

Reputation as an External Incentive Mechanism in State-Owned Enterprises in China: A Game-Theoretical Perspective*

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Using the reputation model of Kreps (1982), Vickers(1986) and Barro(1986), we establish a dynamic game model with incomplete information to examine the relations between the managers of state-owned enterprises(SOEs) in China and the government as the enterprise's owner. Employing the model, we show that even a noncooperative manager will not intrude the owner's interests until the last period of his term in order to maximize his long term utility. The paper also discusses some phenomena in state-owned enterprises in China, such as "insiders' control", "59 phenomenon" and excess on-the-job consumption.

1、 Introduction

China began its far-reaching economic reforms in 1978, and reform of state-owned enterprises (SOEs) that began in the early 1980s has been the core of the economic reforms.

We can divide the reform of SOEs into two main stages; the period lasting from 1984 to 1993 is the first stage. During this period, the government adopted some reform strategies that aimed at improving incentives within enterprises by means of "expanding enterprise autonomy" and "increasing retained profits" (Varouj A, et al.,

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2005). As a result, managerial incentives for profits have been increased and SOEs in China do no longer look like those described under the classical planning system (Qian, 1998).

On the one hand, compared to their own past, SOEs' performance has improved in terms of increased productivity (Groves, et al 1994). On the other hand, however, compared to joint ventures, private enterprises, and even some township-village enterprises (TVEs), SOEs clearly lagged in economic efficiency. After a period of improved productivity in the 1980s, the SOEs' financial performance steadily deteriorated during 1990s, and this triggered the second-stage of reforms of SOEs.

The second stage started in the early 1990s and is ongoing. The focus of SOEs reforms shifted from past delegation of decision-making authority to reforms of ownership and corporate governance. Two strategies have been adopted: privatization and corporatization. Privatization is mostly used to sell small SOEs to private entrepreneurs. The main strategy, however, is corporatization (Zhu, 1999). This aims to turn middle & large SOEs from sole state proprietorships controlled by industry-specific government agencies at various administrative levels to modern-form corporations with a Western-style corporate governance structure (Xu, L.C., et al, 2005).

No matter what, in most corporatized enterprises, the majority of the shares are held by the state. In other words, an important feature in China is that the state remains the controlling owner of SOEs. In the transition towards a market economy, the ultimate control rights of enterprises such as selection and dismissal of top managers, still remain in the hands of the Party and the government; especially the central government. The state ownership is still significant in the majority of reformed enterprises, as in China it takes time to establish market-oriented economic and legal institutions conducive to effective corporate governance in a transitional economy (Xu, L.C., et al, 2005).

In this paper, I will analyze the managers' incentive effect on the performance of China SOEs in a transition economy by applying ideas from the recent economic theories of organization, the agent theory, and the game theory.

Aghion and Tirole (1997) distinguish between formal and real authority in economic organization. These concepts are useful in explaining the issues concerning firms in mature market economies such as the complete separation of ownership and control and delegation or the complete separation of the government from enterprises. They are also useful in understanding firms in transition from planned to market economies (such as SOEs in China) if specific institutional background can be taken into account. They show that real authority, i.e., the effective control over decisions, is determined by the structure of information, which in turn depends on the allocation of

formal authority (i.e. the right to decide)(Qian, 1996; Xu, L.C., et al, 2005).

In an insightful application of organization theories to Chinese enterprise reform, Qian (1996) characterizes the plight of Chinese SOEs in the 1990s as being caused by a combination of agency and control problems. Agency problems arise as managers enjoy more authority, formal as well as real, over business decisions, thanks to delegation reforms. While control problems may be a mechanism of checks-and-balances to mitigate agency costs, it also causes the loss of information, inefficient interference in management, use of incompetent but obedient managers, bad investment decisions, and soft budget constraints. In other words, with more formal authority, an agent will have incentives to acquire more productive information and hence enjoy more real authority. However, agency costs increase as more formal authority is delegated to the agent (Xu, L.C., et al, 2005).

Qian (1996) argues that SOEs reforms should aim at reducing both political and agency costs by establishing a new corporate governance system through a variety of measures such as depoliticization, privatization, and corporatization. From the perspectives of both political and agency costs, China's recent SOEs ownership reform seems to intend to deal with both of costs through the establishing of a modern corporate system. It is hoped that political costs and agency cost will be simultaneously reduced.

