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The Behavior of the Chinese State Enterprises under the Dual Influence of the Government and the Market

David D. Li

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DEPARTMENT OF ECONOMICS
University of Michigan
Ann Arbor, MI 48109-1220

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David D. Li [1]
University of Michigan
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Abstract

The paper examines the behavior of the Chinese state owned enterprises after the reform. The focus is on the key issue of government-enterprise interaction. Based on theoretical analyses and empirical tests, I argue that despite facing strong profit incentives, many of the Chinese state-owned enterprises are still greatly influenced by the government and dependent on the government. They behave like rent-seekers when negotiating contracts with the government. At the same time, the government takes the opportunity to impose its objective onto the enterprise. After signing the contract, firms maximize market profit in making short-term production decisions. However, when it comes to final profit, they are virtually not accountable for financial losses. The implication is that the Chinese enterprise reform provides incentives for firms to pursue short-term efficiency, while long-term dynamic efficiency may not as high.

Keywords: enterprise reform, dual-track pricing/contract system, rent-seeking, soft budget constraint, the Chinese economy.

JEL Classification Code: P50, P52, D21.

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I. Introduction

The paper studies the behavior of the Chinese state-owned enterprises (SOE's), which are the central target of China's gradualist reform. My approach is to focus on the crucial issue of the government-enterprise interaction after the reform. The general conclusion is that although the reform has provided the Chinese SOE's with strong profit incentives after mid-1980's, many enterprises are still both influenced by the government and dependent on the government for various kinds of favors. The conclusion points out the need to further complete the reform, as many have argued (Kornai, 1980; Kornai, 1992; Boycko, Shleifer and Vishny, 1993), the government/enterprise relation is the most fundamental cause of all problems of the former socialist system and a successful reform has to properly redefine such a relation.

The Chinese enterprise reform, which has aroused keen interest in recent years, is in essence a slow and incomplete process of disentangling the government/enterprise relation. Avoiding outright privatization, the reform espouses two themes: decentralization and marketization. Decentralization means more autonomy and more profit incentives for the enterprise. Marketization calls for the utilization of the market mechanism and the product market competition as means of corporate governance. Reform measures built around the two themes do not completely replace the existing system, instead they allow the new system to "grow out of" the old one (Naughton, 1993).

The unique and well-known dual-track price system exemplifies the gradual nature of the Chinese enterprise reform. On surface, the dual-track system allows the co-existence of the planned prices and the market ones. In essence, it is a system which maintains much of the control rights of the government bureaucrats over the enterprises in face of market mechanism (in the way theorized by Grossman and Hart, 1986 and Hart and Moore, 1990). In the dual track system, each SOE is entitled to an input quota, up to which input can be purchased at the (usually lower) planned price. At the same time, the SOE has to deliver to the government an output quota at the (usually lower) planned price. Beyond the quota, the SOE's buy and sell in the market. The negotiation for the quota contract is a rent-seeking process on the part of the enterprise and, at the same time, a chance for the bureaucrats to exercise their control rights over the enterprise.

In order to characterize the enterprise behavior in light of the enterprise-government interaction, I model a full operation cycle of the Chinese SOE. At the beginning of the operation cycle, the manager and the government bureaucrat negotiate a contract on the input/output quotas as well as profit sharing rules. Afterwards, the firm starts production by making its input/output decision. At the end of the operation cycle, when the profit is realized, the manager and bureaucrat may well bargain again on the distribution of profit. The focus of my analysis is on the quota negotiation at the first stage of the operation cycle.

The conclusions of the analyses show different aspects of the behavior of the Chinese state enterprises after the reform, that is, the so-called dual-dependence of the enterprise on the government and the on the market. When negotiating a contract with the government, the SOE managers behave like rent-seekers, since a large amount of profit is at stake in this process. The dual-track pricing system sets the stage for such kind of rent-seeking activities. Through the bargaining process, the government partially imposes its objective onto the enterprise (in a way similar to that in Boycko, Shleifer and Vishny, 1993). After the negotiation of the contract, the enterprise faces the market and tries to maximize its market profit by choosing the best input/output combination. Finally, when the realized profit is negative, the enterprise fully relies upon the government to cover the loss. Thus, the so-called soft budget constraint is still prevalent among Chinese SOE's.

The conclusions of the paper imply an evaluation of the Chinese state enterprises. On the one hand, the reform is credited for providing strong profit incentives and autonomy for the enterprise. With such strong profit incentives, the firms tend to make various market-oriented decisions to improve efficiency. On the other hand, given heavy interactions between the government and the enterprise in the form of rent-seeking and soft budget constraint, dynamic efficiency of the Chinese SOE's may not be as high as commonly believed.

There are numerous good studies on the Chinese enterprise reform.[2] Many authors have carefully measured the productivity and efficiency of these firms after the reform

[2]For a survey of the these studies, see Jefferson and Rawski (1994).

and reached the conclusion that productivity of the firms has increased significantly after the reform. Some of these studies are Chen, Wang, Zheng, Jefferson and Rawski (1988); Gordon and Li (1991); Jefferson, Rawski and Zheng (1992); Groves, Hong, McMillian and Naughton (1993). Consistent with these findings, Groves, Hong, McMillian and Naughton (1994) and Jefferson and Xu (1993) are excellent studies that carefully examine the enterprise's positive response to the reform measures, such as the increase in enterprise autonomy. However, several authors have voiced their concern about drawbacks of the enterprise reform. For example, Fan and Woo (1992) and Woo, Hai, Jin and Fan (1993) argue that the SOE's are still very inefficient and represent a big destabilizing force in the Chinese economy. Given the complicated nature of the issue, all of these studies and mine are necessary to understand the different aspects of the Chinese state enterprise reform.

In the following section, section II, I will develop a theoretical framework to study the interactions between the Chinese government and SOE's. Section III empirically tests the theoretical arguments made in the previous section. Finally, section IV concludes the paper.

II. A Theoretical Analysis

I will model a full operation cycle of a Chinese firm. The cycle contains three time periods. Period 1 is planning and bargaining between the firm and the government. Period 2 is production and period 3 is distribution of profit. The single output is y and the single intermediate input is x. In periods 1 and 2, the government and the firm have extensive interactions.

In period 1, the firm and the government bargain about the quota. Let q_0 and y_0 be the planned price and the quota of the firm's output y, respectively. Let p_0 and x_0 be those of the input x. q_0 and p_0 are exogenous to the model, since in reality they are historically determined by the pre-reform central planning system. The production function is assumed to be

$$y = f(x).$$

$f(.)$ is assumed to follow standard properties of production function: $f'(.) > 0$ and

$f''(.) < 0$. Note that capital and labor are not directly included in such a production function, since they are assumed to be fixed in the short-run which is the time-horizon of the model.

As a notational convention, assume that the allocation of quota (x_0, y_0) is balanced, that is, x_0 is just sufficient to produce y_0, or:

$$y_0 = f(x_0).$$

Once allowing for budgetary transfers, such a convention is not as restrictive as it appears at a first glimpse, since with a market for input x, a quota $x_0 + \Delta x$ with $\Delta x > 0$ ($\Delta x < 0$) means that the firm gets a subsidy (is levied a lump sum tax) equivalent to $(p - p_0)\Delta x$. The contractual variables x_0, y_0 are subject to bargaining between the firm and the government. Let q and p be the market prices of y and x, respectively. Thus, the profit earned from the quota at the market price is:

$$qy_0 - px_0$$

and the profit earned at the planned price is:

$$q_0y_0 - p_0x_0.$$

Thus, by obtaining the quota (x_0, y_0) from the government instead of trading in the market, the firm earns a rent R:

$$R(x_0) = (q_0y_0 - p_0x_0) - (qy_0 - px_0).$$

Of course, the rent can be either positive or negative, depending on the price differences. The value of R is subject to bargaining. The bargaining over the quota x_0 and y_0 is in essence the bargaining over the rent R.

