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## **Incentives, Identity, and Organizational Forms**

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# Incentives, Identity, and Organizational Forms\*

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## Abstract

This paper studies the optimal organizational form and the optimal type of manager by considering the nonmaterial (psychological) payoff as well as the standard material payoff for agents. I compare two organizational forms: T-form, where all agents have the same job title so that they are in a single reference group; and H-form, where one agent is appointed to be the manager and the others are subordinates who form a reference group. I show that the principal should appoint a more (less) able agent to be the manager when the effects of peer pressure are more (less) critical. In addition, I find the conditions under which H-form is more likely to be preferred to T-form. Finally, I discuss the phenomenon of the proliferation of job titles in the context of this model.

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Keywords: Principal-agent Model, Multiagents, Moral Hazard, Reference Group, Peer Pressure, Identity, Proliferation of Job Titles.

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# 1 Introduction

People often compare their actions with those of others in order to confirm that their own actions are proper from a social viewpoint. This behavior, generally referred to as social comparison, is one of the most interesting issues in social psychology, human resource management, and other fields of social science. Social comparison theory often asserts that social comparison is apt to occur in a reference group. Here, a reference group can be defined as a group that people see as a main source for their own social identity. This means that people in a reference group are inclined to compare their behavior with others in their own reference group. As mentioned by Baron and Kreps (1999), social comparison theory also maintains that people think about themselves in comparison with others who are similar;<sup>1</sup>

“... individuals exhibit a strong tendency to make social comparisons vis-à-vis individuals who are similar to themselves. Similarity here is a function of both personal characteristics - such as age, gender, education - and being in a similar situation (for instance, within a work organization, in the same occupation, job title, department, or entry cohort).”  
(Baron and Kreps (1999), p.103)

As pointed out in the above quotation, one of the most important sources of social identity in a reference group is a job title in a work organization such as a firm. Of course, the allocation of job titles in a firm is also one of the most crucial problems when the top manager or owner of a firm tries to find the optimal organizational form. Thus, I note that the allocation of job titles leads to an organizational form in that each job title defines social identity and forms a reference group, and consequently that such reference group formations define an organizational form.<sup>2</sup>

This paper tries to build a formal economic model into which I incorporate the above insights from sociological and psychological findings and study the optimal organizational form. In particular, I focus on the effects on incentives of identity as influenced by job title and peer pressure resulting from social comparisons within a reference group. In particular, I focus on the effects of identity influenced by job titles and peer pressure through social comparisons in a reference group on incentives. In this model, an agent's sociological and psychological payoff according to social identity has a crucial role. For the sake of this purpose, I consider a principal-multiagent model where agents with limited

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<sup>1</sup>This property of social comparison is mentioned in Festinger (1954). In addition, Merton (1957) broadly investigates social comparison in a reference group in terms of relative deprivations.

<sup>2</sup>Baron and Kreps (1999) also have a similar concept of the formation of organizational forms; “Within organizations, ‘similarly situated’ often equates with rank and job title. To reduce invidious social comparisons, organizations sometimes find it useful to create bureaucratic distinctions between groups whom they wish to differentiate.” (Baron and Kreps (1999), p.329.)

liability are engaged in a project. The principal allocates a job title to each agent. I suppose, here, that the job titles draw the boundaries of reference groups. That is, the agents with the same job title are in the same reference group and they compare their actions with those of their colleagues in that group. In this situation, I have to examine the issue of whether the principal allocates the same job title to all of the agents. To investigate this, I consider two typical organizational forms. In one form, the principal gives a unique job title to all of the agents. I call this organizational form “T-form,” as I can interpret the agents as working together in a single “team.” In the other form of organization, the principal allocates a particular (superior) job title (such as the “manager”) to one agent and another (inferior) job title (such as the “subordinate”) to the other agents. Then, the manager is no longer included in the reference group, which is composed of the other agents who are designated as the subordinate. I call this organizational form “H-form,” as this form can be viewed as a “hierarchy.”<sup>3</sup> Thus, one of the main purposes of this paper is to examine whether T-form or H-form is the optimal organizational form.

A key component of this paper is the idea that the psychological payoff for an agent is contingent upon his identity, as defined by his job title.<sup>4</sup> On the one hand, such payoffs for the subordinate in H-form and the member in T-form are attributed to the comparisons of the agents’ effort levels in the reference group to which they belong. This kind of payoff is demonstrated in general research on peer pressure. Here, peer pressure can be referred to as a pressure experienced by an agent when he compares his action with the actions taken by his colleagues.<sup>5</sup> On the other hand, the manager in H-form is free from the peer pressure generated through comparisons of actions in the reference group. This is because he is no longer in that group and does not share a social identity with the members of the group. However, he establishes a new identity by being appointed to the superior job title. Thus, I will be able to consider that this agent’s utility also depends on other additional payoffs related to his new identity once he is appointed to be the manager.<sup>6</sup> In general, people in the higher hierarchy of a firm tend to have similar preferences to the firm. As a result, their utilities are more likely to

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<sup>3</sup>The production technology in H-form is the same as that in T-form. Thus, the task of each agent does not change contingent on his assigned job title. I will also explain this point in footnote 11.

<sup>4</sup>Of course, this kind of nonmaterial payoff is not only psychological but also sociological. However, just for descriptive simplicity, I call it the “psychological” payoff in this paper. I again refer to this usage of psychological payoff in footnote 8.

<sup>5</sup>See, for example, Kandel and Lazear (1992), Baron and Gjerde (1997), Huck et al. (2003), or Daido (2004, 2006). In addition to research on peer pressure, some models with other-regarding preferences, such as Fehr and Schmidt (1999) or Itoh (2004), have similar features in terms of social comparison. However, each agent compares his welfare, instead of an action, with his colleagues in the models with other-regarding preferences.

<sup>6</sup>This view that the principal has an ability to change the agent’s identity is similar to that of Akerlof and Kranton (2003, 2005, and 2008). I will refer to the relationship of this paper with a series of research papers by Akerlof and Kranton later in this section.

depend on the outcome of the firm.<sup>7</sup> For example, a manager usually feels pressure if a project fails but feels pleasure if it is successful. This pressure or pleasure may come from various sources, such as the reputation for being a good or bad manager, the agent's fulfillment of his responsibility as the manager, a sense of achievement, or self-satisfaction. In this way, the manager's payoff depends not only on the standard material payoff but also upon the nonmaterial (psychological) payoff, which is contingent upon the outcome of the project.<sup>8</sup> This point is very important when I evaluate whether the optimal organizational form is H-form or T-form.