On the one hand, with the implementing of depoliticization and corporatization, more and more contractual and residual rights of control have been transferred to managers of SOEs so that managers exercise more effective control rights (mainly the rights to use assets and to distribute income). This has provided incentives for managers to increase current production, but meanwhile it has enabled them to intrude state assets. Therefore, agency problem still remain.

On the other hand, however, as I said before, in most corporatized enterprises, the ultimate control rights of enterprises such as selection and dismissal of top managers, still remain in the hands of the Party and the government. The state ownership is still significant in the majority of reformed enterprises.

Consequently, perhaps both politician control and managerial moral hazard continue to pose problems in reformed enterprises, and the performance of SOEs will decrease.

The modern organization theories have told us lot in this aspect. In fact, the form of corporate governance is an effective economic organization which has evolved from the development of market economy over more than a century. Therefore, whether the organization will work effectively depends on the mature market. In other words, as a set of institutional arrangement in a marker economy, the corporate governance not only governs the relationship among several groups of stakeholders

(investors (shareholder and creditor), managers, and workers), but also provides incentives for managers to work well so as to present their abilities of management in the managers' market. Thus, improvement of performance of firms resulted from managers who run well rather than it is outcome that both the institutional arrangement of corporate governance and the managers' market function together.

Fama (1980) argued that a competitive market for managerial labor will alleviate moral hazard and discipline managers to work. His argument claimed that future wages will depend on past performance, and he thinks managers want to perform well because they will be concerned about their reputation in the labor market. Thus, there will be no need to resolve incentive problems using explicit contracts, since markets already provide efficient implicit incentive contracts (Fama, 1980). Holmstrom (1982, 1999) thought that the Fama' conclusion is correct under some assumptions and not complete in general. He further developed this argument and showed its important life cycle implications: career concerns may be strong early on and will disappear toward the end of one's horizon. It is therefore arguable that reputation concerns can be extended beyond an individual's active career and that the problem of declining incentive can be mitigated.¹

Recent some empirical studies find that managerial labour market and corporatization in China have had a significantly positive impact on SOEs performance. (Groves et al 1995; Varouj, et al, 2005; Xu, L. C. et al, 2005). Especially, some SOEs, which the Party and the Government have their ultimate control, have high performance.

Taking into account of the SOEs characteristic in China, we find that it is the key that understanding this interaction between the effective control by managers over some decisions and the ultimate control by the Party and government over other decisions (Qian, 1996). In this study, we will provide a comprehensive study of SOEs performance in China, through establishing a dynamic game model with incomplete information.

In China, after the reforms of SOEs' corporatization, the main measure which evaluates the ability of management managers owned became their (past) performance of SOEs. This thanks to the fact that a managerial labour market is forming.

From the relations between the managers of SOEs in China and the government, we establish a dynamic game model with incomplete information, and use it to analyze the reputation incentive effect to the managers of state-owned enterprises.

Since the 1990s, the SOEs' controls rights and some residual claim rights have

¹ In a strategic setting of repeated games with incomplete information, Kreps, et al., also show that incentives to act in "good" manner will be generated through the reputation mechanism at the end of the game.

been gradually transferred to the hands of managers, but some new problems arised from these changes. For instance, the managers might pursuit their own maximum interest not the enterprise's, including excess on-the-job consumption, destructive management and stealing of state assets. The usual economic explanation is that because the enterprise's residual claim right is controlled by the managers, the interest of outside owners (such as the local government and central government) or stock holders may be adversely affected, thus reducing the enterprise's efficiency.

As the holders of residual claim rights or control rights, even though the managers may have the opportunity and possibility to extract benefits for their own using the control rights, under normal conditions, this behavior can only have short-term benefit and may lead to bad reputation, thus affects their long term benefit, such as losing more control rights and further promotion (mainly in administrative levels). This leads to the managers' problem of how to balance long term and short term benefits. Under the relative competitive managerial labor market, even for a manager pursuing his own maximum benefit, he must look out his long term benefit, i.e., he must establish a good reputation for himself. The reason is that, even if he is a manager born with pure self interest, for his own long term benefit, he must obey the rules and follow his words, thus establishes an honest and trustworthy reputation.

