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THE CHOICE OF MULTI-TASK DELEGATION MODES IN RELATION-BASED SOCIETIES

Abstract: *This paper mainly discusses the principal's choice between the relational and professional multi-task delegation in relation-based societies. Under the relational multi-task delegation, the principal delegates tasks to the kin agent; while under the professional multi-task delegation, the principal delegates tasks to the non-kin agent. Our theoretical analyses show that under some conditions it is optimal for the principal to choose the relational multi-task delegation, while under other conditions it is optimal for the principal to adopt the professional multi-task delegation.*

Keywords: *multi-task delegation, moral hazard, principal-agent, relation-based societies.*

JEL Classification: D23, L20, M21

1. Introduction

Relation-based societies (e.g., China) are different from rule-based ones in several respects. Firstly, relation (or guanxi in Chinese language) plays different roles in dealing with conflicts in different societies. People in relation-based societies consider relation favorably when they are involved in an individual matter, because relation may go beyond rules and usually implies advantageous treatment to themselves at the cost of others. Secondly, relation plays different roles in enforcing the implicit or explicit contracts in different societies. Relation can act as an effective enforcement mechanism in relation-based societies under some conditions. For example, relation based on repeated interactions usually means rational trust and loyalty, which is beneficial to contract enforcement. Thirdly, relation plays different roles in maintaining human sympathy. For instance, relation based on ties of blood and geography can affect people's choices because relation itself can impose some kind of spiritual and psychological cost on the actors in relation-based societies.

The original studies focusing on the relation-based governance include Li (2003) and Li et al. (2004), which hold that implicit agreements based on relation

play an important part in determining the enforcement outcome. Li (2003) and Li et al. (2004) highlight that relation-based societies have some difficulties in transition to rule-based ones, and that the transitional process may lead to the social and economic crises, such as the 1997-1998 Asian financial crisis. According to the analyses of Dixit (2003, 2009), the relation-based governance can be treated as self-governance, which is widely modelled as game equlubria in repeated interactions (Kandori, 1992; Grief, 1993, 1994; Ellickson, 1994). However, we should note that relation not only results in self-governance, but also exerts some intrinsic cost on the actors which is greatly neglected by the mainstream economics literature.

This paper focuses mainly on two points. The first point is how the principal-agent relationship is affected when relation is an important variable that we should pay close attention to. The second point is when it is optimal for the principal to choose the professional delegation as opposed to the relational delegation. In relation-based societies, a principal can resort to a relational agent or a professional non-kin agent to carry out his specific activities. On the one hand, when the markets in relation-based societies are not perfect, the professional non-kin agent may behave opportunistically without any formally imposed punishment, which constitutes a great obstacle for the principal to adopt the professional delegation. On the other hand, the relational agent may be less able than the professional agent, which implies that the relational agent may have no ability to maximize the principal's utility functions. Thus, the principal has to make a trade-off between the cost of the professional delegation and that of the relational delegation.

Delegation theory is a very important and active academic area in economics. There are many original papers which have greatly developed the theory of delegation. The traditional literature holds that the benefit of delegation is to allow the principal to employ the agent's specific knowledge (e.g., Holmstrom, 1984). However, the delegated agent may misuse his power, and at the same time the agent's delegated power may be taken back by the principal which may in turn cause the agent to act strategically. Therefore, scholars have found out many solutions based on different theoretical or empirical foundations to deal with these two kinds of problems that are mentioned above. All the related literature can be classified into three main strands. The first strand of literature concentrates on the principal's commitment power, which argues that effective commitment can cope with agent's strategical behavior under some conditions (e.g., Corts and Neher, 2003; Alonso and Matouschek, 2007, 2008). The second strand of literature centers on the principal's monitoring or control systems based on some explicit or implicit mechanisms, which deems that these kinds of systems can play an important role (e.g., Lohmann and Hopenhayn, 1998; Narayanan and Davila, 1998; Foss and Laursen, 2005). The third strand of literature focuses on the principal's alternative choice to delegation, which holds that the choice of delegation is contingent on constraint conditions (e.g., Currarini and Feri, 2006; Marino, 2006). Empirical works show that there are many factors that determine whether delegation is adopted or not, such as the characteristics of the communication technologies in use and the ownership status in actuality (e.g., Colombo and Delmastro, 2004).