Related to the issue of the optimal organizational form, I have to consider another critical issue in H-form organizations, which is what type of agent the principal should choose as the manager. In this paper, I consider agents who are heterogeneous with respect to productivity. Then, I have to examine whether a more or a less productive agent should be appointed manager. To examine the optimal type of manager in H-form organizations is another important purpose of this paper.

Through studying this model, I obtain the following results. First, I show that the principal should appoint a more (less) able agent to be the manager when the effects of peer pressure are more (less) critical. In addition, I find the conditions under which H-form is more likely to be preferred to T-form. Finally, I briefly consider the phenomenon of the proliferation of job titles to give an interpretation of the results of the current model and confirm the conditions in which such proliferation occurs in the context of this model.<sup>9</sup>

Many researchers have recently developed principal-agent models incorporating psychological effects. However, there has been little literature that places attention not only on the psychological view but also on the sociological view and studies organizational forms.<sup>10</sup> One of the exceptions is Akerlof and Kranton (2003, 2005, and 2008: henceforth, AK). They are closely related to this paper in terms of aim and motivation. They try to construct an economic model of identity and work incentives. They consider a principal-agent model where an agent's identity leads to behavior that is more or less in concert with the goals of his organization. Moreover, the principal can change an agent's identity through using a supervisor who reports an agent's activity. The agent adopts a work group identity

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<sup>7</sup>Akerlof and Kranton (2003) explain this point by comparing the Weberian and post-Weberian views. While the post-Weberian view is that employees identify with their work group rather than with the organization as a whole, the Weberian view is that employees identify with the firm and experience a loss in utility if they do not act in the interests of that firm.

<sup>8</sup>As seen here, this nonmaterial (psychological) payoff may include more material considerations, such as gaining or losing the chance for further promotion opportunities. However, I refer to the nonmaterial part of the manager's payoff as the "psychological" payoff of the manager in this paper, as such a payoff is scarcely considered in the standard economic model, and moreover does not arise until the manager's identity changes.

<sup>9</sup>Strang and Baron (1990) examine the structure of job titles in the California state government and investigate why some kinds of work roles are subdivided into many job titles and others into very few. For example, there is little differentiation among doctors, but there are detailed job ladders in each branch of engineering.

<sup>10</sup>On the importance of the sociological view for organizational economics, Gibbons (2005) emphasizes that economic sociology is helpful to think about how organizations are and should be structured and managed.

when the principal does not use a supervisor, but he adopts an outsider identity when she appoints a supervisor. The main difference between these two kinds of identity is that the ideal effort level of a work group identity is larger than that of an outsider identity. Note that the agent's utility falls when his effort level deviates from his ideal level. They mainly show that introducing payoff related to an identity reduces the wage difference needed to induce higher effort. However, when the agent has an outsider identity, the principal also compensates his disutility from the gap between the agent's ideal low effort level and the high effort level preferred by the principal.

This paper as well as AK considers a principal-agent model and the principal can change an agent's identity through her policy. However, this model differs from that of AK in several critical ways. First, we consider multiple agents who form a reference group. The behaviors of the agents in this group are affected by peer pressure. Thus, we capture the interaction of the agents who have the same identity toward their reference group. Second, although AK suppose that the principal appoints an outside supervisor, I consider that the principal chooses the manager among the existing group of agents. By this formulation, we can study the optimal form of organization endogenously. Third, I suppose that the agents are heterogeneous in terms of productivity. This setting enables me to generate some results on the optimal types of managers. Thus, these characteristics of this paper lead various fruitful results beyond AK.

The remaining sections are organized as follows. I present the model in Section 2. In Section 3, I find the optimal type of manager in H-form. Then, I study the optimal organizational form in Section 4. Section 5 examines the phenomenon of the proliferation of job titles. Finally, I conclude the paper in Section 6.

## 2 Model

In this model, there is a principal and multiple agents. All of them are assumed risk-neutral, but the agents are protected by limited liability. The number of agents is  $n$ , where  $n \geq 3$ . The agents are engaged in a single project. Agent  $i$  provides his effort  $e_i \in \{0, 1\}$  to the project at cost  $d_i(e_i)$ . I assume that  $d_i(1) = d_i > 0$  and  $d_i(0) = 0$  for all  $i$ . I consider heterogeneous agents with respect to the effort cost. I assume that  $d_1 < d_2 < \dots < d_n$ . That is, agent  $i$  is a more able agent than is agent  $i + 1$ . The outcome of the project,  $b \in \{b_s, b_f\}$ , is  $b_s$  if the project is successful, but  $b_f$  if the project fails. For simplicity, I assume that  $b = b_s > b_f = 0$ . Whether the project is successful is contingent on agents' efforts,  $\mathbf{e} = (e_1, e_2, \dots, e_n)$ . The wage to each agent depends on the outcome and I suppose that  $w_i(b) = w_i \geq 0$  and  $w_i(0) = 0$ . The project is successful with probability  $p(\mathbf{e})$ , whereas it fails with probability  $(1 - p(\mathbf{e}))$ . I assume that  $p(\mathbf{e}) = p_h \in (0, 1)$  if  $\mathbf{e} = (1, \dots, 1)$ , otherwise

$p(\mathbf{e}) = p_l \in (0, p_h)$ .

Here, I define two organizational forms, “T-form” and “H-form.” As mentioned in Section 1, the difference between the two forms is determined by the job titles given to the agents by the principal. On the one hand, T-form is the form where all agents are given the same job title. This means that all agents are in the same reference group. Note that the members in a reference group feel pressure (e.g., peer pressure) from themselves and from the group. Therefore, I suppose that each agent (a member in T-form) feels peer pressure if his effort level is below (or above) the average effort level of the other members in that group. As a result, the agent’s utility contains not only the material payoff but also the psychological payoff from peer pressure. On the other hand, H-form is the form in which one agent is appointed as the manager and the other agents work as the subordinates. Then, the subordinates in H-form as well as the members in T-form identify with their reference group, but the manager does not identify with that group, but rather with the firm to which he belongs. This means that the subordinates feel peer pressure from each other as they are in the same reference group, but the manager is out of that group and free from peer pressure. However, once the agent is appointed manager, his utility contains a kind of psychological payoff related to the outcome of the firm, separate from that resulting from peer pressure. Thus, the psychological payoffs according to job titles have an important role in this model.<sup>11</sup>

I now have to formulate the agent’s payoff according to his job title. First, I represent the payoff for the agent  $i$  in the same reference group.<sup>12</sup>

$$u_i = p(\mathbf{e})w_i - d_i(e_i) - \alpha_i(\mathbf{e}), \quad (2.1)$$

where  $\alpha_i(\mathbf{e})$  represents the psychological payoff for agent  $i$ . Concretely,  $\alpha_i(\mathbf{e})$  is as follows.