The incentive effect of reputation has two aspects in SOEs. One is the manager's search or waiting for the better opportunity to use up his established good reputation, thus maximizes his interest within a given time period. The other is the manager's consideration for good reputation for more control rights or promotion of administrative levels of SOEs². Such as control rights of a larger size SOE or promotion of administrative levels. These two aspects can all provide considerable incentive for the manager's better effort and higher efficiency. From a dynamic point of view, these can no doubt bring good business performance for SOEs. In fact, some Chinese state enterprises controlled by the so-called "insiders" have indeed relatively good performance.

A hypothesis of this paper is that reputation effect is an important incentive mechanism for the SOE's manager. Under such a mechanism, the control rights in the hands of the managers of SOEs (especially the excellent ones) are efficient for the enterprise's operation up to a certain stage. In China, One observation is that an enterprise with good performance is always connected with a *good manager*. Obviously, such incentive effect of reputation is related to the special characteristics of SOEs. In a system of "public-owned economy" where politics and business are not separated, because the enterprise's managers are directly appointed by the government, the above-mentioned reputation effect can be understood in the

² Today, many SOEs have administrative levels which correspond to some governmental sections.

following two aspects: one is the manager's consideration for obtaining or waiting for more control rights; the other is when there is no better future such as further promotion (mainly in administrative levels), he will use up all his established good reputation, thus realizing his maximum economic benefit within a time period. The first effect can no doubt bring tremendous incentive for the managers' better effort and good performance. Of course, there are certain conditions for the above two effects. In fact, the existing literature has proved that a relative competitive environment is the necessary condition for the incentive mechanism to be effective, and the same is true for the reputation mechanism.³ Without loss of generality, we assume that the enterprise's manager faces a relative competitive environment (maybe including both managerial labor and politician market).

The paper is organized as follows. Section 2 presents a simple reputation model for the managers of SOEs, from the perspective of relations between the managers of SOEs in China and the government.

We establish a dynamic game model with incomplete information. The model will analyze the general behavior of the managers of SOEs in China and proves that reputation is an important incentive mechanism. The performance of state enterprises is closely related to their reputation. The basic conclusion is that, under the mechanism of reputation effect, from the consideration of establishing good reputation, managers tend to make one's business behavior beneficial to the SOEs before the last stage of his term, and maintain the enterprise's business performance. Meanwhile, using the conclusion of this paper, this section will discuss some existing issues and phenomena for the present state enterprises.

Section 3 makes some concluding remarks.

2、 A Dynamic Game Model with Incomplete Information

One premise for a manager to acquire the control rights of an enterprise is having established a good reputation for the owners. When an enterprise's owner gives the management right to the manager, he will certainly require the manager to have good reputation, not with "bad" history of management. We will first briefly discuss the control rights of an enterprise.

2.1 Control Rights of SOEs

The studies of Grossman and Hart (1986) and Hart and Moore (1990) tell us that an enterprise's property rights can be defined in terms of the residual control rights. They argued that the residual control rights of firms resulted from incomplete contract,

³ See Steve Tadelis (1999; 2002).

i.e., when the contract is incomplete, the allocation of residual control rights of firms will affect investors' ex ante incentives and their ex post bargaining power in renegotiations. Residual control rights are the rights to determine how the assets should be used outside the specified uses in the final contract, simply known as the enterprise's control rights. In China, because of the special characteristics for the formation of the SOEs, it is difficult to clearly define the residual control rights, and no SOEs can completely define the enterprise's control rights and decision rights. This paper treats the control rights of SOEs as the general control rights, including not only the management rights for the enterprise, but also the contractual control rights besides those special control rights assigned to the managers.⁴ Therefore, this paper defines the SOEs' control rights as the decision rights that the managers can exclusively allocate the enterprises' various resources.