This paper is similar to the third strand of literature to some degree. However, our analysis is conducted not between delegation and its alternative which is like in the third strand of literature, but between different modes of delegation. In order to make our analysis more suitable for relation-based societies, we adopt a multi-task moral hazard framework which is pioneered by Holmstrom and Milgrom (1991) and developed by Laffont and Martimort (2002). That is to say, in our paper the principal can choose between the relational and professional multi-task delegation. Under the relational multi-task delegation, the principal delegates the tasks to the kin agent; while under the professional multi-task delegation, the principal delegates the tasks to the non-kin agent.

The rest of the paper is organized as follows. Section 2 is the basic setup. Section 3 provides the model of the relational multi-task delegation. Section 4 offers the model of the professional multi-task delegation. Section 5 conducts a comparative analysis of the equilibrium outcomes derived from the two distinct models. Some concluding remarks are made in Section 6.

2. The Basic Setup

In this section, we follow Laffont and Martimort's (2002) analytical framework. It is assumed that the delegated relational or professional agent is risk-neutral. There are two tasks for the agent to undertake. For each task, when the agent exerts effort level $e \in \{0,1\}$, the task's added-value will be $\overline{V}$ with probability $p(e)$, and $\underline{V}$ with probability $1-p(e)$, where $0 < p(e) < 1$. When the performance of both tasks is good, the agent can get a bonus; otherwise the agent obtains no bonus. However, the agent will not be punished when his performance is poor. That is to say, he is protected by limited liability. When the agent exerts no effort on either task, his effort cost is Ψ_0, which may be larger than or equal to 0. When the agent exerts effort on only one task, his effort cost is $\Psi_1 > 0$. When the agent exerts effort on both tasks, his effort cost is $\Psi_2 > 0$. The following mathematical definitions should be noted, $p(1) = p_1$, $p(0) = p_0$, $\Delta p = p_1 - p_0 > 0$, $\Delta V = \overline{V} - \underline{V} > 0$, where the subscripts 0 and 1 represent $e = 0$ and $e = 1$, respectively.

According to Maries and Dezsi (2011), relation-based society is a complex multi-agent system. There are two modes of multi-task delegation that the principal can choose from, either the relational multi-task delegation or the professional multi-task delegation.

When the relational multi-task delegation is adopted, the principal delegates the tasks to a relational agent, who is one of the owner's family members and always trusted by the principal. We use the superscript R to denote the relational multi-task delegation. When it is under the relational multi-task delegation, if the relational agent exerts effort on only one task and on both tasks, then his effort cost is $\Psi_1^R = \Psi_1$ and $\Psi_2^R = \Psi_2 > \Psi_1$, respectively. However, if the relational agent

does not exert effort on every task, then his effort cost is $\Psi_0^R = \Psi_0 > 0$. The reason why we set $\Psi_0^R > 0$ is that there is some kind of spiritual and psychological cost when the relational agent shirks. We assume that $\Psi_0^R < \Psi_1$, which means that for the relational agent, exerting effort on only one task without the conscience pricks of this task brings more disutility than shirking with some interior guilt to the principal. At the same time, it should be noted that $\Psi_2 > \Psi_1 + \Psi_0^R$, which means that the disutility resulting from exerting effort on both tasks is larger than that resulting from exerting effort on one task but exerting no effort on another task.

When the professional multi-task delegation is adopted, the principal delegates the tasks to a professional non-kin agent, who is probably distrusted by the principal. We use the superscript P to denote the professional multi-task delegation. When it is under the professional multi-task delegation, if the professional agent exerts effort on only one task and on both tasks, then his effort cost is $\Psi_1^P = \Psi_1$ and $\Psi_2^P = \Psi_2$, respectively. However, if the agent does not exert effort, then his effort cost is $\Psi_0^P = \Psi_0 = 0$. The above assumptions are similar to those in the traditional literature. In this case, the principal can obtain an institutional rent r^P, where $r^P > 0$. The institutional rent results from the professional agent's actually used managerial ability net of the principal's search cost and distrust cost and so on.

In order to simplify the analysis, we assume that when the performance of both tasks is good, the agent will be paid $\bar{t} > 0$, otherwise he will be paid $\underline{t} = 0$. That is to say, when the outcome is $2\bar{V}$, the agent will get the compensation amount to $\bar{t} > 0$. Otherwise, when the outcome is $\bar{V} + \underline{V}$ or $2\underline{V}$, the agent will only get the compensation amount to $\underline{t} = 0$.