In period 2, the firm produces by choosing its input-output combination. At the end of period 2, the profit is determined. It consists of a deterministic component π_0 and a random noise ϵ from the production and marketing process. π_0 is the expected profit of the firm. When the firm operates beyond the quota, i.e., $y \geq y_0$ and $x \geq x_0$, π_0 is:

$$\pi_0 = q[f(x) - y_0] - p(x - x_0) + q_0y_0 - p_0x_0$$

$$= qf(x) - px + (p - p_0)x_0 - (q - q_0)y_0.$$

On the other hand, when the firm chooses to operate by the quota, i.e., $y = y_0$ and $x = x_0$, π_0 becomes

$$\pi_0 = q_0y_0 - p_0x_0$$

$$= qy - px + (p - p_0)x_0 - (q - q_0)y_0.$$

In general, we can define the expected *market* profit as

$$\pi_m = qf(x) - px.$$

Therefore, the total expected profit at the beginning of period 2 can be re-written as:

$$\pi_0(x, x_0) = \pi_m(x) + R(x_0), \quad s.t.\ y \geq y_0, x \geq x_0.$$

The actual realized profit of the firm π is subject to many random factors, such as market fluctuations, production interruptions, and quality shocks, etc. As a simple assumption, let the final profit be:

$$\pi = \pi_0 + \epsilon = \pi_m + R + \epsilon.$$

ϵ is assumed to have mean 0 and follow distribution $f_\epsilon(.)$ with cumulated distribution function $F_\epsilon(.)$.

Period 3 is distribution. If the realized profit π is positive, then the firm and the government divides the total profit according to a profit tax rate.[3] Assuming that the profit tax rate is $1 - \beta$, then the firm gets a retained profit of:

$$\pi_R = \beta(\pi_0 + \epsilon),$$

when $\pi_0 + \epsilon > 0$. However, if the profit is negative, then another round of negotiation will arise. Since in reality, bankruptcy is non-existent, the firm and the government negotiate on how much subsidies the firm will get, or, how much loss should be sustained by the firm. Without getting into the details of the bargaining process, I assume that in this case, the firm sustains a loss of

$$\pi_R = \gamma(\pi_0 + \epsilon).$$

[3] Actually, β is also subject to bargaining in period 1. Here, in order to simplify the model, this problem is ignored. So long as the division rule of profit is not changed when the profit is positive, all the conclusions remain to be valid.

In other words, the subsidies to the firm is $(1-\gamma)(\pi_0+\epsilon)$. Due to the problem of soft budget constraint, assume that $\gamma < \beta$.

The objective function of the firm is to maximize the retained profit π_R, which is closely linked to bonuses and welfare spending of the the firm. Findings of many studies (such as Jefferson and Xu, 1991; Groves, Hong, McMillian and Naughton,1994) lend support to such an objective function of the enterprise. In the following, I identify the firm with the manager, since in a model of short horizon, job security of managers is not an issue.

The government's objective consists of two goals. On the one hand, the government treasures the revenue obtained from the firm's profit, since the economic and political power of the government is dependent upon this. On the other hand, the government, which is controlled by professional career bureaucrats, likes to see a large output and employment from the enterprise. A high output y benefits the bureaucrat in at least two ways. A large output represents the a large domain of control right of the bureaucrat. Also, a large output is associated with high employment which reduces various social problem. The desire for output, as argued by Boycko, Shleifer and Vishny (1993), is a coherent feature of the politics of the old socialist system. As a matter of fact, the output index is one of the most important figures in the Chinese industrial statistics and the performance of the bureaucrats is judged by it. Thus, the government's final payoff is a convex combination of the two components:

$$\lambda E(\pi_G) + (1-\lambda)y,$$

where π_G is the net revenue of the government from the firm.

To model the bargaining game between the firm and the government, I will assume that relative bargaining power of the firm is α. α can be regarded as a simple index of the effort or finesse of the firm in negotiating with the government. A simple Nash bargaining solution is adopted, in order not to be concerned with detailed procedural considerations.

Next in this section, I will first characterize the behavior of the firm in the second period, then examine the bargaining in the first period. Finally, I will discuss further

issues and the implications of the analytical results for the efficiency of the reform.

II.1 The Production Decision

In the second period, the quota parameters y_0 and x_0 have already been decided and the firm makes a decision on the input-output combination (x, y). Anticipating different rules of dividing profits when profits are positive or negative, the manager calculates the expected retained profit:

$$E(\pi_R) = E[\beta(\pi_0+\epsilon) \mid \epsilon > -\pi_0][1 - F_\epsilon(-\pi_0)] + E[\gamma(\pi_0+\epsilon) \mid \epsilon \le -\pi_0]F_\epsilon(-\pi_0).$$

Recall that the expected total profit:

$$\pi_0 = \pi_m(x) + R(x_0) = qf(x) - px + R(x_0).$$

Therefore, the firm's problem is:

$$Max_{\{x\}} \quad E[\beta(\pi_0+\epsilon) \mid \epsilon > -\pi_0][1 - F_\epsilon(-\pi_0)] + E[\gamma(\pi_0+\epsilon) \mid \epsilon \le -\pi_0]F_\epsilon(-\pi_0);$$

$$s.t. \quad \pi_0 = qf(x) - px + R(x_0);$$

$$x \ge x_0.$$

The choice of x only affects the expected total profit from the market π_m. The manager unambiguously prefers a higher π_m to a lower one, since a higher π_m gives a higher probability that the firm is not in red and in that case, the firm can expect to have a higher retained profit. Therefore, intuitively, it is clear that the firm's choice of x is to maximize π_m, the profit evaluated at the market price. The following proposition summarizes the above discussion.

Proposition 1 *Let $(\hat{x}, \hat{y})$ be the firm's choice of input-output combination and (x_1, y_1) be the input-output that maximizes the market profit $\pi_m = qy - px$. Then $(\hat{x}, \hat{y}) = (Max\{x_1, x_0\}, Max\{y_1, y_0\})$. In other words, despite the problem of the soft budget constraint, the firm's production decision is efficient, subject to quota constraints.*

Proof: See Appendix A1.

This result should be carefully interpreted. First, it gives an impression that the soft budget constraint does not have bad consequences. This is because the framework is only concerned with static input/output decisions and leaves out the issue of investment decision, which is distorted in the presence of the soft budget constraint. Second, the proposition appears to imply that quota allocations can be harmless. Such a conclusion was the very justification for the quota system. As I will argue later, this is not entirely the case, since ex ante a large amount resources is devoted in bargaining on quotas. Thus, the quota system is in the way of enhancing long-term efficiency.

One implication of the proposition is that after the reform the Chinese firm's short-term productivity should be improved due to more efficient production decision. Indeed, this is a common conclusion of many studies, such as Chen, Wang, Zheng, Jefferson, and Rawski (1988), Gordon and Li (1991), and Jefferson and Xu (1991).

Li (1993) offers an empirical test of the efficiency of the input-output choice predicted by proposition 1. The test result is very close to that of similar tests conducted on the U.S. firms. Under the null hypothesis that firms do maximize profit when choosing input-output combination, the test statistic is $\hat{\chi}^2(82) = 121.26$ with the critical value $\chi^2_{0.01}(82) = 117.8$. Appelbaum (1978) is a test with the U.S. data, and the result is $\hat{\chi}^2 = 19.7$ v.s. a critical value of 15.1 at 1%. Thus, one may conclude that like the U.S. firms, the Chinese firm's input-output choice is rather close to profit maximization.