The enterprise's control rights can provide various monetary and nonmonetary benefits, including not only the satisfaction of leading others, but also the possible intrusion of the enterprise's interests such as the enjoyment of visible and invisible on-the-job consumption. Generally speaking, monetary benefits belong to the enterprise's owner-residual claim-holder, nonmonetary benefits directly belong to the managers with the enterprise's control rights, i.e., the internal managers. Thus, having the enterprise's control rights itself means an incentive mechanism for the managers. Of course, like the benefit coming with business success and achievement, the nonmonetary punishments due to failures (such as firing and demotion) can also provide the indispensable incentive for the enterprise's managers. Therefore, our hypothesis is that it is necessary for the managers to have a good reputation with the owners in order to acquire the enterprise's control rights.⁵ A good reputation is also the necessary condition for the managers to continue to hold the enterprise's control rights or even to acquire more control rights, even then promotion of administrative levels.

Next we will set up a reputation model for the business managers of SOEs to formally prove the above-mentioned hypothesis.

2.2 A Reputation Model

Considering the special characteristics of the SOEs in China, our model will assume that the internal managers of the SOEs and the government (representative of

⁴ Of course, such a definition for the enterprise's control rights is possible to include the board and CEO as internal managers. In fact, a regular investor not only has no effort and interest but also is impossible to look out for the enterprise's management. Based on our findings from some system reforms for the state enterprises, many enterprises have the president, CEO and party secretary as one person. Therefore, the board's supervision is very limited. The paper's definition for the enterprise's control rights takes such factor into account.

⁵ Here reputation means the performance of the enterprise's managers, its meaning is to characterize the value of the manager's human capital. The better the reputation, the higher the value of the manager's human capital.

state assets) are the two participants of the game.⁶

In general, the government's behavioral characteristics (such as the credibility of its promise) are public information and common knowledge for the public. Therefore, in our model, we assume there is only one type of government that always acts according to its promise, i.e., the government is always consistent, and does what it says.⁷

We assume the enterprise's internal manager is a standard agent, i.e., manager, and the managers have two types. One type is the cooperative type, who's action will maximize the owner's interest of SOEs. Another type is the noncooperative type, who uses his control rights for the enterprise to intrude the owner's interests by excessive on-the-job consumption and shirking. The latter type tends to maximize the manager's self interest, thus directly resulting in lowering the performance of the business management of SOEs.⁸

Only the manager knows what type he belongs to. For the government, this is private information. But the government can deduce the manager's type and revise its judgment based on the enterprise's business performance.⁹ If the manager's intrusion of the owner's interest is too excessive so as to lead the business performance to fall, the government can interfere in the management of business managers, such as firing and demotion, thus taking away the manager's control rights of SOEs. The following specifies the model.

Assume V represents the actual proportion of the enterprise's manager's intrusion of the owner's surplus, which can be understood as the proportion of the enterprise's potential profit taken by the managers. This proportion can be the direct result of the inefficient corrupt behavior on the side of the enterprise's managers, including avoiding responsibility, abusing company funds and even directly stealing assets. For the convenience of analysis, we will commonly call this behavior as the intrusion of the enterprise owner's surplus, profit or generally interests.

We use L to denote the set of manager's types, and according to the problem that we will analyze we assume there are two types managers, that is, $L = \{0, 1\}$,

⁶ Because of the asymmetric information between the enterprise's managers and the government, there exists a "moral hazard" issue, i.e., the managers can use the private information to intrude the owner's rights. A typical case is the "insiders' control" issue to be addressed again later.

⁷ Even though the reality is not always as such. We can also assume there are two types of government such as an honest one and a dishonest one. In this case, we need to use a game model with two-sided incomplete information. This case is more complicated. In this paper, we assume that there is only one type of government.

⁸ Once there is a chance, the internal managers will have the motivation to maximize their self interest. Therefore we can believe that the internal managers are essentially noncooperative. The emphasis of this paper's analysis is noncooperative managers. Cooperative managers are obviously within the context of this paper, but belong to special cases, and the conclusion derived from this model also applies to this type of managers.

⁹ Here we exclude those factors that cannot accurately reflect the enterprise's business performance.

where $\alpha \in L, \alpha = 0$ represents the manager's type as cooperative who does not intrude the owner's interests. The behavior of this type of manager is efficient for the enterprise. $\alpha = 1$ represents the manager's type as noncooperative who will intrude the owner's interests. The noncooperative manager's behavior is certainly inefficient for the enterprise.