Inspired by Pi (2011a, 2011b), for the sake of narrative simplicity, we call Ψ_0^R the uneasiness cost, Ψ_1 the partial exertion cost, and Ψ_2 the full exertion cost. At the same time, similar to Pi (2011c), we should note that the principal knows the kin agent profoundly, and that the kin agent does so, too. This can ensure that Ψ_0^R is common knowledge between the principal and the agent. According to Iandoli et al. (2010), collective knowledge in relation-based society plays an important in social action.

The timing of the principal-agent game is as follows.

(1) At *t*=1, the principal offers a take-it-or-leave-it compensation contract $\{(\underline{t}, \bar{t})\}$ to the agent, either relational or professional.

(2) At *t*=2, the agent chooses an effort, which is equal to 1 or 0.

(3) At *t*=3, the added-value is realized.

(4) At *t*=4, the signed contract is enforced.

3. Relational Multi-Task Delegation

When it is under the relational multi-task delegation, the principal's programming problem will be:

$$\max_{\{\bar{t}\}} p_1^2(2\bar{V}-\bar{t})+2p_1(1-p_1)(\bar{V}+\underline{V})+2(1-p_1)^2\underline{V}$$

$$s.t.\quad p_1^2\bar{t}-\Psi_2 \geq p_1p_0\bar{t}-\Psi_1-\Psi_0^R \tag{1}$$

$$p_1^2\bar{t}-\Psi_2 \geq p_0^2\bar{t}-2\Psi_0^R \tag{2}$$

$$p_1^2\bar{t}-\Psi_2 \geq 0 \tag{3}$$

$$p_1p_0\bar{t}-\Psi_1-\Psi_0^R \geq 0 \tag{4}$$

$$p_0^2\bar{t}-2\Psi_0^R \geq 0 \tag{5}$$

(1) and (2) are the kin agent's incentive compatibility constraints. (3), (4) and (5) are the kin agent's participation constraints. In order to neglect constraints (3), (4), and (5), we assume that:

$$\max\{\frac{\Psi_2}{p_1^2},\frac{\Psi_1+\Psi_0^R}{p_1p_0},\frac{2\Psi_0^R}{p_0^2}\} \leq \min\{\frac{\Psi_2-\Psi_1-\Psi_0^R}{p_1\Delta p},\frac{\Psi_2-2\Psi_0^R}{(p_1+p_0)\Delta p}\}.$$

According to the standard incentive theory, it is easy for us to find that constraint (1) is binding when $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1-\Delta p\Psi_0^R}{p_0}$ (namely, $\frac{\Psi_2-\Psi_1-\Psi_0^R}{p_1\Delta p} \geq \frac{\Psi_2-2\Psi_0^R}{(p_1+p_0)\Delta p}$) and that constraint (2) is binding when $\Psi_2 < \frac{(p_1+p_0)\Psi_1-\Delta p\Psi_0^R}{p_0}$ (namely, $\frac{\Psi_2-\Psi_1-\Psi_0^R}{p_1\Delta p} < \frac{\Psi_2-2\Psi_0^R}{(p_1+p_0)\Delta p}$).

Solving this programming problem, we obtain:

If $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1-\Delta p\Psi_0^R}{p_0}$, then

$$\bar{t}^{R*}=\frac{\Psi_2-\Psi_1-\Psi_0^R}{p_1\Delta p} \tag{6}$$

If $\Psi_2 < \frac{(p_1+p_0)\Psi_1-\Delta p\Psi_0^R}{p_0}$, then

$$\bar{t}^{R*}=\frac{\Psi_2-2\Psi_0^R}{(p_1+p_0)\Delta p} \tag{7}$$

The superscript $R*$ stands for second-best state under the relational multi-task delegation. $\bar{t}^{R*}$ is the agent's efficiency wage under the relational multi-task delegation.

If $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1 - \Delta p \Psi_0^R}{p_0}$, then the principal's equilibrium utility will be:

$$U_C^{R*} = p_1^2(2\bar{V} - \frac{\Psi_2 - \Psi_1 - \Psi_0^R}{p_1 \Delta p}) + 2p_1(1-p_1)(\bar{V}+\underline{V}) + 2(1-p_1)^2\underline{V} \quad (8)$$

If $\Psi_2 < \frac{(p_1+p_0)\Psi_1 - \Delta p \Psi_0^R}{p_0}$, then the principal's equilibrium utility will be:

$$U_C^{R*} = p_1^2[2\bar{V} - \frac{\Psi_2 - 2\Psi_0^R}{(p_1+p_0)\Delta p}] + 2p_1(1-p_1)(\bar{V}+\underline{V}) + 2(1-p_1)^2\underline{V} \quad (9)$$

Throughout the paper, we use the subscript C to stand for the principal, which is just borrowed from the fifth letter of the word "principal."