$$\alpha_i(\mathbf{e}) = \alpha \max\{\bar{e}_{-i} - e_i, 0\} + \alpha\gamma \max\{e_i - \bar{e}_{-i}, 0\}, \quad (2.2)$$

where  $\bar{e}_{-i}$  is the average effort level of the agents other than agent  $i$  in the reference group. That is, suppose  $R$  is the set of agents in the reference group and that  $\#R$  is the number of agents in this group. Then,  $\bar{e}_{-i} = \frac{\sum_{j \in R, j \neq i} e_j}{\#R - 1}$ .<sup>13</sup> I suppose that  $\alpha > 0$  and  $0 < \gamma \leq 1$ . This implies that agent  $i$  has disutility when his effort level is either below or above the average level of the other agents but

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<sup>11</sup>Note that production technology is the same in both organizational forms. That is, I suppose that all agents are equally engaged in a project regardless of their job titles. I believe that this view is not unusual. Baron and Kreps (1999), for example, supports this view in the following way; “In two-tiered employment systems, for instance, there are usually separate titles used to describe the higher- and lower-tier workers, who are performing tasks that are nearly or even precisely identical.” (Baron and Kreps (1999), p.329)

<sup>12</sup>This case implies that the agent is either a member in T-form or a subordinate in H-form.

<sup>13</sup>As seen below, each agent decides his effort level given others do effort. In this respect, this formulation seems to be interpreted that the agents’ reference effort level is the high effort level as a norm.

that the disutility is larger when his effort level is below than when his effort level is above that of the other agents.<sup>14</sup> In addition, I suppose that the magnitude of the psychological payoff,  $\alpha$ , is the same for all agents.

Next, I consider the psychological payoff for the manager  $i$ . As mentioned before, the manager identifies with the firm rather than with the reference group to which he belonged before he was appointed the manager. Then, the manager will come to care greatly about the outcome of the project, which is attributed to the benefit of the firm, although he is free from the peer pressure experienced among the members of the reference group. That is, the manager has negative feelings if the project fails and has positive feelings if it is successful. Then, I suppose that agent  $i$ 's payoff if appointed manager is represented by:

$$u_i = p(\mathbf{e})w_i - d_i(e_i) - (1 - p(\mathbf{e}))\beta + p(\mathbf{e})\mu\beta, \quad (2.3)$$

$\beta$  ( $> 0$ ) can be interpreted as how much the manager psychologically cares about the outcome.  $\mu$  represents the degree of the positive psychological payoff from success relative to the negative one from failure. I assume that this psychological payoff has the property of loss aversion, so that  $0 < \mu < 1$ .<sup>15</sup>

Finally, we consider the situation where the principal wants to implement  $\mathbf{e} = (1, \dots, 1)$  and then her object is to minimize the total wage. The timing is as follows. First, the principal offers a wage contract to the agents, contingent on their job titles. Then, the agents decide simultaneously whether to accept or reject the contract. If it is rejected by at least one agent, this game ends and each agent receives the reservation utility, which is assumed to be zero. If it is accepted by all agents, the game proceeds to the next stage. Then, each agent chooses his own effort level. Finally, the output is realized, and the principal pays wages to the agents according to the contract.

### 3 Optimal Type of Manager

In this section, I first consider the agent's participation constraint (henceforth, PC) and incentive compatibility constraint (henceforth, IC) according to his job title, and find the conditions under which PC or IC is binding. Then, I calculate the total expected payment in the three cases of H-form, which are divided by such conditions. Finally, by comparing these three cases, I show what type of agent should be appointed manager.

First, I consider the constraints for member  $i$  in T-form. Suppose  $e_{-i} = 1$ , IC for the member  $i$  is represented by:

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<sup>14</sup>Note that  $\gamma$  does not have any effect on the following analysis because, in this model, I suppose that effort choice is binary and that the outcome is so large that the principal prefers  $\mathbf{e} = (1, \dots, 1)$ .

<sup>15</sup>See, for example, Kahneman and Tversky (1979).

$$p_h w_i - d_i \geq p_l w_i - \alpha \Rightarrow w_i \geq \frac{d_i}{\Delta_p} - \frac{\alpha}{\Delta_p}, \quad (\text{ICT})$$

where  $\Delta_p \equiv p_h - p_l$ . Assuming the reservation payoff is zero, PC for the member  $i$  is represented by:

$$p_h w_i - d_i \geq 0 \Rightarrow w_i \geq \frac{d_i}{p_h}. \quad (\text{PCT})$$

From (ICT) and (PCT), the condition where (ICT) rather than (PCT) is binding is:

$$d_i \geq \rho \alpha, \quad (\text{CT})$$

Note that both IC and PC for the subordinate  $i$  in H-form are the same as those for member  $i$  in T-form as  $n$  agents are engaged in a project not only in T-form, but also in H-form.

Next, in H-form, IC and PC for the agent  $i$  who is appointed manager are as follows, respectively:

$$p_h w_i - d_i - (1 - p_h)\beta + p_h \mu \beta \geq p_l w_i - (1 - p_l)\beta + p_l \mu \beta \Rightarrow w_i \geq \frac{d_i}{\Delta_p} - (1 + \mu)\beta. \quad (\text{ICM})$$

$$p_h w_i - d_i - (1 - p_h)\beta + p_h \mu \beta \geq 0 \Rightarrow w_i \geq \frac{d_i}{p_h} + \frac{\beta}{p_h} - (1 + \mu)\beta. \quad (\text{PCM})$$

(ICM) is given by supposing that  $e_{-i} = 1$  and assuming that the reservation payoff is zero. From (ICM) and (PCM), the condition where (ICM) rather than (PCM) is binding is given by:

$$d_i \geq (\rho - 1)\beta. \quad (\text{CM})$$

So far, I have examined the conditions under which IC or PC is binding according to the job title of the agent. Before finding the optimal type of manager in H-form, I categorize the agents by the conditions obtained above. Such categorization differs according to the following two cases: in Case X,  $\alpha > (1 - \frac{1}{\rho})\beta$ , whereas in Case Y,  $\alpha < (1 - \frac{1}{\rho})\beta$ .<sup>16</sup> This threshold can be obtained from (CT) and (CM). Intuitively, Case X (Case Y) represents the situation where the effect of peer pressure is more (less) crucial relative to that of the manager's concern about the outcome from the projects.

First, I consider Case X. I define some sets for the following analysis.  $N$  is the set of agents.  $M_0$  and  $M_1$  are the set of agents whose costs are  $d_i \in (0, (\rho - 1)\beta)$  and  $d_i \in ((\rho - 1)\beta, \rho\alpha)$ , respectively.<sup>17</sup> Moreover,  $M_2 = N \setminus (M_0 \cup M_1)$ . I interpret that  $M_0$  is the high-productivity group,  $M_1$  is the middle-productivity group, and  $M_2$  is the low-productivity group. The number of agents in  $M_0$ ,  $M_1$ , and

<sup>16</sup>See Figure 1 and 2. The analysis of the case where  $\alpha = (1 - \frac{1}{\rho})\beta$  is very simple. I will remark on this case later in this section.