Let V represent the actual intrusion rate, obviously $0 \leq V \leq 1$. Let V^e denote the government's expected intrusion rate for the enterprise's managers. V^e represents the government's expected judgment for the manager's action, and $0 \leq V^e \leq 1$. The one-period utility function for the enterprise's manager is constructed as follows:

$$U = \begin{cases} V - \frac{1}{2}V^2 - V^e, & \alpha = 1 \\ 0, & \alpha = 0 \end{cases} \quad (1)$$

For the cooperative manager, Eq.(1) shows that his utility is independent of the intrusion rate, so this type of manager will not intrude on the enterprise's interests. For the noncooperative manager, Eq. (1) shows that the manager's utility is an increasing function of the intrusion rate V up to the maximum rate, and the marginal utility declines with respect the intrusion rate. For this type manager, the first part of the utility function $(V - \frac{1}{2}V^2)$ can be thought of as the manager's utility derived from the material benefit with his intrusion of the enterprise's interests. The second term $(-V^e)$ is the disutility associated with the government's expected intrusion, such as fearing of being found out and punishments. The underlying assumption is that higher expected intrusion by the government means a greater probability that the manager's corrupt behavior could be found and punished, thus resulting in negative utility.

If the game is one-time or the manager's term is final, then what is the manager's best response? From the manager's utility function, the first order condition for utility maximization is $\partial U / \partial V = 1 - V = 0$. Therefore the optimal intrusion rate is $V^* = 1$. The maximum utility is $U^* = 1/2$. This is the manager's optimal choice in a one-time game. That is, in a one-time game, the rational manager does not need to cooperate.

Now, we assume $V_1 - \frac{1}{2}V_1^2 - V_1^e > 0$, in that, government considers the manager's intruding

is not serious so that V_1^e is very small. Otherwise, the manager couldn't get control rights of SOEs.

Now let us consider the case when the game is a repeated in many periods. Assume the a priori probability that a manager is cooperative in period t is P_t , then the a priori probability that a manager is noncooperative in period t is $1 - P_t$. In other

words, in time period t , the government believes the probability that a manager belongs to the cooperative type is P_t , and that for a noncooperative type is $1 - P_t$.

Suppose the game is repeated for T periods.¹⁰ Let Y_t denote the probability that the manager chooses the cooperative strategy in period t , X_t the probability perceived by government that the manager will choose the cooperative strategy. We know that in equilibrium, $X_t = Y_t$. If the government does not observe the manager's intruding behavior in period t , then according to the Bayesian Rule, the perceived posterior probability by the government that the manager is the cooperative type in period $t+1$ is

$$P_{t+1}(\alpha = 0 | V_t = 0) = \frac{P_t \times 1}{P_t \times 1 + (1 - P_t)X_t} \geq P_t \quad (2)$$

Here, P_t is the probability that the manager is the cooperative type in period t . 1 is the probability that the cooperative manager will not intrude the owner's surplus. An important implication of Eq. (2) is that, if the manager chooses to be cooperative in this period, then the government's perceived posterior probability that the manager will be cooperative in the next period will increase. If $X_t < 1$, then the strict inequality in Eq. (2) holds true.

If the manager chooses to intrude in period t , according to the Bayesian Rule, then in the next period $t+1$ the government's expected probability that the manager is cooperative is

$$P_{t+1}(\alpha = 0 | V_t = 1) = \frac{P_t \times 0}{P_t \times 0 + (1 - P_t)X_t} = 0. \quad (3)$$

This is to say, if a manager intrudes the owner's surplus this period that leads to the decline of the enterprise's profit, then the government will deduce immediately in the next period that the manager is noncooperative. This will result in some punishment measures or the loss of the enterprise's control rights. Losing the control rights means losing everything, not just the control rights. Therefore, the manager will not choose the noncooperative intrusive behavior until the last period. This is essentially the reason why noncooperative managers have the incentive to cooperate.

Now let's analyze the final two periods of the game. In period T , it is not necessary for the enterprise's manager to establish a cooperative reputation.¹¹ Therefore the manager's optimal choice is $V_T^* = 1$. The government's expected intrusion rate is:

$$V_T^e = V_T \times (1 - P_T) = 1 \times (1 - P_T) = 1 - P_T. \quad (4)$$

The manager's utility level is:

¹⁰ T usually represents the duration of a manager's term.