II.2. The Bargaining of Quotas

To simplify the analysis and to focus on the enterprise behavior, I assume that there is no real price distortion in the old planning system. All the difference between the market price and the planned price is due to inflationary pressure. Most of the conclusions and intuitions derived from such a simplifying assumption still hold in a more general framework. To be precise, assume:

$$q_0 = kq, \quad p_0 = kp, \quad 0 < k \leq 1.$$

With this assumption, the rent R associated with quota x_0 becomes:

$$R(x_0) = (k-1)[qf(x_0) - px_0] = (k-1)\pi_m(x_0)$$

and the firm's total profit becomes

$$\pi = \pi_0 + \epsilon = \pi_m(x) + (k-1)\pi_m(x_0) + \epsilon.$$

From π, the firm gets the retained profit π_R and the government gets revenue π_G according to rules described before.

The firm maximizes its objective function $F(.)$ which is the expected retained profit:

$$F(x_0) = E\{\pi_R[x_0, x(x_0)]\}.$$

The government's objective function is

$$G = \lambda E(\pi_G) + (1-\lambda)y.$$

Suppose that the pre-reform production plan is (x^*, y^*). This is the default production plan if no agreement can be reached in the negotiation for quotas. The justification for this assumption is that the reform is not a compulsory process, both party have to agree to departing from the original plan in order for the reform to proceed.

Two extreme situations are discussed in the following. In the first case, the government can make lump sum budgetary transfers to the firm as part of a package in negotiating on quotas. For example, the government can reach an agreement with the firm so that the firm has to produce y_0 output and the government subsidizes (or taxes) the firm an amount of t. In the second case, the government faces a tight budget so that such kind of *ex ante lump sum* transfers are impossible. The reality should lie in the middle of the two extreme cases and the real quota allocations should be in between the two extreme predictions.

The generalized Nash bargaining solution is given by

$$MAX \quad (F - F^*)^{\delta}(G - G^*)^{(1-\delta)}$$

where, $0 \leq \delta \leq 1$ is the relative bargaining power of the firm; F^* and G^* are the status quo payoff of the firm and the government, respectively.

Case 1. Ex Ante Budgetary Transfer Is Possible

Let t be the *ex ante* (up front) budgetary transfer from the government to the firm. Exactly through which way t is implemented is not a concern here. It can take many forms. A popular form is through providing extra (relative to output quota) input quota at the low planned price. Another form is by promising favorable treatment in taxes. Therefore, the following analysis is to predict the output quota $f(x_0)$ (which is defined as the corresponding level of input to produce the output quota), instead of the input quota which may not be x_0. (when t is made through adjusting the input quota)

With the transfer, the payoff to the firm becomes:

$$F = E(\pi_R) + t$$

where the retained profit π_R depends on both x and x_0. The payoff to the government becomes:

$$G(x_0, t) = \lambda[E(\pi_G) - t] + (1-\lambda)f[x(x_0)].$$

The Nash Bargaining solution is given by:

$$MAX_{\{x_0\}} \ [\ E[\pi_R(x, x_0)] + t - F^*\ ]^{\delta}[\ \lambda[\ E[\pi_G(x, x_0)] - t] + (1-\lambda)f[x(x_0)] - G^*\ ]^{1-\delta};$$

$$s.t. \ \ x = argmax_{x \geq x_0}\ E[\pi_R(x, x_0)];$$

$$E[\pi_R(x, x_0)] = \ E[\beta(\pi_0 + \epsilon) \mid \epsilon > -\pi_0][1 - F_\epsilon(-\pi_0)] + E[\gamma(\pi_0 + \epsilon) \mid \epsilon \leq -\pi_0]F_\epsilon(-\pi_0);$$

$$E[\pi_G(x, x_0)] = \ E[(1-\beta)(\pi_0+\epsilon) \mid \epsilon > -\pi_0][1-F_\epsilon(-\pi_0)] + E[(1-\gamma)(\pi_0+\epsilon) \mid \epsilon \leq -\pi_0]F_\epsilon(-\pi_0).$$

The constraints state that the final production x is endogenous and depends on the quota x_0. The following proposition predicts the level of output quota.

Proposition 2 *When the government can arrange unrestricted ex ante lump sum budgetary transfers to the firm, the equilibrium output quota $f(x_0)$ is either 0 or $f[x_2(k, \lambda)]$ with $x_2 > x_1$; where x_1 maximizes total expected market profit $E(\pi_m)$. Moreover, the equilibrium $f(x_0)$ is non-increasing in λ and x_2 is non-increasing in k.*

Proof: See Appendix A2.

The results are intuitive. A low λ means that the government tends to care more about output than controlling output. Thus, the outcome is high quota such that the firm's output can be higher. On the other hand, the intuition for the $\frac{\partial x_2}{\partial k} \leq 0$ is slightly more complicated. The quota, x_2, exists in order to coordinate the difference between the objectives of the firm and the government: the firms loves profit and the government loves output more. Fixing a quota, such a divergence is augmented by the difference between the planned price and the market price. Thus, when k increases, the quota x_2 is smaller.

A feature of proposition 1 is that the allocation of quota is independent of the relative bargaining power. The intuition is very simple: when transfers are possible and when the firm cares about profit, adjusting the transfer t is more efficient than bargaining over x_0.

One special case of the proposition deserves special attention. It explains one kind of soft budget constraint, which I shall define as *ex ante* soft budget constraint. Consider a situation in which λ is small enough so that $f(x_0) = f(x_2) > f(x_1)$. This is the case when the government desires a tight control over the output. In this case, the firm over-produces relative to the profit maximizing level. The over-production can go so far that the expected profit is negative, that is,

$$\pi_0(x_2) = \pi_m(x_2) + (k-1)\pi_m(x_2) = k\pi_m(x_2) < 0.$$

Thus, the firm operates inefficiently and expects to lose profit. Also the firm gets a subsidy of t. This gives an appearance that the firm does not care about profit and still obtains subsidies. The model says that this is a natural outcome of the bargaining game in which the government has an excessive desire for the control of output. Boycko, Shleifer and Vishny(1993) uses this theory to explain the soft budget constraint. Here I define this as *ex ante soft budget constraint,* since there is another kind of soft budget constraint when the firm makes loss unexpectedly and I will define that as the *ex post* soft budget constraint. The following corollary sums up the discussion.

Corollary 1 *(Ex ante Soft Budget Constraint — Boycko, Shleifer and Vishny (1993)) There exists $\underline{\lambda} > 0$, such that when $\lambda < \underline{\lambda}$, the total expected profit is negative, that is,*

$$E(\pi) < 0.$$

In addition, $t > 0$.

Proof: (Trivial; Omitted.)

Case 2. Ex Ante Budgetary Transfer Is Impossible

This is the opposite of case 1. Now, the government faces a tight budget which does not allow any transfers. Without t, the Nash solution becomes:

$$MAX_{\{x_0\}} \ [\ E[\pi_R(x, x_0)] - F^* \ ]^\delta [\ \lambda E[\pi_G(x, x_0)] + (1-\lambda) f[x(x_0)] - G^* \ ]^{1-\delta};$$

$$s.t. \ \ x = argmax_{x \geq x_0} \ E[\pi_R(x, x_0)];$$

$$E[\pi_R(x, x_0)] = \ E[\beta(\pi_0 + \epsilon) \mid \epsilon > -\pi_0][1 - F_\epsilon(-\pi_0)] + E[\gamma(\pi_0 + \epsilon) \mid \epsilon \leq -\pi_0] F_\epsilon(-\pi_0);$$

$$E[\pi_G(x, x_0)] = \ E[(1-\beta)(\pi_0+\epsilon) \mid \epsilon > -\pi_0][1-F_\epsilon(-\pi_0)] + E[(1-\gamma)(\pi_0+\epsilon) \mid \epsilon \leq -\pi_0] F_\epsilon(-\pi_0).$$

Here the quota allocation x_0 plays the role of adjusting the payoffs of both parties so that what each gets depends on its relative bargaining power. Unlike the previous case, the equilibrium x_0 can take many values.