<sup>17</sup>For analytical tractability, I assume that  $d_i \neq (\rho - 1)\beta, \rho\alpha$ , for all  $i$ .

$M_2$  is  $m_0$ ,  $m_1$ , and  $m_2$ , respectively. For analytical simplicity, I assume that  $m_0 \geq 1$ ,  $m_1 \geq 1$ , and  $m_2 \geq 1$ .<sup>18</sup> In this setting, I have to consider three types of H-form: (1) H-form with the manager from  $M_0$  (type  $H_0^X$ ); (2) H-form with the manager from  $M_1$  (type  $H_1^X$ ); and (3) H-form with the manager from  $M_2$  (type  $H_2^X$ ).

The total payment to  $H_z^X$  ( $z = 0, 1, 2$ ) can be shown as follows:

$$\begin{aligned} W^{H_0^X} &= \sum_{\substack{i \in M_0 \cup M_1 \\ i \neq k_0}} \frac{d_i}{p_h} + \sum_{j \in M_2} \left\{ \frac{d_j}{\Delta_p} - \frac{\alpha}{\Delta_p} \right\} + \frac{d_{k_0}}{p_h} - (1 + \mu)\beta + \frac{\beta}{p_h} \\ \Rightarrow W^{H_0^X} &= \sum_{i \in M_0 \cup M_1} \frac{d_i}{p_h} + \sum_{j \in M_2} \frac{d_j}{\Delta_p} - \frac{\alpha}{\Delta_p} m_2 - (1 + \mu)\beta + \frac{\beta}{p_h}, \end{aligned} \quad (3.1)$$

$$\begin{aligned} W^{H_1^X} &= \sum_{\substack{i \in M_0 \cup M_1 \\ i \neq k_1}} \frac{d_i}{p_h} + \sum_{j \in M_2} \left\{ \frac{d_j}{\Delta_p} - \frac{\alpha}{\Delta_p} \right\} + \frac{d_{k_1}}{\Delta_p} - (1 + \mu)\beta \\ \Rightarrow W^{H_1^X} &= \sum_{i \in M_0 \cup M_1} \frac{d_i}{p_h} + \sum_{j \in M_2} \frac{d_j}{\Delta_p} + \frac{d_{k_1}}{\rho \Delta_p} - \frac{\alpha}{\Delta_p} m_2 - (1 + \mu)\beta, \end{aligned} \quad (3.2)$$

and

$$\begin{aligned} W^{H_2^X} &= \sum_{i \in M_0 \cup M_1} \frac{d_i}{p_h} + \sum_{\substack{j \in M_2 \\ j \neq k_2}} \left\{ \frac{d_j}{\Delta_p} - \frac{\alpha}{\Delta_p} \right\} + \frac{d_{k_2}}{\Delta_p} - (1 + \mu)\beta \\ \Rightarrow W^{H_2^X} &= \sum_{i \in M_0 \cup M_1} \frac{d_i}{p_h} + \sum_{j \in M_2} \frac{d_j}{\Delta_p} - \frac{\alpha}{\Delta_p} (m_2 - 1) - (1 + \mu)\beta. \end{aligned} \quad (3.3)$$

Note that  $k_z$  represents the agent who is appointed manager from  $M_z$  ( $z = 0, 1, 2$ ). Now, I have the proposition for the optimal type of manager in Case X.<sup>19</sup>

**Proposition 1.** *In Case X, the optimal H-form is  $H_0^X$ . That is, the principal should choose a more able agent as the manager.*

In Case X, the effect of peer pressure ( $\alpha$ ) is relatively larger than that of the manager's care for the outcome ( $\beta$ ). When the principal appoints a less able agent to be the manager or the subordinate, she

<sup>18</sup>I can easily confirm the results when the assumption that  $m_0 \geq 1$ ,  $m_1 \geq 1$  and  $m_2 \geq 1$  is not satisfied. First, consider the situations where only one set is empty and the other two sets are not empty. Then, although either set is empty, the principal can save on payment by choosing an agent from more productive set as the manager. Next, consider the situations where only one set is not empty and the others are empty. If only  $M_1$  is not empty, (3.2) says that the principal should choose the most productive agent as the manager. However, if either  $M_0$  or  $M_2$  is not empty, then it is irrelevant which agent the principal chooses from own set.

<sup>19</sup>Proofs of Proposition 1, 2, and 5 are presented in the Appendix.

has to care about his incentives to exert high effort. That is, I have to examine whether the principal should impose on him (ICT) or (ICM). If the principal appoints him to be the subordinate instead of the manager, then (ICT) binds and she can save on payment to him because peer pressure reduces rent even when she makes him exert high effort. On the other hand, when the principal appoints a more able agent to be the manager or the subordinate, she has to care about if he accepts her offer or not. That is, I have to examine whether the principal should impose on him (PCT) or (PCM). In Case X, the effect of the manager's care for the outcome is relatively small. Thus, this decision has not critical effect on the principal's payment to the agent. As a result, since the effect of reducing rent by keeping a less able agent in the peer group is strong, the principal should appoint a more able agent to be the manager.<sup>20</sup>

Next, I focus on Case Y. I also define some sets in this case.  $L_0$  and  $L_1$  are the sets of agents whose costs are  $d_i \in (0, \rho\alpha)$  and  $d_i \in (\rho\alpha, (\rho - 1)\beta)$ , respectively.  $L_2 = N \setminus (L_0 \cup L_1)$ . The number of agents in  $L_0$ ,  $L_1$ , and  $L_2$  is  $l_0$ ,  $l_1$ , and  $l_2$ , respectively. I assume that  $l_0 \geq 1$ ,  $l_1 \geq 1$ , and  $l_2 \geq 1$ .<sup>21</sup> As in Case X, I have to consider three types of H-form in this case: (1) H-form with the manager from  $L_0$  (type  $H_0^Y$ ); (2) H-form with the manager from  $L_1$  (type  $H_1^Y$ ); and (3) H-form with the manager from  $L_2$  (type  $H_2^Y$ ). Then, I have the proposition for the optimal type of manager in Case Y.