¹¹ In fact, the manager has two choices: "intrude and not intrude." Assuming the manager chooses "intrusion" in the final period is trying to explain this paper's conclusion. Actually, "not intruding" is also an equilibrium strategy; it is just a choice that the manager is waiting for larger control rights in the next period. But eventually it will be the same problem.

$$U_T = -\frac{1}{2}V_T^2 + (V_T - V_T^e) = P_T - \frac{1}{2}. \quad (5)$$

Eq. (5) tells us that the final period's utility for the noncooperative manager is an increasing function of reputation.¹² This is to say, if the government's believes that the manager has a higher probability to be cooperative, i.e., if P_T is higher, then the manager's expected utility from intruding the owner's interests in the final period is also higher. Therefore, if there is not certain mechanism to constraint the manager, he will not care about his good reputation in the past, and greatly intruding the owner's interests in the final period.

Now we analyze the manager's behavioral choice in period T-1. Assume the manager always tries to improve the enterprise's efficiency and maximize the owner's interests until period T-1 (including period T-1), i.e., he chooses the strategy not to intrude. From Eq. (3), $P_{T-1} > 0$, the government's expected intrusion rate for the noncooperative manager is:

$$V_{T-1}^e = V_{T-1}^* \times (1 - P_{T-1})(1 - X_{T-1}) = 1 \times (1 - P_{T-1})(1 - X_{T-1}). \quad (6)$$

Here, $V_{T-1}^* = 1$ is the maximum intrusion rate in period T-1. $1 - P_{T-1}$ is probability that the manager is noncooperative type in period T-1. $1 - X_{T-1}$ is the probability that the government believes a noncooperative manager will intrude.

Let δ denote the discount factor for the manager's next period utility, it is used to express the manager's discount relationship between this and next period, it can also express the degree of patience for a noncooperative manager to pretend as a cooperative manager.

The two strategic choices for the manager's utility in period T-1 are as follows:¹³

A. Intrude in period T-1. If the noncooperative manager chooses to intrude the owner's interests in period T-1, i.e., $Y_{T-1} = 0, V_{T-1}^* = V_{T-1} = 1$, then, according to Eq.(2), $P_T = 0$. In this case, since $V_T^e = 1 - P_T$, $V_T = 1$, so $P_T = 0$ and $V_T^e = V_T = 1$. Using Eqs. (3) and (5), the noncooperative manager's total utility for the final two periods is:

$$\begin{aligned} U_{T-1}(\alpha = 1, V_{T-1} = 1) + \delta U_T(\alpha = 1, V_T = 1) &= -\frac{1}{2}V_{T-1}^2 + (V_{T-1} - V_{T-1}^e) + \delta[-\frac{1}{2}V_T^2 + (V_T - V_T^e)] \\ &= \frac{1}{2} - V_{T-1}^e - \frac{1}{2}\delta. \end{aligned} \quad (7)$$

B. Not intrude in period T-1. If the noncooperative manager chooses not to intrude the owner's interests in period T-1, i.e., $Y_{T-1} = 1$, and $V_{T-1} = 0$, then the

¹² It is not difficult to see that whether a manager has a good or bad reputation with the government is determined by the posterior probability P_t determined by the government's judgment of the manager's type. The bigger the value of P_t , the better the reputation, and vice versa.

¹³ We only consider the pure strategy case, i.e., $Y_{T-1} = 0$ or 1 . Since only when the expected utility of the two pure strategies are equal will the participants choose mixed strategy, knowing the condition for the best strategy means knowing the condition for mixed strategy.

total utility function of two periods for the noncooperative manager is:

$$\begin{aligned}
& U_{T-1}(\alpha = 1, V_{T-1} = 0) + \delta U_T(\alpha = 1, V_T = 1) \\
& = -\frac{1}{2}V_{T-1}^2 + (V_{T-1} - V_{T-1}^e) + \delta[-\frac{1}{2}V_T^2 + (V_T - V_T^e)] \\
& = -V_{T-1}^e + \delta(P_T - \frac{1}{2}). \tag{8}
\end{aligned}$$

Therefore, if the value in Eq. (8) is greater than that in Eq. (7), then it shows the manager's not intruding the owner's interests in period T-1 is better than intruding. Specifically, if

$$\begin{aligned}
& \frac{1}{2} - V_{T-1}^e - \frac{1}{2}\delta \leq -V_{T-1}^e + \delta(P_T - \frac{1}{2}), \text{ i.e.,} \\
& P_T \geq \frac{1}{2\delta}, \tag{9}
\end{aligned}$$

then the manager will choose not to intrude in period T-1.