For the sake of simplicity, we assume that

$\frac{2\Delta p \Delta V}{p_1^2} \geq \max\{\frac{\Psi_2 - \Psi_1 - \Psi_0^R}{p_1 \Delta p}, \frac{\Psi_2 - 2\Psi_0^R}{(p_1+p_0)\Delta p}\}$, which can ensure that the principal always chooses to incentivize the relational agent.

Through comparative statics, we can obtain Proposition 1.

Proposition 1: When it is under the relational multi-task delegation, $\frac{\partial U_C^{R*}}{\partial \bar{V}} > 0$, $\frac{\partial U_C^{R*}}{\partial \underline{V}} > 0$, $\frac{\partial U_C^{R*}}{\partial p_1} > 0$, $\frac{\partial U_C^{R*}}{\partial \Psi_2} < 0$, $\frac{\partial U_C^{R*}}{\partial \Psi_1} \geq 0$, $\frac{\partial U_C^{R*}}{\partial \Psi_0^R} > 0$, irrespective of whether $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1 - \Delta p \Psi_0^R}{p_0}$ or $\Psi_2 < \frac{(p_1+p_0)\Psi_1 - \Delta p \Psi_0^R}{p_0}$.

Proof: When $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1 - \Delta p \Psi_0^R}{p_0}$, then from (8), we obtain:

$$\frac{\partial U_C^{R*}}{\partial \bar{V}} = 2p_1 > 0, \quad \frac{\partial U_C^{R*}}{\partial \underline{V}} = 2(1-p_1) > 0,$$

$$\frac{\partial U_C^{R*}}{\partial p_1} = 2\Delta V + \frac{p_0(\Psi_2 - \Psi_1 - \Psi_0^R)}{(\Delta p)^2} > 0, \quad \frac{\partial U_C^{R*}}{\partial \Psi_2} = -\frac{p_1}{\Delta p} < 0,$$

$$\frac{\partial U_C^{R*}}{\partial \Psi_1} = \frac{p_1}{\Delta p} > 0,\ \frac{\partial U_C^{R*}}{\partial \Psi_0^R} = \frac{p_1}{\Delta p} > 0.$$

When $\Psi_2 < \frac{(p_1 + p_0)\Psi_1 - \Delta p \Psi_0^R}{p_0}$, then from (9), we obtain:

$$\frac{\partial U_C^{R*}}{\partial \bar{V}} = 2p_1 > 0,\ \frac{\partial U_C^{R*}}{\partial \underline{V}} = 2(1-p_1) > 0,$$

$$\frac{\partial U_C^{R*}}{\partial p_1} = 2\Delta V + \frac{p_0(\Psi_2 - 2\Psi_0^R)}{(\Delta p)^2} > 0,\ \frac{\partial U_C^{R*}}{\partial \Psi_2} = -\frac{p_1^2}{(p_1 + p_0)\Delta p} < 0,$$

$$\frac{\partial U_C^{R*}}{\partial \Psi_1} = 0,\ \frac{\partial U_C^{R*}}{\partial \Psi_0^R} = \frac{2p_1^2}{(p_1 + p_0)\Delta p} > 0. \ \blacksquare$$

4. Professional Multi-Task Delegation

When it is under the professional multi-task delegation, the principal's programming problem will be:

$$\max_{\{\bar{t}\}} p_1^2(2\bar{V} - \bar{t}) + 2p_1(1-p_1)(\bar{V} + \underline{V}) + 2(1-p_1)^2\underline{V} + r^P$$

$$s.t.\quad p_1^2\bar{t} - \Psi_2 \geq p_1 p_0 \bar{t} - \Psi_1 \qquad (10)$$

$$p_1^2\bar{t} - \Psi_2 \geq p_0^2\bar{t} \qquad (11)$$

$$p_1^2\bar{t} - \Psi_2 \geq 0 \qquad (12)$$

$$p_1 p_0 \bar{t} - \Psi_1 \geq 0 \qquad (13)$$

$$p_0^2\bar{t} \geq 0 \qquad (14)$$

(10) and (11) are the non-kin agent's incentive compatibility constraints. (12), (13) and (14) are the non-kin agent's participation constraints. In order to neglect constraints (12), (13), and (14), we assume that

$$\max\{\frac{\Psi_2}{p_1^2}, \frac{\Psi_1}{p_1 p_0}\} \leq \min\{\frac{\Psi_2 - \Psi_1}{p_1 \Delta p}, \frac{\Psi_2}{(p_1 + p_0)\Delta p}\}.$$