Proposition 3 *Without budgetary transfers, the equilibrium allocation* $x_0 \in [0, x_3]$, *where* $x_3(p, q, \lambda, k)$ *is at least as large as* $x_2(p, q, \lambda, k)$ *of proposition 2. Furthermore,* $\frac{\partial x_0}{\partial \lambda} \leq 0$; $\frac{\partial x_0}{\partial \delta} \leq 0$; $\frac{\partial x_0}{\partial F^*} \leq 0$; $\frac{\partial x_0}{\partial G^*} \geq 0$. *Finally, the sign of* $\frac{\partial x_0}{\partial k}$ *can go either way.*

Proof: See Appendix A3.

The basic message of proposition 2 is the same as that of proposition 1. This is, a major factor affecting the level of quota is government's preference between revenue and output. When the government cares more about output, quota level tends to be higher. An easy to understand conclusion is that the power of the firm, δ, affects the quota level negatively, since the firm prefers a low quota and the government in general likes a high quota. Also, the initial position before the bargaining is important. An initially well situated party should do well in the bargaining. The empirical tests in the next section will verify these predictions.

II.4. Further Discussions of the Model

The theoretical framework can be readily extended to discuss two other important aspects of the firm behavior. The implications from such extensions are interesting. The first issue is the investment decision or the demand for investment of the firm. The second is rent seeking.

Investment decision of the firm is absent in the model. Therefore, the presence of the soft budget constraint does not cause any inefficiency. However, with investment

considerations, such an efficiency outcome will disappear. As a matter of fact, the soft budget constraint is in essence an *ex ante* subsidy for investor and thus causes excessive demand for investment (Kornai, 1992; Li, 1993). In other words, firms' investment decisions, which are unlike static input/output decisions and has long-term consequences, are socially inefficient. Facing such a high demand for investment, the government is unlikely to allocate investment fund efficiently. This gives rise to one kind of dynamic inefficiencies across firms, since truly efficient firms may not get the needed capital.

Another implication of the model is that rent seeking can be very crucial to the firm. This may be a severe impediment to efficiency improvement in the firm. In a more general framework, assume that the production function is $y = Af(x)$, where A is an endogenous productivity factor. Suppose that in period 1, the manager does two things at the same time: studying the market and spending time and energy bargaining with the government. Suppose that the manager spends e_m of his time studying the market and $1 - e_m$ dealing with the government. e_m is expended in order to increase the productivity of the firm, i.e., $A = A(e_m)$. $1 - e_m$ is spent to increase the bargaining power of the firm: $\alpha = \alpha(1 - e_m)$. As Murphy, Shleifer, and Vishny (1993) has argued, rent seeking has a scale economy, while improving productive efficiency does not. Thus, it can be shown in the generalized model that in equilibrium, managers will spend a lot of time dealing with the bureaucrats instead of within the firm or in the market place. The end result is that the equilibrium productivity level A is low. Clearly, this is a rather socially undesirable situation.

To summarize, investment hunger with misallocation of capital and excessive rent seeking are implied by the model as two undesirable aspects of the Chinese enterprise reform. These are problems that can prevent the Chinese state enterprises from making effective long-run decisions, despite the fact that their short-run production decisions can be efficient as shown before. Therefore, the implication is that in the long run, there may be limits to the positive effects of the Chinese enterprise reform, although the measured productivity of the firms can be higher after the reform due to better static production decision.

III. Empirical Analyses

In the following empirical analyses, I will concentrate on the interaction between the government and the SOE, i.e., the negotiation of the quota and the bargaining for the soft budget constraint. I will examine the pattern of the allocation of quota and the impact of quota negotiation on the profit of the enterprise. Also, the magnitude of the soft budget constraint is estimated.

III.1. The Data

The data is from a so-called Enterprise Panel Survey (EPS) project, which aimed to evaluate the performance of China's enterprises, and hence that of the reform. The EPS was initiated in 1985 by the Chinese Economic System Reform Research Institute (CESRRI) in conjunction with some other economic research institutions in China. About 800 industrial enterprises were chosen and quarterly data was collected from each of the enterprises starting from the first quarter of 1986. The data available for the present research is limited to the first ten (10) quarters, namely, the first quarter of 1986 to the second quarter of 1988.[4] Only about 600 firms had their data recorded for all 10 quarters.

The sample selection of the original data set is not uniform. The majority of the firms included are large and medium state owned enterprises. In addition, the lack of a uniform reporting standard for some of the entries is very common. A prudent methodology is adopted in this research; that is, whenever unexplained violations of accounting identities occur, then firm's record is deleted. It is likely that the mistakes in reporting on the part of the enterprises are random, since most of them are purely arithmetical and do not seem to be intentionally manipulated. In the end, out of the 800 firm, about 500 are utilized for the statistical analyses in the following empirical analyses.

The dataset essentially covers three aspects of the firms' economic statistics. It has physical quantities of input/output for major (3 of them) products; various accounting

[4]The CESRRI was blamed for its involvement in the Tienanmen event in June 1989 and was subsequently dissolved. However, the EPS project survived.

Table 1: Distribution of Quota by the Type of Control

Year	Controlled by	Mean	St. Dev.
1986	Central Government	0.783	0.366
	Provincial Government	0.632	0.427
	Prefectural Government	0.462	0.427
	County Government	0.456	0.509
Year	**Controlled by**	**Mean**	**St. Dev.**
1987	Central Government	0.770	0.377
	Provincial Government	0.600	0.416
	Prefectural Government	0.442	0.430
	County Government	0.461	0.512
Year	**Controlled by**	**Mean**	**St. Dev.**
1988	Central Government	0.767	0.366
	Provincial Government	0.579	0.426
	Prefectural Government	0.417	0.428
	County Government	0.298	0.465

figures, including sales revenue, costs and different kinds of profit; asset values and different kinds of investment of the firm.

III.2 The Negotiation of Quotas

I will study two respects of the negotiation on quota in this sub-section, namely, the determination of quota and the effect of quota negotiation on the profit of the firm. As a first look, Table 1 to Table 3 give some descriptive statistics on the distribution of output quotas for various classifications of firms.

It is easy to discern some patterns of the quota allocation. Across the years, output quotas decreased. Firms controlled by higher branches of government tend to get higher quotas. Larger firms get higher quotas. Finally, Mining and raw material industry gets the highest quota while heavy manufacturing gets the lowest.

In order to analyze the allocation of quota on a more rigorous basis, a group of

Table 2: Distribution of Quota by Size

Year	Size	Mean	St. Dev.
1986	Large	0.605	0.411
	Medium	0.495	0.441
	Small	0.454	0.447
1987	Large	0.600	0.408
	Medium	0.474	0.442
	Small	0.433	0.439
1988	Large	0.574	0.418
	Medium	0.438	0.440
	Small	0.404	0.435

Table 3: Distribution Output Quota by Industry

Year	Industry	Mean	St. Dev.
1986	Mining & Raw Material	0.752	0.382
	Light Manufacturing	0.578	0.452
	Chemical Industry	0.565	0.408
	Heavy Manufacturing	0.434	0.422
1987	Mining & Raw Material	0.729	0.387
	Light Manufacturing	0.560	0.450
	Chemical Industry	0.587	0.414
	Heavy Manufacturing	0.402	0.410
1988	Mining & Raw Material	0.726	0.401
	Light Manufacturing	0.526	0.456
	Chemical Industry	0.546	0.416
	Heavy Manufacturing	0.383	0.411

censored regressions are carried out. The dependent variable Q is the output quota ratio (quota to total output) which lies between 0 and 1. In the dataset, there are sample dense points of value 0's and 1's for Q, since some firms either have no output quota or fully rely on the government for selling the output. Therefore, Q can be regarded as a censored dependent variable. Table 4 and 5 contain the regression results. Three regressions are carried out. Regression 1 includes the most complete set of regressors, while regression 2 and 3 drop many of the insignificant variable for the sake of multicollinearity. (there are strong correlations among types of firms)

The dummy variables are as following. Relation dummies, Gov1, Gov2, Gov3, indicate the control relationship of the firm — whether it is controlled by the central government, the provincial government, the prefecture government, respectively. (governments of lower levels are the default case). The trade dummies indicate: the mining and raw material processing industry (TRD1); light manufacturing industries (TRD2); chemical industries (TRD3); and heavy manufacturing industries. Large, medium and small firms are dummied respectively by SC1, SC2 and SC3. Unfortunately, in a lot of situations, these dummies are perfectly co-linear with other ones, especially the relationship dummies.[5] The enterprise responsibility system is dummied by Ref1, which means the firm signs a contract with the government; the director tenure target system is dummied by Ref2. The director tenure system is manager-specific and is generally loaded with higher incentive programs than the enterprise responsibility system.

