

An Incentive Problem Considering the Conflict Between the Individual and the Organization's Objectives

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Abstract

Agency theory is employed to analyze an incentive problem. In conventional agency models, employees have been assumed to devote their efforts only to objectives given by organizations. In this paper, we develop a new model considering not only the organization's objectives but also the laborers' individual objectives. We obtain following result from the analysis of it:

- (A) When there is a conflict between the individual and the organization's objectives
 - 1 When non-monetary productivity of the individual objective is high, PBW is effective.
 - 2 When non-monetary productivity of the organization's objective is low, PBW is effective.
- (B) When there is no conflict between the individual and the organization's objectives
 - 1 Non-monetary productivity of the individual objective does not affect the IS design.
 - 2 When non-monetary productivity of the organization's objective is low, PBW is effective.

1. INTRODUCTION

Agency theory has often been employed to discuss an incentive problem[1,2]. In conventional agency models, laborers have been assumed to devote their efforts only to objectives given by organization. But, in practice, employees, especially white collar ones such as researchers, managers and engineers seem to have individual objectives besides the ones given by organizations. Moreover, there are large conflicts between the objectives of a creative organization as a whole and of its members as individuals[3]. Based on these observations, in this paper, we develop a new model considering not only the organization's objectives but also the laborers' individual objectives. In section 2, we explain a new model. The results of the comparative static analysis and implications from them are described in section3. We obtain entirely different results according to whether there is a conflict between the individual and the organization's objectives or not.

2. MODEL

2.1 Agency model

Here, we have to outline agency model. Agency model is designed to analyze the situation where an economic subject (principal) is managed to control the behavior of another subject (agent) in exchange for an incentive. It is assumed that the principal cannot estimate the agent's behavior correctly. Then, there is no guarantee that the agent takes actions preferred by the principal. This is called "the moral hazard". Here we define the term incentive system (IS) as the way of offering such incentives. When the agent is offered an IS which is heavily dependent on output, he is highly responsible for the output and may behave as the principal wants. However, when the uncertainty of environment is large such an IS makes him bear large risk. Thus, we can see the desirable IS balances the positive utility from the agent's desirable actions against the disutility from the risk premium.

The basic structure of the agency model is as follows. First, the principal proposes an IS to the agent. Next, the agent decides his effort level. Considering the agent's decision the principal designs the IS to maximize her objective function.

2.2 New model for analyzing

Suppose there are the principal and the agent while the former wants to direct the latter to her objective. On one hand, he works for it and is offered incentives by her according to his performance. Work for the organization's objective brings him not only monetary but also non-monetary utility. On the other hand, he also has an individual objective which brings him larger non-monetary utility, though efforts for it bring the principal no utility. Under such conditions, the principal considers how to design an IS to maximize her utility.

Our analyzing model uses the following notations. We assume all variables and parameters are positive real numbers.

i : effort level for the agent's individual objective

o : effort level for the organization's objective

$U = po$: output function

Large p means that efforts for the organization's objective bring large monetary utility to both the principal and the agent. Then, we can call it as "monetary productivity of the organization's objective".

f : fixed wage

The agent is sure to be offered fixed wage f .

s : share

The agent is provided s of the output.

N : non-monetary utility function

N contains positive utility such as feeling of attainment or interest in it, and negative utility such as fatigue or boredom from it. We can naturally assume that N is an increasing function of effort levels when they are small. But, as they become large, the disutility of effort sharply rises. Then, we assume that N turns to be a decreasing function when the effort levels become large.

Considering the individual objective of the agent, we must treat following two cases.

(A) When there is a conflict between the individual and the organization's objectives

We often see organizations where total labor hours should not exceed a certain level because of a financial reason. In those organizations, the increase of effort level for the individual (organizations') objectives causes the decrease of effort level for the organizations' (individual) objectives. In such cases we can say that there is a conflict between the individual and the organization's objectives. We define following function to represent the non-monetary utility in those cases.

$$N = ui + vo - (ci + do)^2 \quad i + o = T \quad u > v, c < d$$

We call the $u(v)$ as "non-monetary productivity of the individual (organization's) objective".