According to the standard incentive theory, it is easy for us to find that constraint (10) is binding when $\Psi_2 \geq \frac{(p_1 + p_0)\Psi_1}{p_0}$ (namely, $\frac{\Psi_2 - \Psi_1}{p_1 \Delta p} \geq \frac{\Psi_2}{(p_1 + p_0)\Delta p}$) and that constraint (11) is binding when $\Psi_2 < \frac{(p_1 + p_0)\Psi_1}{p_0}$ (namely, $\frac{\Psi_2 - \Psi_1}{p_1 \Delta p} < \frac{\Psi_2}{(p_1 + p_0)\Delta p}$).

Solving this programming problem, we obtain:

If $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1}{p_0}$, then

$$\bar{t}^{P*} = \frac{\Psi_2 - \Psi_1}{p_1 \Delta p} \tag{15}$$

If $\Psi_2 < \frac{(p_1+p_0)\Psi_1}{p_0}$, then

$$\bar{t}^{P*} = \frac{\Psi_2}{(p_1+p_0)\Delta p} \tag{16}$$

The superscript $P*$ stands for second-best state under the professional multi-task delegation. $\bar{t}^{P*}$ is the agent's efficiency wage under the professional multi-task delegation.

If $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1}{p_0}$, then the principal's equilibrium utility will be:

$$U_C^{P*} = p_1^2(2\bar{V} - \frac{\Psi_2 - \Psi_1}{p_1 \Delta p}) + 2p_1(1-p_1)(\bar{V}+\underline{V}) + 2(1-p_1)^2\underline{V} + r^P \tag{17}$$

If $\Psi_2 < \frac{(p_1+p_0)\Psi_1}{p_0}$, then the principal's equilibrium utility will be:

$$U_C^{P*} = p_1^2[2\bar{V} - \frac{\Psi_2}{(p_1+p_0)\Delta p}] + 2p_1(1-p_1)(\bar{V}+\underline{V}) + 2(1-p_1)^2\underline{V} + r^P \tag{18}$$

For the sake of simplicity, we assume that:

$\frac{2\Delta p \Delta V}{p_1^2} \geq \max\{\frac{\Psi_2 - \Psi_1}{p_1 \Delta p}, \frac{\Psi_2}{(p_1+p_0)\Delta p}\}$, which can ensure that the principal always chooses to incentivize the professional agent.

Through comparative statics, we can obtain Proposition 2.

Proposition 2: When it is under the professional multi-task delegation, $\frac{\partial U_C^{P*}}{\partial \bar{V}} > 0$, $\frac{\partial U_C^{P*}}{\partial \underline{V}} > 0$, $\frac{\partial U_C^{P*}}{\partial q_1} > 0$, $\frac{\partial U_C^{P*}}{\partial \Psi_2} < 0$, $\frac{\partial U_C^{P*}}{\partial \Psi_1} > 0$, $\frac{\partial U_C^{P*}}{\partial \Psi_0^R} = 0$, irrespective of whether $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1}{p_0}$ or $\Psi_2 < \frac{(p_1+p_0)\Psi_1}{p_0}$.

Proof: When $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1}{p_0}$, then from (17), we obtain:

$$\frac{\partial U_C^{P*}}{\partial \bar{V}} = 2p_1 > 0, \frac{\partial U_C^{P*}}{\partial \underline{V}} = 2(1-p_1) > 0,$$

$$\frac{\partial U_C^{P*}}{\partial p_1} = 2\Delta V + \frac{p_0(\Psi_2 - \Psi_1)}{(\Delta p)^2} > 0,\ \frac{\partial U_C^{P*}}{\partial \Psi_2} = -\frac{p_1}{\Delta p} < 0,$$

$$\frac{\partial U_C^{P*}}{\partial \Psi_1} = \frac{p_1}{\Delta p} > 0,\ \frac{\partial U_C^{P*}}{\partial \Psi_0^R} = 0.$$