The regression results are generally consistent with the theoretical predictions in the last section. A few findings are worthwhile discussing.

- *The Market/Plan Price Ratio* (P-ratio) The P-ratio commands an insignificant and small coefficient. This is not surprising at all, as the predictions on this from the two cases discussed in the theoretical part indicate certain ambiguity.

- *The Control Effect (who controls the firm)* Estimates on dummies *Gov1* to *Gov3* show that firms controlled by higher level governments have higher output quotas. This is consistent with the prediction. It is widely observed that relatively higher

[5] This means that adding in these additional dummies will not give additional explanatory power to the system. For instance, a firm with Gov1=1 almost guarantees that either SC1=1 or SC2=1, vice versa.

Table 4: Censored Regression Analysis of Output Quota

Regressor	Regression 1			Regression 2		
	Coefficient	t-ratio	Prob($t > x$)	Coefficient	t-ratio	Prob($t > x$)
One	-0.379	-1.313	0.189	-0.223	-2.652	0.008
Year86	0.166	2.499	0.0124	0.165	2.50	0.0125
Year87	0.121	1.835	0.0665	0.121	1.83	0.0667
P-ratio	-0.677E-3	-1.067	0.286	-0.682E-3	-1.077	0.281
Gov1	0.856	2.893	0.00381	0.691	6.684	0.000
Gov2	0.492	1.729	0.0839	0.323	4.747	0.000
Gov3	0.169	0.606	0.544			
Size1	0.408	5.176	0.000	0.410	5.242	0.000
Size2	0.161	2.161	0.0307	0.163	2.187	0.000
Trd1	0.933	6.517	0.000	0.927	6.497	0.000
Trd2	0.417	6.395	0.000	0.414	6.374	0.000
Trd3	0.398	5.537	0.000	0.398	5.545	0.000
Ref1	-0.190E-01	-0.301	0.763			
Ref2	-0.152	-1.461	0.144	-0.142	-1.505	0.132
	$n = 1790$	$z_{5\%} = 1.55$		$n = 1790$	$z_{5\%} = 1.55$	

Table 5: Censored Regression Analysis of Output Quota

Regressor	Regression 3			Regression 4		
	Coefficient	t-ratio	Prob($t > x$)	Coefficient	t-ratio	Prob($t > x$)
One	-0.380	-1.315	0.188	-0.221	-2.610	0.009
Year86	0.166	2.499	0.0125	0.166	2.50	0.0125
Year87	0.125	1.896	0.0580	0.125	1.896	0.0580
P-ratio						
Gov1	0.860	2.906	0.00366	0.690	6.678	0.000
Gov2	0.496	1.742	0.0814	0.322	4.738	0.000
Gov3	0.174	0.623	0.533			
Size1	0.403	5.115	0.000	0.404	5.182	0.000
Size2	0.156	2.086	0.0370	0.157	2.112	0.0347
Trd1	0.931	6.502	0.000	0.925	6.482	0.000
Trd2	0.417	6.400	0.000	0.415	6.377	0.000
Trd3	0.396	5.520	0.000	0.397	5.528	0.000
Ref1	-0.190E-1	-0.300	0.764			
Ref2	-0.148	-1.419	0.156	-0.137	-1.460	0.144
	$n = 1790$	$z_{5\%} = 1.55$	$n = 1790$	$z_{5\%} = 1.55$		

level governments have more political considerations and treasure more about controlling over cheap output, while lower level firms care more about fiscal revenue. There is plenty of anecdotal evidence on this.

- *The Size Effect* Similar to the control effect, the regressions domonstrate that larger firms tend to have higher quota. Part of the reason is that larger firms are usually controlled by higher level of governments.

- *The Industry Effect* The mining industry has the highest quota. This is because prices of their output influence all products and the government's controlling their output is the most important to curb inflation. To the contrary, having the lowest quota is the heavy industry (the default case), which faces a buyers' market due to many years of over-investment. Therefore, the government is not keen in controlling its output at all.

- *The Manager Contracting Effect* The coefficient on $Ref2$ says that when the firm is contracted out to the manager, its quota is low. I interpret this as the bargaining power effect. The fact that a manager is able to takeover a firm indicates the the manager is already in a good position to bargain with the bureaucrat. Thus, from the proposition 1 or 2, the quota is low.

Besides the determination of the quota, another very important issue is to estimate the magnitude of the rent at stake in the government/enterprise negotiation. The size of the rent directly determines how much effort the manager should devote to dealing with the government bureaucrat instead of enhancing efficiency internally. A natural measure of the impact of rent is obtained by comparing the rent with the firm's total gross (before tax) profit. That is, $\frac{R}{\pi_0}$. Recall that

$$\pi_0 = \pi_m + R.$$

Therefore the ratio $\frac{R}{\pi_0}$ measures the proportion of the firm's final profit generated by (or lost to) the government. Similarly, another measure is $\frac{R}{\pi_m}$ which catches the magnitude of the firm's rent relative to the firm's market profit.

As a first step, it is interesting to look at some descriptive statistics of $\frac{R}{\pi_0}$. Note that the rent R can be either positive or negative. Table 6 gives the mean and standard

Table 6: The Mean and Standard Deviation of the Rent/Profit Ratio $\mid \frac{R}{\pi_m+R} \mid$

Case Type (no. of cases)	Mean	St. Dev.	Max.
$R = 0$ (n=376)	0	0	0
$R \neq 0$(n=609)	1.665	4.335	46.374

deviation of $\mid \frac{R}{\pi_0} \mid$. The first thing to note is the sheer magnitude of the rent/profit ratio. From table 6, the average of the $\mid \frac{R}{\pi_m+R} \mid$ for firms with non-zero rents is 1.665. That is, the government's manipulation of quota generated rents which on average are much bigger than the final profit of the firm. Also, these rents are in general of the opposite sign of the market profit. In addition, note the large standard deviation 4.335, which indicates that there were large variations in the rent/profit ratio.

Table 7 takes another look at the magnitude of the rent by calculating the average rent/market-profit ratio $\mid \frac{R}{\pi_m} \mid$ and classifying it by by various categories of firms. $R > 0$ indicates rent earning firms; $R < 0$ the rent losers. A clear pattern emerges from table 7. That is, the government's manipulation of the quota actually amounts to equalizing the final profits. Specifically, rent-losing firms are almost all market-profit makers (only 3 out 241 cases — less than 1.5% — are not). On the other hand, most of the market-profit losers enjoy positive rent provided by the government (3 out of (97+3) cases — less than 3% — did not). A second observation from table 7 is the sheer magnitude of rent enjoyed by the profit losers, as measured by the ratio $\mid \frac{R}{\pi_m} \mid$. It implies how important the rent is for the rent-earners and thus how much effort the managers must have put in.