Since under competitive equilibrium¹⁴, the government's expectation X_{T-1} is equal to the manager's choice Y_{T-1} , i.e., $X_{T-1} = Y_{T-1}$. From Eq. (2), we have $P_{T-1} = P_T$, so Eq. (9) becomes

$$P_{T-1} \geq \frac{1}{2\delta}. \tag{10}$$

Eq. (10) shows that, if the government's belief in the probability that the manager is cooperative in period T-1 is not less than $1/2\delta$, then the noncooperative manager's choice of not intruding is better than intruding.

Therefore we can deduce that the game's Nash equilibrium strategy is as follows. As long as δ is sufficiently large,¹⁵ then the noncooperative manager will choose not to intrude in period T-1 and intrude in period T. In other words, given the manager's discount rate for future utility, then a manager with better reputation in period T-1 will choose not intrude in the period, but intrude in the last period.

The above analysis shows that the noncooperative manager faces the balance of short-term and long-term benefits when choosing the strategy in period T-1. Suppose the government does not know the manager's true type, if the noncooperative manager chooses to intrude the owner's interest, then his utility in the next period T is the minimum. If P_{T-1} is sufficiently large, the best strategy for the noncooperative manager is to cooperate in all T-1 periods, i.e., not to intrude, but to intrude in the last period T, thus achieving his maximum long term utility.

The existence of the game's equilibrium strategic solution must satisfy

¹⁴ We assume that there is a relative competitive political market, because it is a way to choose managers in SOEs.

¹⁵ Under this condition, $1/2\delta$ is very small, so (8) is more likely to hold true.

$P_{T-1} \geq \frac{1}{2\delta}$,¹⁶ i.e., for sufficiently large δ or P_{T-1} that makes (10) true. Since δ represents the manager's degree of patience, from a rational point of view, if a manager wants to obtain his maximum utility in the long run, he must have sufficient patience to choose the cooperative behavior from period 1 to period T-1. This is to say, a manager's δ or P_{T-1} must be sufficiently large to make $P_{T-1} \geq \frac{1}{2\delta}$ true, otherwise the noncooperative manager can only obtain the short term utility. Generally speaking, from a manager's point of view, it is always possible to make one's δ or P_{T-1} sufficiently large to make (10) hold true, thus making him cooperate until the last period.

Another interesting observation is that, for the noncooperative manager to be cooperative until the last period, even a manager with a bad reputation will cooperate as long as he has enough patience. On the other hand, even a manager with a good reputation but is impatient may not cooperate before the last period. It is the degree of patience and reputation working together to determine whether a manager cooperate or not.

In summary, we use a repeated game model with incomplete information to explain that within a manager's term, even the noncooperative manager will always adopt the cooperative strategy until the last period of his term in order to maximize his long term utility, i.e., not intruding the owner's interests but to improve the enterprise's management performance.

We have discussed the enterprise's internal manager's appropriate policy in a repeated game environment with incomplete information in different periods. It can be said that the enterprise's manager is essentially noncooperative, a manager always wants to maximize one's interest under certain conditions. But if the number of games is sufficiently large, i.e., if the manager is not just to control the enterprise in a short period of time, then his intrusion of the owner's surplus would be interfered by the representative of the enterprise's owner --- the government, thus making the loss of future benefits exceed his current gain from intruding the owner's interests in the short term. Therefore, under certain conditions, it is the optimal choice of the enterprise's manager to maximize the owner's interest, improve the enterprise's efficiency and establish a good reputation of cooperation. Therefore, from the theoretical point of view, within a certain periods of time, the SOEs controlled by the manager can be efficient. Only when the game is close to the end such as retirement, change of job, being fired or loss of confidence with the enterprise will the manager believe the short term benefit is very large and the long term benefit is very small, and begins to use up his good reputation and intrude the owner's surplus in a large

¹⁶ From the Folk Theorem, this equilibrium must exist. See Fudenberg and Maskin (1986).

amount,¹⁷ thus reducing the firm's performance. But if the manager is sufficiently patient or his accumulated reputation is sufficiently good, he not do this until the end of the game. This explains why some enterprises with internal manager's control rights for the owner's surplus have good performance within certain periods of time, even though it seems contradictory with the principle of economics.