**Proposition 2.** *In Case Y, the optimal H-form is  $H_2^Y$ . That is, the principal should choose a less able agent as the manager.*

In Case Y, the effect of peer pressure is relatively less critical than that of the manager's concern about the outcome. Just in Case X, the principal has to care about a less able agent's IC whether he is the manager or the subordinate. However, unlike in Case X, the principal can save on payment to a less able agent by appointing him as the manager and imposing upon him (ICM) instead of (ICT) because the peer pressure effect is weak in Case Y. With a more able agent, this case can be considered much like Case X. The principal has to care about a more able agent's PC whether he is the manager or the subordinate. By appointing him as the manager, the principal can change his PC from (PCT) to (PCM) but it is not certain whether she can save on payment. Although a such change may or

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<sup>20</sup>I should also consider the effect of changing the job title for the agent in the middle-productivity group. Note that such agent's PC (IC) is binding when he is the subordinate (the manager). By changing his title from the subordinate to the manager, the principal can impose (ICM) instead of (PCM) for him and this increases the material payment to him. This result is the same as that in the standard moral hazard model. Of course, the principal's payment to the agent is influenced by her care for the outcome, but this effect is trivial in Case X. Thus, the principal should choose the manager from the set of the high-productivity group.

<sup>21</sup>Similar to Case X, I can also confirm the results when the assumption that  $l_0 \geq 1$ ,  $l_1 \geq 1$  and  $l_2 \geq 1$  is not satisfied in this case. First, when only one set is empty, the principal can save on payment by choosing an agent from a less productive set as the manager. Next, consider the situations where only one set is not empty and the others are empty. If only  $L_1$  is not empty, (A.2) means that the principal should choose the less productive agent as the manager. However, if either  $L_0$  or  $L_2$  is not empty, then it is irrelevant which agent the principal chooses from own set.

may not be beneficial for her, this effect has less impact on the principal's payment than the effect of appointing a less able agent as the manager. As a consequence, the principal should appoint a less able agent to be the manager.<sup>22</sup>

To summarize the results regarding the optimal types of manager, the principal should appoint a more able agent as the manager when the effects of peer pressure are more critical. In this situation, the principal should keep less able agents in the peer group because peer pressure gives them incentives to increase their efforts. On the contrary, when the effects of peer pressure are trivial and the effect of the manager's concern about the outcome instead is crucial, the principal should appoint a less able agent as the manager. The principal cannot save on much rent by peer pressure even if she keeps a less able agent in peer group. However, once she appoints him as the manager, she can save on more rent by making the agent care for the outcome.

## 4 Optimal Organizational Form

In this section, I study the optimal organizational form by comparing T-form and H-form where the principal appoints the appropriate agent as the manager. That is, we compare  $H_0^X$  ( $H_2^Y$ ) with T-form in Case X (Case Y). For this purpose, I first consider the total payment to T-form. This payment differs between Case X and Case Y. The total payment in each case is as follows, respectively:

$$W^X = \sum_{i \in M_0 \cup M_1} \frac{d_i}{p_h} + \sum_{j \in M_2} \frac{d_j}{\Delta_p} - \frac{\alpha}{\Delta_p} m_2. \quad (4.1)$$

$$W^Y = \sum_{i \in L_0} \frac{d_i}{p_h} + \sum_{j \in L_1 \cup L_2} \frac{d_j}{\Delta_p} - \frac{\alpha}{\Delta_p} (l_1 + l_2). \quad (4.2)$$

Then:

$$\begin{aligned} W^{H_0^X} - W^X &= -\beta \left[ 1 + \mu - \frac{1}{p_h} \right] \\ &= -\frac{(1 + \mu)\beta}{p_h} \left[ p_h - \frac{1}{1 + \mu} \right], \end{aligned} \quad (4.3)$$

and

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<sup>22</sup>As the same of Case X, I should consider the effect of changing the job title for that agent in the middle-productivity group. By changing the job title from the subordinate to the manager, the principal can impose (PCM) instead of (ICM) for the agent. This enables for the principal to save on the material payment. However, the benefit from the change of the psychological payoff is greater when a less able agent becomes the manager than when the agent in the middle-productivity group does. In Case Y, this effect in terms of psychological payoff is greater than the former effect of the reduction of material payoff. This leads the result that the principal should choose the manager from the low-productivity group.

$$W^{H_2^Y} - W^Y = \frac{\alpha}{\Delta_p} - (1 + \mu)\beta. \quad (4.4)$$

From (4.3) and (4.4), I can obtain the following proposition on the optimal organizational form.

**Proposition 3.** *The optimal organizational form is as follows:*

- (i) *In Case X, where  $(1 - \frac{1}{\rho})\beta < \alpha$ , H-form is optimal if  $\frac{1}{1+\mu} \equiv p^X < p_h$ .*
- (ii) *In Case Y, where  $\alpha < (1 - \frac{1}{\rho})\beta$ , H-form is optimal if  $\frac{\alpha}{\beta} \frac{1}{1+\mu} \equiv p^Y < \Delta_p$ .*

First,  $\mu$  affects the optimal organizational form both in Case X and in Case Y. H-form is preferable to T-form in both cases as  $\mu$  increases because  $p^X$  and  $p^Y$  are decreasing in  $\mu$ . Thus, if the manager is more likely to enjoy the psychological payoff from the success of the project, then, in both cases, H-form is more attractive to the principal. This result implies that the principal should choose H-form if she can let the manager identify with her purpose and if he derives pleasure from the success of the project as she does.

In contrast to  $\mu$ ,  $\alpha$  and  $\beta$  affect the optimal organizational form only in Case Y although it is independent of such parameters in Case X.<sup>23</sup> In Case X, the principal appoints the agent whose PC is binding regardless of his job title to be the manager. Then, the number of the agents whose PCs are binding in H-form is the same as that in T-form, so the effect of  $\alpha$  does not appear. That is, the effects of peer pressure work the same way in both forms. Thus, the difference in the payments between the two forms is attributed only to the psychological payoff of the manager,  $\beta[1 + \mu - 1/p_h]$ . However, it is obvious that the sign of this term does not depend on  $\beta$ , given that  $\beta > 0$ . Therefore, the condition determining whether H-form or T-form is optimal in Case X is independent of  $\alpha$  and  $\beta$ .

On the contrary,  $\alpha$  and  $\beta$  have a crucial role in determining the optimal form in Case Y. Choosing H-form brings the principal both negative and positive effects. On the negative side, she has to give up the opportunity of giving the agent the incentive to choose high effort via peer pressure. On the positive side, she can save on rent because the agent cares for the outcome. Because the effect of peer pressure is less critical than that of the manager's caring for the outcome in Case Y, the positive effect overcomes the negative one so that H-form is more attractive for the principal than T-form. Thus, the principal should choose H-form and let the agent identify with the firm whenever the peer pressure has little effect on the incentive to work.