To summarize the findings on the size of the rent, it is fair to say that rent-seeking is very important for the Chinese SOE's after the reform. This is simply because in the bargaining with the government on the contract, a huge amount of rent is at stake for the enterprise.

In order to further study the distribution of the rent, I ran a group of regressions by treating the rent/total-profit ratio ($\frac{R}{\pi}$) as the dependent variable. The independent variables are the market/plan price ratio, output quota, and a group of dummy variables of the attributes of the firm. The regression results are listed in table 8. Regression 1

Table 7: The Mean and Standard Deviation of the Rent/Market-Profit Ratio $\mid \frac{R}{\pi_m} \mid$

R (no. of cases)	π_m (no. of cases)	Mean	St. Dev.
$R > 0$ (n=375)	$\pi_m > 0$ (n=278)	2.67	13.11
	$\pi_m \leq 0$ (n=97)	5.74	16.61
$R < 0$ (n=241)	$\pi_m > 0$ (n=238)	0.413	0.295
	$\pi_m \leq 0$ (n=3)	0.751	1.08

has the most complete regressors. Regression 2 and 3 take out the insignificant output quota, which is suspected to be highly collinear with the dummies, given the outcome of previous regressions. Regression 3 further drops several insignificant dummies from regression 2.

The regressions reveal a simple pattern: none of the regressors are significant, except for the 1986 dummy and the market/planed ratio (P-ratio). The implication is that various attributes of the firm are not predictive of the size of the rent the firm obtains. It suggests that the bargaining power of the firm, which determines the size of the rent, is not associated with the types of the firm. Rather, it is possible for managers of any types of firms to grab a large rent. In other words, the rent is seekable. As for the negative coefficient on P-ratio, it simply means that firms facing a high market/plan price ratio lose the most rent. The reason is that given the same quota, the larger the difference between the planned price and the market price, the firm loses more rent.

Overall, the findings on the quota negotiation can be summarized as follows. First, the allocation of the quota is generally consistent with a bargaining theory. This gives us more confidence on the assumption that government desires both profit and output.(As argued by Boycko, Shleifer and Vishny, 1993.) Second, the large size of the rent suggests that it is highly necessary for the manager to devote a great effort in dealing with bureaucrats. Finally, the rent is found to be independent of the enterprise type and this

Table 8: Regression Analysis of the Rent/Profit Ratio

	Regression 1		Regression2		Regression 3	
Regressor	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
One	3.948	3.696	3.912	3.699	3.899	3.832
Year86	-0.565	-2.374	-0.551	-2.372	-0.512	-2.534
Year87	-0.0880	-0.375	-0.0796	-0.346		
P-ratio	-2.289	-22.198	-2.290	-22.426	-2.288	-22.487
Quota	0.723E-7	1.624				
Gov1	-1.032	-0.935	-1.027	-0.939	-0.998	-0.931
Gov2	-0.975	-0.929	-0.975	-0.939	-0.954	-0.941
Gov3	-0.957	-0.929	-0.942	-0.922	-0.936	-0.941
Size1	0.115	0.411	0.104	0.381		
Size2	-0.280	-1.115	-0.261	-1.037	-0.321	-1.675
Trd1	0.0611	0.0935	0.0584	0.0903		
Trd2	-0.237	-1.017	-0.220	-0.972	-0.239	-1.094
Trd3	-0.237	-0.917	-0.186	-0.728	-0.187	-0.739
Ref1	0.274	1.204	0.292	1.309	0.325	1.654
Ref2	-0.0723	-0.207	-0.0730	-0.214		
$n = 984$	Adj.$R^2 = 0.342$	$t_{5\%} = 1.645$	Adj.$R^2 = 0.340$	$t_{5\%} = 1.645$	Adj.$R^2 = 0.342$	$t_{5\%} = 1.6$

suggests that the rent is open to managers of all enterprises.

III.3. Ex Post Bargaining — The Problem of the Soft budget Constraint

Ex Post bargaining is a situation where the enterprise bargains with the government for retained profit *after* the profit is realized. During the reform, typically, the firm signs a contract with the state regarding the profit sharing rule. However, such contracts are hardly expected to be binding, especially when the firm makes a negative total profit. In such cases, the firm can always expect to get a favorable treatment from the government. It is the so-called soft budget constraint.

The following analyses focus on the profit losers. A tricky issue is the profit figure, which has to be carefully calculated, since the accounting profit many times already includes government subsidies. The gross profit figure, which I will use, is recalculated by taking all production costs from the sales revenue. Not counted as a cost item are contributions to the firm's welfare funds, which is for extra-bonus and perks and therefore should be regarded as part of the retained profit.

According to the re-constructed gross profit, Table 9 lists the percentage of profit-losers among all firms for each year in the sample. Also listed are the percentage of profit losers according to the reported accounting profit. One obvious observation is that the reported account profit losing rate is much lower than the re-calculated rate. This is simply because a lot subsidies are already provided before the firm ever reports losing profit. A second observation is that even the re-calculated profit losing rate is consistently lower than 20%, while the widely accepted profit losing rate in China is 30%. Sample selection bias is the major reason for this. It is much easier to collect data from profit making firms than profit losing firms and therefore the sample definitely consists of disproportionately more profit making "good" firms.

Who are the profit losers? One useful classification is by dividing them into chronic losers and random losers. Chronic profit losers may be caused by distorting governmental policies and are not necessarily due to mis-management. They are corresponding to the *ex ante* soft budget constraint discussed in secton II. Random profit losers are either due to mis-management of the manager or just because of bad luck. Table 10 gives the proportion of firms that encountered negative profit for one year, two year, and three

Table 9: Sample Percentage of Profit Losers

Year	By Accounting Profit	By Reconstructed Profit
1986	4.02%	14.07%
1987	5.70%	13.57%
1988	9.21%	19.36%

Table 10: The Distribution of the Number of Years in Red

1 Year	2 Years	3 Years
55.07%	34.29%	9.64%

years from 1986 to 1988, respectively. The table reveals that distribution of years of losing profit is rather skewed towards the one year end. That means that most of the firms in the sample appears to be random profit losers. Of course, sample bias may have caused this pattern.

Who are the most likely profit losers? In other words, what are the characteristics of the profit losing firms? In order to answer these questions, a Probit analysis is provided in table 11. Each firm in each year is one observation point. 0 is assigned to profit makers and 1 is assigned to profit losers. The explanatory variables are the firm dummies as well as *Quota*, which is the output quota ratio (planned output to total output). The regression reveals several interesting patterns. *Quota* has a very significant and positive coefficient. This means that firms facing high quotas are likely to be in red. According to the model, a high quota means the government's desire for output is more or less imposed onto the firm and therefore a negative profit is not surprising at all. Similarly, the control dummies (*Gov*1, *Gov*2, and *Gov*3) essentially explains the same intuition. A surprise is that the size effect per se, as revealed by the size dummies, is negative. That is, given other things being equal, large firms are less likely to be in red. One possible explanation is that for these firms, many favorable treatments are already incorporated before the accounting profit is calculated, such as low interest loans. Finally, the regression shows that industry type matters. Firms in mining and

Table 11: Probit Analysis of Likelihood of Firms in Red

Regressor	Coefficient	t-ratio	$\frac{dP}{dx}$
One	-0.752	-2.374	-0.168
Year86	-0.218	-2.391	-0.0488
Year87	-0.231	-2.535	-0.0517
Quota	0.281	3.050	0.0629
Gov1	0.353	1.084	0.0789
Gov2	0.103	0.331	0.0231
Gov3	0.266	0.894	0.0596
Size1	-0.516	-4.862	-0.115
Size2	-0.311	-3.341	-0.0696
Trd1	0.480	2.974	0.107
Trd2	0.388	-4.215	-0.0868
Trd3	-0.323	-3.112	-0.0721
Ref1	-0.519E-02	-0.0571	-0.00116
Ref2	-0.187	-1.983	-0.0419
$n = 1747$	$\%Pred = 84$	$z_{5\%} = 1.55$	

raw material industry ($TRD1$) are most likely to be in red while firms in light industry ($TRD2$) or chemical industry ($TRD3$) are least likely to be in red. Explanations similar to those for the quota distribution apply here.