When $\Psi_2 < \frac{(p_1 + p_0)\Psi_1}{p_0}$, then from (18), we obtain:

$$\frac{\partial U_C^{P*}}{\partial \bar{V}} = 2p_1 > 0,\ \frac{\partial U_C^{P*}}{\partial \underline{V}} = 2(1 - p_1) > 0,$$

$$\frac{\partial U_C^{P*}}{\partial q_1} = 2\Delta V + \frac{p_0\Psi_2}{(\Delta p)^2} > 0,\ \frac{\partial U_C^{P*}}{\partial \Psi_2} = -\frac{p_1^2}{(p_1 + p_0)\Delta p} < 0,$$

$$\frac{\partial U_C^{P*}}{\partial \Psi_1} = \frac{p_1^2}{(p_1 + p_0)\Delta p} > 0,\ \frac{\partial U_C^{P*}}{\partial \Psi_0^R} = 0.$$

5. A Comparative Analysis

In this section, we will conduct a comparative analysis between the equilibrium outcomes under the relational multi-task delegation and these under the professional multi-task delegation. There are three distinct cases which should be noticed and deeply analyzed, namely $\Psi_2 < \frac{(p_1 + p_0)\Psi_1 - \Delta p\Psi_0^R}{p_0}$, $\frac{(p_1 + p_0)\Psi_1 - \Delta p\Psi_0^R}{p_0} \le \Psi_2 < \frac{(p_1 + p_0)\Psi_1}{p_0}$, and $\Psi_2 \ge \frac{(p_1 + p_0)\Psi_1}{p_0}$.

By comparison, it is easy for us to obtain the following three propositions.

Proposition 3: When $\Psi_2 < \frac{(p_1 + p_0)\Psi_1 - \Delta p\Psi_0^R}{p_0}$, if $r^P \le \frac{p_1^2\Psi_0^R}{(p_1 + p_0)\Delta p}$, then it is optimal for the principal to choose the relational multi-task delegation; however, if $r^P > \frac{p_1^2\Psi_0^R}{(p_1 + p_0)\Delta p}$, then it is optimal for the principal to choose the professional multi-task delegation.

Proof: When $\Psi_2 \ge \frac{(p_1 + p_0)\Psi_1}{p_0}$ and $r^P \le \frac{p_1^2\Psi_0^R}{(p_1 + p_0)\Delta p}$, then from (9) and (18), we obtain:

$$U_C^{R*} - U_C^{P*} = \frac{p_1^2\Psi_0^R}{(p_1 + p_0)\Delta p} - r^P \ge 0.$$

When $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1}{p_0}$ and $r^P > \frac{p_1^2\Psi_0^R}{(p_1+p_0)\Delta p}$, then from (9) and (18), we obtain:

$$U_C^{R*} - U_C^{P*} = \frac{p_1^2\Psi_0^R}{(p_1+p_0)\Delta p} - r^P < 0.$$

Proposition 3 implies that when the full exertion cost is small enough, if the institutional rent is also small enough, then the principal tends to choose the relational multi-task delegation; however, if the institutional rent is big enough, then the principal tends to choose the professional multi-task delegation.

Proposition 4: When $\frac{(p_1+p_0)\Psi_1 - \Delta p\Psi_0^R}{p_0} \leq \Psi_2 < \frac{(p_1+p_0)\Psi_1}{p_0}$, if $r^P \leq \frac{p_1(p_1+p_0)(\Psi_1+\Psi_0^R) - p_1p_0\Psi_2}{(p_1+p_0)\Delta p}$, then it is optimal for the principal to choose the relational multi-task delegation; however, if $r^P > \frac{p_1(p_1+p_0)(\Psi_1+\Psi_0^R) - p_1p_0\Psi_2}{(p_1+p_0)\Delta p}$, then it is optimal for the principal to choose the professional multi-task delegation.