In addition,  $p_l$  also affects the determination of the optimal organizational form in Case Y. The principal has to give up the benefit from peer pressure when she chooses H-form and appoints a less

<sup>23</sup>Needless to say,  $\alpha$ ,  $\beta$ , and  $\rho$  indirectly affect the result in Case X through the condition via which either Case X or Case Y is realized.

able agent as the manager. Precisely, this loss of benefit is  $\alpha/\Delta_p$ . Then, given  $p_h$ , as  $p_l$  is decreasing, this effect is diminished and H-form is preferable to T-form. This implies that the principal should allow a less able agent to identify with the firm when the probability of success would drastically drop if even one agent shirks from exerting high effort.

## 5 Proliferation of Job Titles

In this section, I briefly discuss the proliferation of job titles as a possible application of the current model. Sociologists have studied the structure of job titles in organizations although there is too little economic research on it. In one example of this sociological literature, Strang and Baron (1990) study this issue from the view of job title proliferation. They investigate variations in the proliferation of job titles across different kinds of work within the California state government. They show that the proliferation of job titles depended on political, social, and institutional forces, as well as on organizational size and environmental complexity. As cited in Strang and Baron (1990), DiPrete (1989) cites evidence that job title distinctions were advocated by early architects of the federal civil service to segregate the professions from lower status work. From this viewpoint, I can see the phenomenon of job title distinction as a device that segregates some people from those who are engaged in lower status work. Then, when an agent is chosen as the manager and is free from peer pressure, this implies that a kind of job title proliferation occurs.<sup>24</sup> Adopting this view in the context of this paper, I interpret that job title proliferation occurs when the principal prefers H-form to T-form.

I have studied the model in which only one agent leaves the reference group by being given a new job title. In Section 3, I presented the results (Proposition 1 and 2) that the principal chooses such an agent from the set of the high-productivity ( $M_0$ ) group in Case X and from the set of the low-productivity group ( $L_2$ ) in Case Y. That is, I found the optimal set from which the principal chooses an agent to which she will give a new job title. Note that these results do not determine which agent should be chosen from the optimal set in each case. However, it is not difficult to determine whether the principal should give new job titles to other agents who are also in the optimal set as long as I suppose that the agents who are additionally appointed to be managers have the same utility function represented by (2.3). This is because the principal's problem does not change the problem I have studied. Now, I have the following corollary.<sup>25</sup>

**Corollary 1.** *In both Case X and Case Y, if H-form is better than T-form for the principal, then she*

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<sup>24</sup>Baron and Pfeffer (1994) point out that the proliferation of job titles can reduce the tendency to seek similar treatment, citing Lansberg (1989).

<sup>25</sup>There is a possibility that the agents who are appointed as managers form a new reference group and they are again affected by peer pressure. However, I do not consider such a scenario for reasons of analytical simplicity.

should appoint all agents in the optimal set to be the managers.

Here, I call this stage of proliferation the “first-round proliferation.” Next, I try to examine the possibility that a further proliferation (the “second-round proliferation”) will occur in the current model. After the first-round proliferation, the agents in the optimal set disappear. That is, I consider the situations where only  $M_1$  and  $M_2$  exist in Case X and where only  $L_0$  and  $L_1$  exist in Case Y. In these situations, I investigate whether the principal should appoint some additional agents to a superior job title, such as “sub-manager.” For simplicity, I suppose that the utility of the sub-manager has the same property as that of the manager (2.3).<sup>26</sup> Under this setting, in Case X, I can easily show that  $H_1^X$  is better than  $H_2^X$  in Case X after the optimal set ( $M_0$ ) disappears. Also, I can show that  $H_1^Y$  is better than  $H_0^Y$  in Case Y after  $L_2$  disappears. Then, I should examine whether the principal prefers H-form to T-form. If the principal chooses H-form, I can interpret that the second-round proliferation of job titles occurs. I have the following proposition on this issue.

**Proposition 4.** *The second-round proliferation occurs in the following ways.*

- (i) *In Case X, the principal should appoint a more able agent in  $M_1$  to be the manager. In addition, all of the agents in  $M_1$  should be managers when  $\frac{\alpha}{\beta} < (1 + \mu)\Delta_p$ .*
- (ii) *In Case Y, the principal should appoint a less able agent in  $L_1$  to be the manager. In addition, all of the agents in  $L_1$  should be managers when  $\frac{\alpha}{\beta} < [1 + \mu - \frac{1}{p_h}] \frac{\Delta_p}{1 - \Delta_p}$ .*

First, Proposition 4 means that, when the principal appoints an agent as the manager from  $M_1$  or  $L_1$ , she has to care about which agent should be chosen. Note that, once the agent is appointed to be the manager, his binding constraint changes from PC to IC (from IC to PC) in Case X (Case Y). Then, the productivity of the agent appointed as the manager affects the principal’s payment so that she has to care about which type of agent should be appointed as the manager. Second, this proposition means that the condition for the second-round proliferation is stricter than the first-round one.

Now I should summarize the results from this proposition as well as Proposition 3. First, the proliferation seems to be more likely to occur when the effect of peer pressure is not so significant. This means that when peer pressure works well as an incentive, the principal should exploit this effect by keeping the agents in their reference group so that she can save on payment to them. Second, the more important cooperation is (e.g., the larger  $\Delta_p$  is), the more likely it is that proliferation will occur. That is, when the probability of success of the project decreases drastically if just one agent does not

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<sup>26</sup>The implications of the results obtained below do not change even if I suppose, for example, that the sub-manager’s concern about the outcome is less than the manager’s. In what follows, I treat “sub-manager” as “manager” for discretionary simplicity.

exert effort, the principal is more likely to be better off by appointing some agents to be managers. In this situation, the effect of peer pressure is weakened, so the principal cannot efficiently provide incentives to the agents by keeping them in their reference group. Finally, the larger the manager's concern about the outcome is and the more the manager experiences a gain when the project succeeds, the more likely it is that proliferation will occur. This implies that, when the effect of the manager's gain-loss feeling from the outcome overcomes the effect of peer pressure, the principal should divide the group of the agents by providing the different job titles. As a result, it is important that the principal lets the agents identify with her purpose. If the principal can do so, she would be better off due to the proliferation of job titles.

## 6 Concluding Remarks

In this paper, I study the optimal organizational form and the optimal type of manager by considering the psychological payoff as well as the standard material payoff for the agents. Specifically, I compare two organizational forms, H-form and T-form. T-form is the form where all agents have the same job title so that they are in a single reference group. On the other hand, H-form is the form where one agent is appointed manager and other agents work as subordinates, who form a reference group.