The next question is about the severity of the so-called soft budget constraint. The mere fact that in China no state owned firm is allowed to bankrupt is a proof of the existence of the soft budget constraint. However, further analysis is needed in order to measure the extent of the problem. One possible index of the softness of the budget constraint is the correlation between the firm's retained profit and the firm's total gross profit. Specifically, one can run the following regression across profit-losing firms of various years:

$$\pi_{Rit} = c_i + \beta\pi_{it} + \epsilon_{it},$$

where, π_{Rit} is the retained profit of the firm i in year t; π_{it} is the firm's gross profit and ϵ_{it} is the random error which is omitted by the model. Thus, the higher the β, the more accountable the firm is for its loses.

In measuring the accountability for financial loses, I find it useful to distinguish random profit losers from chronic ones. Table 12 gives the results from such analyses for firms that have run loses for less than two years from 1986 to 1988. Table 13 lists those for firms that have run loses for all three years.

Measured by the accountability for losses, the budget constraint is softer for the random profit losers than for the chronic ones. For the random losers, the average correlation between the retained profit and the gross profit is actually -10.9% (regression 2). That means the big one-time losers can expect to get more positive retained profit than the small one-time losers. A likely explanation is that with these random profit losers, the government has less accurate information as of the reason of the profit loss. Therefore the firm can always argue for the case that they have really tried very hard and the profit loss is due to bad luck. The big losers can even make a bigger case out of this than the small ones. This explanation is backed by the size effect in the regression ($Size1$ and $Size2$): medium size and to some extent large size firms faced softer budget constraint. Also, very interestingly, reform actually implies more subsidies (as indicated by the coefficients of $Ref1$ and $Ref2$). This is perhaps due to the fact that firms under special reform programs enjoy higher bargaining power than others.

As for the chronic losers, Table 13 reveals that their retained profit is in general independent of the negative profit — the correlation coeffient is statistically indistinguishable from 0. This result for the chronic losers is not surprising, since their losing profit is often due to exogenous reasons and in many times fully expected by all, as described by Corollary 1. In addition, Table 13 finds no particular type of firm enjoyed better treatment, except for firms undergoing special reform measures. Similar intuitions discussed in the random profit losing are applicable here.

Overall, the findings on the soft-budget constraint can be summarized that the soft budget constraint is still very prevalent after the reform. Profit losing is to a large extent an outcome of government intervention, such as imposing a high quota. Random profit losers enjoy better treatment from the government than the chronic one, partly due to

Table 12: Measuring Budget Softness For Random Profit Losers

Regressor	Regression 1 Coefficient	t-ratio	Regression 2 Coefficient	t-ratio
One	87.180	0.334	-52.865	-0.412
Year86	25.521	0.590	70.275	1.781
Year87	13.690	0.151	95.893	2.387
Gov1	78.538	0.283	108.012	0.734
Gov2	-77.863	-0.298	141.109	1.101
Gov3	-32.374	-0.206	1.930	0.0161
Size1	112.209	1.894	116.838	2.229
Size2	-18.706	-0.473	32.193	0.824
Trd1	-32.374	-0.251	-101.278	-1.122
Trd2	-2.329	0.0573	-48.522	-1.238
Trd3	-23.061	0.4660	3.816	0.0809
Ref1	-14.537	-0.333	15.983	0.391
Ref2	0.820	0.0194	53.858	1.320
π	0.432	0.537	-0.109	-5.115
$\pi * Year86$	-0.167	-2.032		
$\pi * Year87$	-0.223	-3.307		
$\pi * Gov1$	-0.0268	-0.033		
$\pi * Gov2$	-0.464	-0.572		
$\pi * Gov3$	-0.0550	-0.0683		
$\pi * Size1$	-0.204	-1.708		
$\pi * Size2$	-0.363	-3.576		
$\pi * Trd1$	0.171	0.0152		
$\pi * Trd2$	0.109	1.931		
$\pi * Trd3$	0.0745	0.978		
$\pi * Ref1$	-0.0702	-1.220		
$\pi * Ref2$	-0.232	-3.459		
	Adj.R^2=0.420	$t_{5\%}(172) = 1.645$	Adj.R^2=0.262	$t_{5\%}(184) = 1.645$

Table 13: Measuring Budget Softness For Chronic Profit Losers

Regressor	Regression 1 Coefficient	t-ratio	Regression 2 Coefficiet	t-ratio
One	-12.546	-0.212	-23.292	-0.425
Year86	1.011	0.0225	42.647	1.035
Year87	32.096	0.715	51.691	1.260
Gov1	51.949	0.506	-19.606	-0.295
Gov2	-39.241	-0.345	-85.558	-1.014
Gov3				
Size1	85.306	1.416	165.422	3.223
Size2	57.637	0.805	57.063	0.995
Trd1	20.758	0.252	15.355	0.235
Trd2	40.117	0.401	8.059	0.103
Trd3	21.992	0.219	-27.930	-0.436
Ref1	-43.109	-0.866	-9.556	-0.233
Ref2	75.641	0.996	48.130	0.794
π	0.0731	0.709	0.4409E-2	0.420
$\pi * Year86$	-0.0438	-1.457		
$\pi * Year87$	-0.0499	-1.64		
$\pi * Gov1$	-0.129	-0.362		
$\pi * Gov2$	0.115	-0.317		
$\pi * Gov3$				
$\pi * Size1$	-0.0936	-0.988		
$\pi * Size2$	-0.948E-3	-0.783E-2		
$\pi * Trd1$	-0.0731	-0.202		
$\pi * Trd2$	0.232	0.308		
$\pi * Trd3$	0.0613	0.172		
$\pi * Ref1$	-0.115	-1.827		
$\pi * Ref2$	0.912E-2	0.127		
	Adj.R^2=0.463	$t_{5\%}(56) = 1.676$	Adj.R^2=0.224	$t_{5\%}(67) = 1.671$

their informational advantage. (As illustrated by Dewatripont and Maskin, 1990.)

IV. Conclusions

The paper examines the response of the Chinese state owned enterprises with special attention to the interactions between the government and the enterprise. The purpose is to offer an evaluation of the Chinese gradualist approach to enterprise reform, which has attracted a great amount of attention and is sometimes touted as an alternative to privatization.

The study reaches three general conclusions. First, rent seeking, which takes the form of the firm's bargaining with the government over production quotas, accounts for a large portion of the firm's profit. During the process, the government takes the opportunity to impose its own objective onto the enterprise. This implies that firm managers have to divert a large proportion of their energy dealing with the bureaucrats instead of improving the firm's productive efficiency. Second, despite the soft budget constraint, Chinese firms have strong incentives to maximize profit when making static production decisions after the contract is negotiated. This is a desirable effect of the reform and perhaps accounted for the documented productivity improvement. Third, the problem of the soft budget constraint, in the forms of subsidizing both chronic and random (occasional) profit losers, is still prevalent and is not mitigated after the reform. This implies that the investment decision of the firm is still severely distorted.

The overall implication of the conclusions is clear. The remaining problems with the Chinese SOE's are excessive rent seeking and the soft budget constraint. These are mere symptoms instead of the cause. The cause is deeply rooted in the nature of the entangled relationship between the government and the enterprise. The reform is incomplete in re-defining the government-enterprise relation. In order to completely resolve these problems, some types of substantial reform which amounts to re-defining the government-enterprise relations and building a new corporate governance structure

seem to be unavoidable.