(B) When there is no conflict between the individual and the organization's objectives

When there is no demand regarding total labor hours, and efforts for one objective do not spoil the motivation for work for another one, the agent can decide the effort levels for both objectives independently. We define following function to represent the non-monetary utility in those cases.

$$N = ui + vo - ci^2 - do^2 \quad u > v, c < d$$

It is assumed that i and o are determined independently.

Of course, in practice, total labor hours is not necessarily constant or employees necessarily cannot decide effort levels for both objectives independently. But, we are sure that it is significant to analyze two ideal models to investigate how to design IS considering the conflict between two objectives.

z : uncertainty of output

Output observed by the principal is assumed to be a random variable following the normally distributed curve whose mean value is U and variance $U^2 z^2$. We call z the uncertainty of output.

$R = rsUz$: Risk function

The agent's disutility resulting from risk is assumed to be a linear function of the standard deviation of his financial rewards. The variance of output is $U^2 z^2$, and then, the standard deviation of his monetary incentive is sUz .

B : reservation utility level

The agent accepts an IS offered by the principal if the value of his utility function exceeds this reservation utility.

$P = (1-s)U - f$: the principal's objective function

The principal cares only for monetary utility and is risk neutral.

$M = sU + f - R$: the agent's monetary utility function

The agent's monetary utility function is the difference between the expected value and a linear function of the standard deviation of his financial reward. It is called a linear trade off model[4]. If $rz \geq 1$, the agent's monetary utility function will be a decreasing one of effort level for the organization's objective, so we can naturally assume $rz < 1$.

$A = M + N$: the agent's objective function

We assume the agent's objective function is the sum of monetary and non-monetary utility functions.

Thus the principal's optimization problem can be represented as follows.

$$\begin{aligned} \max_{f,s} \quad & P \\ \text{s.t.} \quad & A \geq B \\ & i, o \in \operatorname{argmax}_{i,o} A \end{aligned}$$

3. ANALYSIS

In this section we solve the optimization problem introduced in the previous section and analyze the relationship between the solution s and parameters u, v . When s is large, it can be said that introducing performance-based wage (PBW) is effective. The solution is obtained as follows.

(A) When there is a conflict between the individual and the organization's objectives

$$s = \frac{p(1-rz) - rz(v-u) + 2cTrz(d-c)}{p(1-r^2z^2)}.$$

(B) When there is no conflict between the organization's and the individual objectives

$$s = \frac{p - (v+p)rz}{p(1-r^2z^2)}.$$

(A) 1. The relationship between u and s

$$\frac{\partial s}{\partial u} = \frac{rz}{p(1-r^2z^2)} > 0.$$

We can see that when u grows, s grows, too.

2. The relationship between v and s

$$\frac{\partial s}{\partial v} = -\frac{rz}{p(1-r^2z^2)} < 0$$

We can see that when v grows, s falls.

(B) 1. The relationship between u and s

$$\frac{\partial s}{\partial u} = 0.$$

We can see that u does not affect s .

2. The relationship between v and s

$$\frac{\partial s}{\partial v} = -\frac{rz}{p(1-r^2z^2)} < 0$$

We can see that when v grows, s falls.

4. Conclusion

The results of the comparative static analysis show that :

(A) When there is a conflict between the individual and the organization's objectives

1 When non-monetary productivity of the individual objective is high, PBW is effective.

2 When non-monetary productivity of the organization's objective is low, PBW is effective.

(B) When there is no conflict between the individual and the organization's objectives

1 Non-monetary productivity of the individual objective does not affect the IS design.

2 When non-monetary productivity of the organization's objective is low, PBW is effective.

It follows from (A)-1 and (B)-1 that there are different principles regarding how to design IS considering non-monetary productivity of the individual objective according to whether there is a conflict or not. When there is a conflict and non-monetary productivity of the individual objective is low, PBW is effective. While on the other hand, when there is not a conflict, the principal can consider IS without considering non-monetary productivity of the individual objective.

From (A)-2 and (B)-2 we can affirm that when non-monetary productivity of the principal's objective is low, introducing PBW would be always effective.

We should understand that the principles of designing IS are different according to whether there is a conflict between the individual and the organization's objectives or not.

References

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