Proof: When $\frac{(p_1+p_0)\Psi_1 - \Delta p\Psi_0^R}{p_0} \leq \Psi_2 < \frac{(p_1+p_0)\Psi_1}{p_0}$ and $r^P \leq \frac{p_1(p_1+p_0)(\Psi_1+\Psi_0^R) - p_1p_0\Psi_2}{(p_1+p_0)\Delta p}$, then from (8) and (18), we obtain:

$$U_C^{R*} - U_C^{P*} = \frac{p_1(p_1+p_0)(\Psi_1+\Psi_0^R) - p_1p_0\Psi_2}{(p_1+p_0)\Delta p} - r^P \geq 0.$$

When $\frac{(p_1+p_0)\Psi_1 - \Delta p\Psi_0^R}{p_0} \leq \Psi_2 < \frac{(p_1+p_0)\Psi_1}{p_0}$ and $r^P > \frac{p_1(p_1+p_0)(\Psi_1+\Psi_0^R) - p_1p_0\Psi_2}{(p_1+p_0)\Delta p}$, then from (8) and (18), we obtain:

$$U_C^{R*} - U_C^{P*} = \frac{p_1(p_1+p_0)(\Psi_1+\Psi_0^R) - p_1p_0\Psi_2}{(p_1+p_0)\Delta p} - r^P < 0.$$

Proposition 4 implies that when the full exertion cost is moderate, if the institutional rent is small enough, then the principal tends to choose the relational multi-task delegation; however, if the institutional rent is big enough, then the principal tends to choose the professional multi-task delegation.

Proposition 5: When $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1}{p_0}$, if $r^P \leq \frac{p_1\Psi_0^R}{\Delta p}$, then it is optimal for the principal to choose the relational multi-task delegation; however, if $r^P > \frac{p_1\Psi_0^R}{\Delta p}$, then it is optimal for the principal to choose the professional multi-task delegation.

Proof: When $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1}{p_0}$ and $r^P \leq \frac{p_1\Psi_0^R}{\Delta p}$, then from (8) and (17), we obtain:

$$U_C^{R*} - U_C^{P*} = \frac{p_1\Psi_0^R}{\Delta p} - r^P \geq 0.$$

When $\Psi_2 \geq \frac{(p_1+p_0)\Psi_1}{p_0}$ and $r^P > \frac{p_1\Psi_0^R}{\Delta p}$, then from (8) and (17), we obtain:

$$U_C^{R*} - U_C^{P*} = \frac{p_1\Psi_0^R}{\Delta p} - r^P < 0.$$

Proposition 5 implies that when the full exertion cost is big enough, if the institutional rent is small enough, then the principal tends to choose the relational multi-task delegation; however, if the institutional rent is also big enough, then the principal tends to choose the professional multi-task delegation.

According to Propositions 3-5, as long as the institutional rent is sufficiently big, the principal's optimal choice is the relational multi-task delegation. However, when the full exertion cost stands in three different intervals, the critical values of the institutional rent will be greatly different. In the light of Propositions 3-5, the critical values of the institutional rent are $r_1^P = \frac{p_1^2\Psi_0^R}{(p_1+p_0)\Delta p}$, $r_2^P = \frac{p_1(p_1+p_0)(\Psi_1+\Psi_0^R) - p_1p_0\Psi_2}{(p_1+p_0)\Delta p}$, and $r_3^P = \frac{p_1\Psi_0^R}{\Delta p}$, respectively. Thus, we can draw a conclusion that both the full exertion cost and the institutional rent play an important role in determining the principal's eventual choice of multi-task delegation modes.

6. Concluding Remarks

In this paper, we mainly discuss the principal's choice between the relational and professional multi-task delegation in relation-based societies. Our theoretical analyses show that under some conditions it is optimal for the principal to choose the relational multi-task delegation, while under other conditions it is optimal for the principal to adopt the professional multi-task delegation.

Relation is an important variable that we should pay close attention to in relation-based societies. This paper sheds light on the transition from relation-based societies to rule-based societies. That is to say, only when it is optimal for the principal to choose the professional multi-task delegation can rule-based societies be possibly built and in some cases be gradually consolidated and prevalent in a wider range. It is obvious that this transitional process is long, subtle, and complex. Along with the economic development and social progress, many exogenous variables (e.g., r^P and Ψ_0^R) which are stressed in this paper may be changed by the external environment. These changes may favorably and strongly support the transition from relation-based societies to rule-based ones.

Acknowledgement

This work was supported by the Major Bidding Project of the National Social Science Foundation of China (Grant No. 10zd&020), the Humanity and Social Science "Reform Program" of "Project 985" of Nanjing University (Grant No. NJU985FW01), and the Priority Academic Program Development (PAPD) of Jiangsu Higher Education Institutions.

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