3、Concluding Remarks

This paper uses a simplified reputation model to prove our hypothesis. It can be said that, under certain conditions, the manager's control rights for the surplus is an efficient, dynamic and evolutionary form. In fact, the model in this paper can also be used to explain the following three phenomena.

First, a good leader or an excellent entrepreneur is a key for the SOEs. We show that an essentially "good" manager, i.e., a cooperative manager, will certainly not intrude the owner's interest, so his behavioral characteristics should usually be cooperative,¹⁸ i.e., not intruding the owner's surplus. In fact this is an equilibrium behavior in the current model.¹⁹ The model's conclusion tells us that the manager's behavior can improve the enterprise's business performance. If one looks carefully at the current SOEs in China, one can find many empirical facts to support our hypothesis.

The second phenomenon is the "59 phenomenon". This phenomenon means certain managers including some excellent managers, just before their retirement, seek their own maximum benefit and intrude on the state's assets in large amount. Superficially speaking, the cause for this phenomenon seems to be the manager's corrupt personality. In fact, from the conclusion of this paper, "59 years old" means the manager has reached the last stage of the game. At this stage, he has two choices, one is to continue to "cooperate", and the other is to choose not to cooperate, but uses the good reputation he has acquired to intrude the owner's interest. If there is a lack of restrictions on the enterprise's control rights, then even the "good" managers are most likely choosing not to cooperate, but to intrude the owner's interest, because at this time this kind of behavior is nearly legal (i.e., expected by the owner) and the return is

¹⁷ There exists a similar phenomenon within many professions commonly known as the "59 phenomenon". That is, at the last stage of one's career near 59 years old or before retirement, he will frantically intrude on the collective or public's interest,

¹⁸ Here we exclude the possibility of "good" people doing "bad things".

¹⁹ In a repeated game, there are many different equilibria. For example, it is an equilibrium if the manager never "intrudes", this is the best reputation. It is also an equilibrium if the manager occasionally intrudes, but the reputation becomes worse than the previous case. We can also find many different equilibria. The equilibrium given in this paper can best reflect the internal behavioral characteristics of the state enterprise and its manager, especially the causal relationship between the manager's behavior and the enterprise's business performance, and explains some other real economic phenomenon.

huge. Therefore, the comparison of before and after one's retirement inevitably shows "good people" doing "bad things".

The third phenomenon is "on-the-job consumption". This phenomenon also exists in modern foreign enterprises, but just more prominent in China, and is incompatible with the enterprise's real business performance. In our model, the government can only observe the business performance of an enterprise to some extent. A rational manager will always maximize his intrusion of the owner's interest within the ranges set by the government, thus making the government believe the manager is still cooperative. In China, the manager's compensation is relatively low, so on-the-job consumption (one form of intruding the owner's interest) is unavoidable.

The first implication of this paper's conclusion for the management of SOEs is to have an internal and external competitive environment that can demonstrate the manager's abilities and personalities, thus it is key to establish a sufficiently competitive market economy that will use the enterprise's profit as a true measure of its performance. A sufficiently competitive market economy is the basis for the efficient operation of a modern enterprise system. For the decision makers of every reform policy, the first task should be to create a really fair and competitive environment, making the enterprise's profit rate as the true and sufficient information indicator for the manager's ability and performance. On by this can the government as the SOEs' owner master enough information to efficiently monitor the manager's behavior.

The second implication is the importance of the enterprise's internal organizational system. The evolution of the market economic system tells us that, with the advent, formation and development of the modern enterprise system, there have been various economic and legal systems to safeguard the enterprise owner's interests. It can be said that the whole market economic system has had huge changes, and has become more and more mature and complete. In this sense, it is important to reform the enterprise's internal organization, especially the enterprise's property rights. This will not only facilitates the development of the market economic system, but also promotes the formation of an effective organizational system. The most effective enterprise system should make those essentially noncooperative managers adopt the cooperative strategy, thus improving the enterprise's overall performance. The paper demonstrates that reputation effect can be an important mechanism to guarantee the effective operation of the enterprise's system.

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