I consider two cases. One is the case where the agent's psychological payoff is more significant than the manager's psychological payoff. In this case, I show that the principal should appoint a more able agent as manager in H-form. Compared to T-form, H-form is preferable as the project is easier and the manager receives a greater benefit when the project is successful. By contrast, in the other case, I can assert that the principal should appoint a less able agent as manager in H-form. Compared to T-form, as in the previous case, H-form is preferable as the project is easier and the manager receives a greater benefit when the project is successful. In addition, H-form is preferable as the manager's psychological payoff is higher and the agent's psychological payoff is less important. In addition, I interpret the result that H-form is preferable to T-form as the proliferation of job titles occurs.

The issue of organizational forms, including the problem of the optimal type of manager, is very important for economics of organizations. This importance has been emphasized not only by economists, but also by sociologists. Moreover, I have learned that the psychological aspect of the agent's payoff has a crucial effect on his behavior. This paper focuses on these points and reaches some conclusions. I hope that this research contributes to future research on organizations using both sociological and psychological approaches.

## Appendix A

### Proof of Proposition 1

First, I can show that  $H_1^X$  is better than  $H_2^X$  ( $W^{H_1^X} < W^{H_2^X}$ ). From (3.2) and (3.3):

$$\begin{aligned} W^{H_1^X} - W^{H_2^X} &= \frac{d_{k_1}}{\rho\Delta_p} - \frac{\alpha}{\Delta_p} \\ &= \frac{1}{\rho\Delta_p}(d_{k_1} - \rho\alpha). \end{aligned}$$

Note that  $d_{k_1} < \rho\alpha$  since  $k_1 \in M_1$ . Then, I can show that  $W^{H_1^X} < W^{H_2^X}$ .

Next, I can show that  $H_0^X$  is better than  $H_1^X$  ( $W^{H_0^X} < W^{H_1^X}$ ). From (3.1) and (3.2):

$$\begin{aligned} W^{H_0^X} - W^{H_1^X} &= \frac{\beta}{p_h} - \frac{d_{k_1}}{\rho\Delta_p} \\ &= \frac{1}{\rho\Delta_p}\{(\rho - 1)\beta - d_{k_1}\}. \end{aligned}$$

Since  $k_1 \in M_1$ ,  $(\rho - 1)\beta < d_{k_1}$ . Then, I can conclude that  $W^{H_0^X} < W^{H_1^X}$ . As a result,  $W^{H_0^X} < W^{H_1^X} < W^{H_2^X}$ .  $\square$

### Proof of Proposition 2

The total payment to  $H_z^Y$  ( $z = 0, 1, 2$ ) can be shown as follows:

$$\begin{aligned} W^{H_0^Y} &= \sum_{\substack{i \in L_0 \\ i \neq k_0}} \frac{d_i}{p_h} + \sum_{j \in L_1 \cup L_2} \left\{ \frac{d_j}{\Delta_p} - \frac{\alpha}{\Delta_p} \right\} + \frac{d_{k_0}}{p_h} - (1 + \mu)\beta + \frac{\beta}{p_h} \\ \Rightarrow W^{H_0^Y} &= \sum_{i \in L_0} \frac{d_i}{p_h} + \sum_{j \in L_1 \cup L_2} \frac{d_j}{\Delta_p} - \frac{\alpha}{p}(l_1 + l_2) - (1 + \mu)\beta + \frac{\beta}{p_h}, \end{aligned} \quad (\text{A.1})$$

$$\begin{aligned} W^{H_1^Y} &= \sum_{i \in L_0} \frac{d_i}{p_h} + \sum_{\substack{j \in L_1 \cup L_2 \\ j \neq k_1}} \left\{ \frac{d_j}{\Delta_p} - \frac{\alpha}{\Delta_p} \right\} + \frac{d_{k_1}}{p_h} - (1 + \mu)\beta + \frac{\beta}{p_h} \\ \Rightarrow W^{H_1^Y} &= \sum_{i \in L_0} \frac{d_i}{p_h} + \sum_{j \in L_1 \cup L_2} \frac{d_j}{\Delta_p} - \frac{d_{k_1}}{\rho\Delta_p} - \frac{\alpha}{\Delta_p}(l_1 + l_2 - 1) - (1 + \mu)\beta + \frac{\beta}{p_h}, \end{aligned} \quad (\text{A.2})$$

and

$$\begin{aligned}
W^{H_2^Y} &= \sum_{i \in L_0} \frac{d_i}{p_h} + \sum_{\substack{j \in L_1 \cup L_2 \\ j \neq k_1}} \left\{ \frac{d_j}{\Delta_p} - \frac{\alpha}{\Delta_p} \right\} + \frac{d_{k_2}}{\Delta_p} - (1 + \mu)\beta \\
\Rightarrow W^{H_2^Y} &= \sum_{i \in L_0} \frac{d_i}{p_h} + \sum_{j \in L_1 \cup L_2} \frac{d_j}{\Delta_p} - \frac{\alpha}{\Delta_p}(l_1 + l_2 - 1) - (1 + \mu)\beta.
\end{aligned} \tag{A.3}$$

First, I can show that  $H_1^Y$  is better than  $H_0^Y$  ( $W^{H_1^Y} < W^{H_0^Y}$ ). From (A.1) and (A.2):

$$\begin{aligned}
W^{H_1^Y} - W^{H_0^Y} &= -\frac{d_{k_1}}{\rho\Delta_p} + \frac{\alpha}{\Delta_p} \\
&= -\frac{1}{\rho\Delta_p}(d_{k_1} - \rho\alpha).
\end{aligned}$$

I can conclude that  $W^{H_1^Y} < W^{H_0^Y}$  as  $\rho\alpha < d_{k_1}$  ( $k_1 \in L_1$ ).

Next, I can also show that  $H_2^Y$  is better than  $H_1^Y$  ( $W^{H_2^Y} < W^{H_1^Y}$ ). From (A.2) and (A.3):

$$\begin{aligned}
W^{H_2^Y} - W^{H_1^Y} &= \frac{d_{k_1}}{\rho\Delta_p} - \frac{\beta}{p_h} \\
&= -\frac{1}{\rho\Delta_p}\{d_{k_1} - (\rho - 1)\beta\}.
\end{aligned}$$

Since  $d_{k_1} < (\rho - 1)q\beta$  ( $k_1 \in L_1$ ), I can conclude that  $W^{H_2^Y} < W^{H_1^Y}$ . As a result,  $W^{H_2^Y} < W^{H_1^Y} < W^{H_0^Y}$ .  $\square$

### Proof of Proposition 5

I compare H-form to T-form after removing all agents from  $M_0$  in Case X. From the proof of Proposition 1, I can confirm that the principal should choose the agent from  $M_1$  rather than from  $M_2$  to become the manager. Then,

$$\begin{aligned}
W^{H_1^X} - W^X &= \frac{d_{k_1}}{\rho\Delta_p} - (1 + \mu)\beta \\
&= \frac{1}{\rho\Delta_p}\{d_{k_1} - p_h(1 + \mu)(\rho - 1)\beta\}.
\end{aligned} \tag{A.4}$$

