned on π rather than just on σ. We also assume that conferring status is almost costless to the principal. The agent enjoys a utility from achieving the status which is denoted by $\bar{\lambda}(>0)$ and at the same time the agent suffers a disutility from not achieving it, which is denoted by $\underline{\lambda}(<0)$. The agent receives $\bar{\lambda}$ with probability P_i, and $\underline{\lambda}$ with probability $1-P_i$, where $i=H,L$.

For the sake of simplicity we assume that the outside option of the agent is zero. The implication of this assumption is that at the optimum the participation constraint will not bind. We assume that the agent has no wealth, thus a limited liability constraint operates.

Now we proceed to analyze the optimal contract when effort is unobservable and hence non-contractible. To obtain the optimal contract under unobservability we have to perform the following optimization exercise when the principal wants to enforce high effort over low effort.

$$Max\ U^P = P_H\{\pi - \Delta[b(1)-b(0)]\} - v_0[b(1)-b(0)] - b(0) \tag{2}$$

subject to the following constraints:

a) *Limited liability constraint* requiring that the agent be left with a non negative level of wealth :

$$b(1) \geq 0, b(0) \geq 0 \tag{3}$$

b) Participation constraint stating that for participation in the job it is necessary that the agent is offered at least her outside option (reservation utility)

$$P_H\Delta[b(1)-b(0)] + v_0[b(1)-b(0)] + b(0) + P_H\left(\bar{\lambda}-\underline{\lambda}\right) + \underline{\lambda} - c \geq 0 \tag{4}$$

c) *Incentive compatibility constraint* which ensures that the agent does not have the incentive to deviate from high effort to low effort:

$$(P_H - P_L)[\Delta\{b(1)-b(0)\} + \left(\bar{\lambda}-\underline{\lambda}\right)] \geq c \tag{5}$$

Observe that $b(0) \geq 0$ is the relevant limited liability constraint and the other one is a slack constraint. It is optimal for the principal to offer that bonus at which the IC constraint just binds. When incentive compatibility constraint binds it ensures that the participation constraint is satisfied and non-binding. Therefore, the optimization problem becomes

$$Max\ U^P = P_H\{\pi - \Delta[b(1)-b(0)]\} - v_0[b(1)-b(0)] - b(0)$$

Subject to

$$IC: (P_H - P_L)\left\{\Delta[b(1)-b(0)] + \left(\bar{\lambda}-\underline{\lambda}\right)\right\} = c$$

$$LL: b(0) \geq 0$$

The principal will maximize her expected utility to determine the optimal contract. Given this optimization exercise we can state the optimal contract under this situation in the following proposition.

Proposition 1:

The optimal payments are characterized as follows

a) $b^*(0) = 0$

b) $b^*(1) = \begin{cases} \frac{c-(P_H-P_L)(\bar{\lambda}-\underline{\lambda})}{\Delta(P_H-P_L)} & when\ \frac{c}{(P_H-P_L)} > (\bar{\lambda}-\underline{\lambda}) \\ 0 & otherwise \end{cases}$

The proposition provides the optimal contract when the principal wants to implement high effort. It is optimal for the principal to offer the minimum bonus when the signal is bad since for any other contract, satisfying the IC, say, $(b(1), b(0) > 0)$, the corresponding expected payment of the principal is $(\Delta P_H + v_0)[b(1) - b(0)] + b(0)$, which is greater than the optimal expected payment $(\Delta P_H + v_0)b(1)$ since $(\Delta P_H + v_0) < 1$. The optimal monetary incentive, when signal is good, is such that it exhibits an inverse relation with utility from achieving status. Precisely, when the utility from achieving status is high it is optimal for the principal to offer low monetary payment. On the contrary, when the disutility from not achieving the status ($\underline{\lambda} < 0$) is high then the agent has to be compensated with higher monetary incentive. Thus, though status and monetary incentive exhibits imperfect substitution, if the disgrace from not obtaining the status is high then conferring status may not be an efficient tool to reduce the burden on monetary incentive. Put differently, there exists a complementary relation between $\underline{\lambda}$ and bonus. Hence it is implicitly assumed that the absolute value of utility from status is strictly greater than the absolute value of disutility from not achieving status. Noteworthy fact is that, the principal can do away by paying zero bonus when the cost of putting high effort is sufficiently low. The low cost of putting high effort, in a way, indicates that the agent enjoys associating herself with the work[4]. So, it is optimal for the principal to offer non-zero payments only when the cost of putting high effort is sufficiently high. In contrast to Besley and Ghatak (2008) the optimal bonus is invariant to the return of the firm. It changes only when the valuation of status or the cost of putting high effort changes. Thus, when the effort is discrete then the principal need not link monetary payment with the return of the firm to motivate the agent to elicit high effort. We also observe that the optimal expected payoff of the agent falls when the utility from obtaining status increases, whereas, the opposite happens when the disutility part (i.e., $\underline{\lambda}$) rises.[5] This result is also different to Besley and Ghatak (2008) where the agent is worse off when disutility out of failure of achieving status is high and is better off when $\bar{\lambda}$ increases. The intuition behind this result is as follows: the loss accounting from lower monetary incentive due to increase in the utility from status outweigh the direct gain from status. Similarly, when the disutility from not obtaining status increases the direct loss of utility is offset by the monetary gain, arising out of increase in disutility of the agent. Though the optimal bonus (and hence the expected utility) of

[4] This can also be interpreted as high intrinsic motivation of the agent (see Benabou and Tirole 2003, Besley and Ghatak 2005).