This means that the agent whose cost is less than  $p_h(1 + \mu)(\rho - 1)\beta$  should be appointed to be the manager. From Proposition 3 and Corollary 1,  $p_h(1 + \mu) > 1$  when there are no agents in  $M_0$ . This leads  $(\rho - 1)\beta < p_h(1 + \mu)(\rho - 1)\beta$ . As a result, the principal should appoint the agent whose cost is in the region of  $((\rho - 1)\beta, p_h(1 + \mu)(\rho - 1)\beta)$  as the manager. In addition, if  $\rho\alpha < p_h(1 + \mu)(\rho - 1)\beta \Leftrightarrow \frac{\alpha}{\beta} \frac{1}{1 + \mu} < \Delta_p$ , then the principal should appoint all agents in  $M_1$  to be managers.

Next, in Case Y, the proof of Proposition 2 leads that the principal should chooses the agent who becomes the manager from  $L_1$  instead of  $L_0$ . Then,

$$\begin{aligned} W^{H_1^Y} - W^Y &= -\frac{d_{k_1}}{\rho} + \frac{\alpha}{\Delta_p} - (1 + \mu)\beta + \frac{\beta}{p_h} \\ &= \frac{1}{\rho} \left[ \rho \left\{ \frac{\alpha}{\Delta_p} - (1 + \mu)\beta + \frac{\beta}{p_h} \right\} - d_{k_1} \right]. \end{aligned} \quad (\text{A.5})$$

This means that the principal should appoint the agent whose cost is larger than  $\rho \left\{ \frac{\alpha}{\Delta_p} - (1 + \mu)\beta + \frac{\beta}{p_h} \right\}$  to be the manager. Now, I should confirm whether  $\rho \left\{ \frac{\alpha}{\Delta_p} - (1 + \mu)\beta + \frac{\beta}{p_h} \right\}$  is in the region of  $(\rho\alpha, (\rho-1)\beta)$  or not.

First, I can show that  $\rho \left\{ \frac{\alpha}{\Delta_p} - (1 + \mu)\beta + \frac{\beta}{p_h} \right\} < (\rho-1)\beta \Leftrightarrow \frac{\alpha}{\beta} < \left[ 1 + \mu - \frac{1-\Delta_p}{p_h} \right] \Delta_p$ . Suppose this condition does not hold;

$$\frac{\alpha}{\beta} \geq \left[ 1 + \mu - \frac{1-\Delta_p}{p_h} \right] \Delta_p. \quad (\text{A.6})$$

Note that, from Proposition 3,  $\frac{\alpha}{\beta} < (1 + \mu)\Delta_p$  must hold in the current situation. However, under this condition, (A.6) cannot hold. Thus, the principal should appoint the agents whose cost is in the region  $(\rho \left\{ \frac{\alpha}{\Delta_p} - (1 + \mu)\beta + \frac{\beta}{p_h} \right\}, (\rho-1)\beta)$  to be the manager.

In addition, if  $\rho \left\{ \frac{\alpha}{\Delta_p} - (1 + \mu)\beta + \frac{\beta}{p_h} \right\} < \rho\alpha \Leftrightarrow \frac{\alpha}{\beta} < \left[ 1 + \mu - \frac{1}{p_h} \right] \frac{\Delta_p}{1-\Delta_p}$ , for all of the agents in  $L_1$ , their costs are larger than  $\rho \left\{ \frac{\alpha}{\Delta_p} - (1 + \mu)\beta + \frac{\beta}{p_h} \right\}$ . The principal should then appoint all the agents in  $L_1$  to be managers.  $\square$

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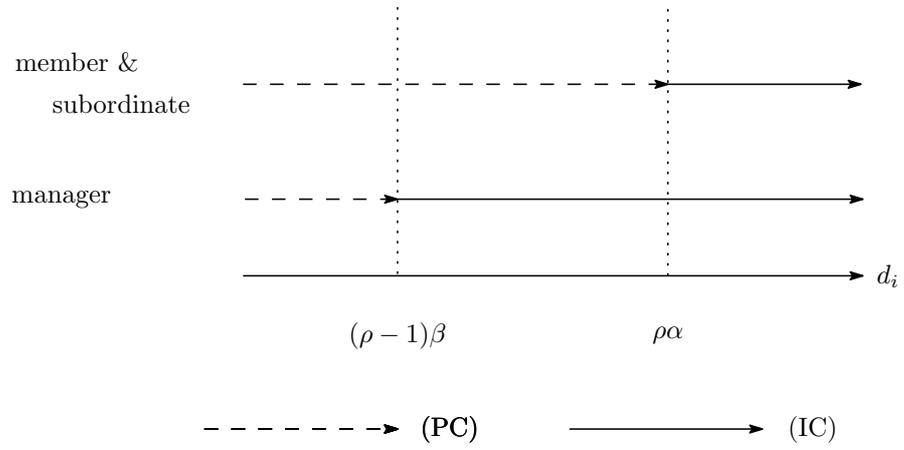


Figure 1: The Condition whether (IC) or (PC) is binding in Case X.

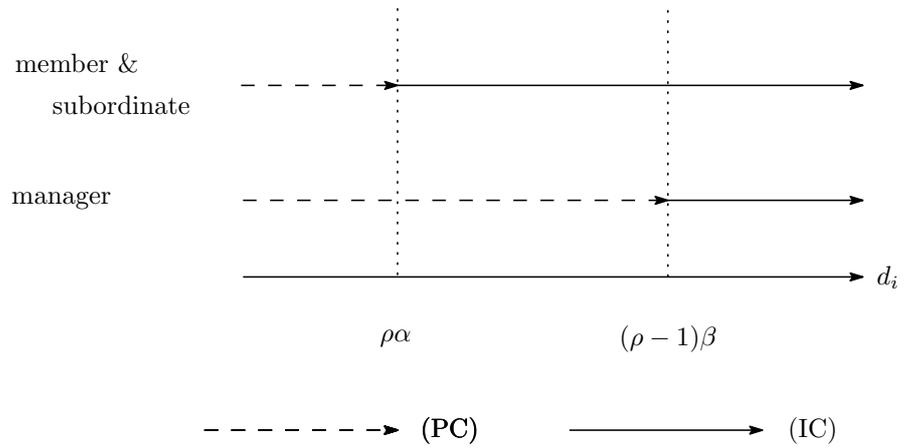


Figure 2: The Condition whether (IC) or (PC) is binding in Case Y.