[5] The optimal expected utility of the agent is $U^A = (\Delta P_H + v_0)\left(\frac{c-(P_H-P_L)(\bar{\lambda}-\underline{\lambda})}{\Delta(P_H-P_L)}\right) + P_H(\bar{\lambda}-\underline{\lambda}) + \underline{\lambda} - c$. It is easy to verify that $\frac{\partial U^A}{\partial \bar{\lambda}} = -\frac{v_0}{\Delta} < 0$, whereas, $\frac{\partial U^A}{\partial \underline{\lambda}} = \frac{v_0+\Delta}{\Delta} > 0$.

the agent diminishes with the increase in utility from status, yet the principal make her accept the contract as the participation constraint is satisfied. Thus, when effort is discrete, the principal can introduce status as an incentive even when it is welfare reducing for the agents.[6]

If the principal wants to enforce e_L then the optimal monetary incentive scheme is $\{b^*(1) = 0, b^*(0) = 0\}$. The corresponding expected utility of the principal is $P_L\pi$. The principal would enforce high effort only when $U^P|e_H \geq U^P|e_L$. It should be noted that the principal wants to implement e_H over e_L since it is implicitly assumed that $\pi \geq \pi^* = \frac{(\Delta P_H + v_0)[c-(P_H-P_L)(\bar{\lambda}-\underline{\lambda})]}{\Delta(P_H-P_L)^2}$ which ensures that $U^P|e_H \geq U^P|e_L$. With the increase in $\bar{\lambda}$ it is easier for the principal to implement high effort[7]. But when the disutility out of disgrace of not obtaining the status increases, it becomes difficult for the principal to induce high effort.

3. Informativeness of the Output Signal: Implications

The model also helps to predict how the informativeness of the signal affects principal's expected payoff. In this section we measure how status incentive and cost of putting effort affect utility of the principal when the non-verifiability of output increases. To observe more clearly we normalize $v_1 + v_0 = 1$ and let $v_0 \equiv x = 1 - v_1$. This implies that higher is the value of x less informative is the signal as a measure of output. We can state these results in the following proposition.

Proposition 2:

I. With increase in non-verifiability of output,

a) Principal's gain from using status incentive increases.

b) Principal's expected utility falls when the disutility from not achieving status increases.

II. When the output is harder to verify, the expected payoff of the principal falls further for higher cost of effort.

The first part of the proposition states that with the increase in non-verifiability of output the expected utility of the principal increases with $\bar{\lambda}$ and it decreases with $\underline{\lambda}$. The intuition is that, the principal has to offer higher optimal bonus with the decrease in informativeness of the signal. This loss is overshadowed by the gain from increase in utility from status incentive. Hence, principal gains from the increase in utility from status, with the decrease in verifiability of output. Similarly, the loss is aggravated when the disutility, from not getting status, increases and the principal's expected utility falls. The second part of the proposition reveals that when the output is harder to verify then it is difficult for the principal to exploit the agent and offer lower bonus. Together with that, if the cost of eliciting high effort is high enough then principal is bound to offer higher monetary incentive to make it incentive compatible. Thus, the expected payment of the principal increases with c when non-verifiability of output increases.

[6] This can be re-interpreted as 'curse of taste for status'. We thank the referee for pointing this out.
[7] Since the condition for implementing high effort is relaxed with the increase in utility from achieving status.

4. Conclusion

In this paper we have addressed how status works as an incentive in generating motivation among the agents, when the effort space is discrete. Incorporating the fact that status brings in both positive and negative privileges together with it (see Weber 1922), we assign a positive utility from status accruing from its trophy value and a disutility arising out of agent's disgrace from the failure of achieving it. Put differently, this paper analyzes the effect of change in valuation for status and the associated disutility from failing to achieve status on the optimal monetary incentive scheme. Using a moral hazard framework with limited liability we show that the optimal monetary incentive falls with the increase in utility from status, whereas it increases when the disgrace, from not achieving it, is high. Hence, in line with the existing literature (for instance, Huberman *et al.* 2004, Besley and Ghatak 2008, and Dhillon and Herzog-Stein 2009) our paper also suggests that monetary rewards and positional goods are imperfect substitutes, provided the disutility part is not high enough.

This paper contributes to the emerging literature on contract theory, which has focused on the importance and implications of status as a non-pecuniary incentive (see Frank 1985, Dubey and Geanakoplos 2010, Moldovanu *et al.* 2007, Fehr and Schmidt 1999, Besley and Ghatak 2008, Auriol and Renault 2008, and Dhillon and Herzog-Stein 2009), by generating some intriguing findings which results from making the effort space discrete. We find, unlike Besley and Ghatak (2008) that the expected payoff of agent increases when the disutility from not achieving status increases and exactly opposite happens when the value for status increases. Also the optimal incentive payment is invariant with the return of the firm.

Our paper provides an analytical structure, in discrete effort framework, to address the role of status as an incentive by assuming that the incentive (both status and monetary) is conferred only to the deserving agent. But, frequently it is observed that the principal often face a problem of performance assessment and therefore the incentive might not always reach the deserving agent. Again, the principal might indulge in some form of favouritism (while offering incentives) as well. These issues have remained unaddressed in this paper. In future, we intend to incorporate such feature and analyze the role of status as an incentive and its associated economic implications.

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