APPENDIX

A1. Proof of Proposition 1

The objective function of the firm is the expected retained profit:

$$\begin{aligned} E(\pi_R) = \; & E[\beta(\pi_0+\epsilon) \mid \epsilon > -\pi_0][1 - F_\epsilon(-\pi_0)] + E[\gamma(\pi_0+\epsilon) \mid \epsilon \leq -\pi_0]F_\epsilon(-\pi_0) \\ & = \int_{-\pi_0}^{\infty} \beta(\pi_0+s)f_\epsilon(s)ds + \int_{-\infty}^{-\pi_0} \gamma(\pi_0+s)f_\epsilon(s)ds. \end{aligned}$$

Thus,

$$\begin{aligned} \frac{dE(\pi_R)}{d\pi_0} & = \int_{-\pi_0}^{\infty} \beta f_\epsilon(s)ds + \int_{-\infty}^{-\pi_0} \gamma f_\epsilon(s)ds + \beta(\pi_0-\pi_0)f_\epsilon(-\pi_0) + \gamma(\pi_0-\pi_0)f_\epsilon(-\pi_0) \\ & = \int_{-\pi_0}^{\infty} \beta f_\epsilon(s)ds + \int_{-\infty}^{-\pi_0} \gamma f_\epsilon(s)ds > 0. \end{aligned}$$

Therefore, maximizing $E(\pi_R)$ is equivalent to maximizing π_0. Consequently, it is easy to check that $(\hat{x}, \hat{y})$ maximizes π_0.

A2. Proof of Proposition 2

A2.1. Step 1

Let's show that the optimal allocation x_0 must maximize

$$\lambda E[\pi(x_0)] + (1-\lambda)f(x(x_0)).$$

Suppose not. There exists x' such that

$$\lambda E[\pi(x')] + (1-\lambda)f(x(x')) > \lambda E[\pi(x_0)] + (1-\lambda f(x(x_0)).$$

Let the old transfer which goes with x_0 be t_0. Define t', such that

$$E[\pi_R(x')] + t' = E[\pi_R(x_0)] + t_0,$$

i.e., the firm is indifferent between the package x', t' and x_0, t_0. Let's calculate the new payoff to the government:

$$\lambda[E[\pi_G(x')] - t'] + (1-\lambda)f(x(x')) = \lambda[E(\pi(x')] - E(\pi_R(x') - t'] + (1-\lambda)f(x(x'))$$

$$= \lambda[E(\pi(x')]+(1-\lambda)f(x(x'))-\lambda[E[\pi_R(x')]+t'] > \lambda[E(\pi(x_0)]+(1-\lambda)f(x(x_0))-\lambda[E[\pi_R(x_0)]+t']$$

$$= \lambda[E(\pi(x_0)] + (1-\lambda)f(x(x_0)) - \lambda[E[\pi_R(x_0)] + t_0] = \lambda[E(\pi_G(x_0) - t_0] + (1-\lambda)f(x(x_0)).$$

Therefore, the package x', t' is also superior to x_0, t_0 for the government. This is a contradiction to the assumption.

A2.2. Step 2

I will show that there are only two possible optimal x_0 which maximize $\lambda E[\pi(x_0)] + (1-\lambda)f(x(x_0))$. Define $W(x_0) = \lambda E[\pi(x_0)] + (1-\lambda)f(x(x_0))$. Notice that

$$W'(x_0) = \lambda E'[\pi(x_0)] + (1-\lambda)f'(x(x_0)) = \lambda\pi_0'(x_0) + (1-\lambda)f'(x(x_0)).$$

There are two cases: $x_0 < x_1$ and $x_0 \geq x_1$, where x_1 is defined in Proposition 1, which says that in the first case $x(x_0) = x_1$ and $\pi_0 = \pi_m(x_1) + (k-1)\pi_m(x_0)$. Thus, in the first case,

$$W'(x_0) = \lambda(k-1)\pi_m'(x_0) < 0$$

since $k < 1$ by assumption. In this case, the optimal x_0 is 0.

In the second case, $x(x_0) = x_0$ and $\pi_0 = \pi_m(x_0) + (k-1)\pi_m(x_0) = k\pi_m(x_1)$. Thus,

$$W'(x_0) = \lambda k\pi_m'(x_0) + (1-\lambda)f'(x_0).$$

Notice that by the definition of x_1, the first term is negative. The second term is always positive. The second order derivative is

$$W''(x_0) = \lambda kqf''(x_0) + (1-\lambda)f''(x_0) < 0$$

according to the general assumption on $f(.)$. Thus, an optimal will be achieved by a point of $x_0 > x_1$. Define this to be x_2.

In order to determine which of the two 0 and x_2 is optimal, we have

$$W(0) = \lambda\pi_m(x_1),$$

since when $x_0 < x_1$, the firm chooses x_1; and

$$W(x_2) = \lambda k\pi_m(x_2) + (1-\lambda)f(x_2).$$

Comparing these two expressions while noticing that $\pi_m(x_1) > \pi_m(x_2)$ and $0 < f(x_2)$, it is hard to decide which is better *a priori*. Thus, the statements in propositions are verified.

A2.3. Step 3

To show that the equilibrium x_0 is non-increasing in λ, it is enough to show that $\frac{\partial^2 W(x_0)}{\partial x_0 \partial\lambda} \leq 0$. This is easy to see, since

$$\frac{\partial^2 W(x_0)}{\partial x_0 \partial\lambda} = k\pi_m'(x_0) + -f'(x_0) < 0,$$

when $x_0 \geq x_1$, and

$$\frac{\partial^2 W(x_0)}{\partial x_0 \partial\lambda} = k\pi_m'(x_0) > 0,$$

when $x_0 < x_1$.

Similarly, to show that x_2 is non-increasing in k, one can check that $\frac{\partial^2 W(x_0)}{\partial x_0 \partial k} \leq 0$, when $x_0 > x_1$. In this case, we have

$$\frac{\partial^2 W(x_0)}{\partial x_0 \partial k} = \lambda\pi_m'(x_0) < 0.$$

A3. Proof of Proposition 3

First of all, x_3 has to be defined. Consider the case $\delta = 0$. As will be shown in A3.1, x_0 in this case is the largest. The solution of x_0 now maximizes

$$G = \lambda E(\pi_G) + (1-\lambda)f(x).$$

It can be easily checked that $G''(x_0) < 0$ if $x_0 > x_1$. x_3 is defined as the solution to the first order condition

$$\lambda E_{x_0}'(\pi_G) + (1-\lambda)f_{x_0}'(x) = 0.$$

In order to show that $x_3 \geq x_2$, by the definition of x_2 in A2, it suffices to show that $| E'(\pi_G) | < | E'(\pi) | = | \pi_0' |$, since $f'(x_0)$ decreases with x_0. This is can be easily verified, as

$$| E'(\pi_G) | = [\int_{-\pi_0}^{+\infty} (1-\beta)f_\epsilon(s)ds + \int_{-\infty}^{-\pi_0} (1-\gamma)f_\epsilon(s)ds] \, | \pi'(x_0) | < | \pi'(x_0) | .$$

A3.1. $\frac{\partial x_0}{\partial\delta} \geq 0$

Since everything is differentiable, a discrete case suffices here. Take $0 \leq \delta_1, \delta_2 \leq 1$, and suppose that $\delta_1 \leq \delta_2$. Let F_1 and G_1 be the payoff to the firm and the government associated with δ_1, respectively. Let F_2 and G_2 be those associated with δ_2. Since (F_i, G_i) is the argument which maximizes $(F - F^*)^{\delta_i}(G - G^*)^{1-\delta_i}$ ($i = 1$ or 2), it must be that neither one Pareto dominates the other.

Suppose that $F_1 > F_2$ and $G_1 < G_2$. I will show that this is impossible. From the optimization condition, we have

$$(F_1 - F^*)^{\delta_1}(G_1 - G^*)^{1-\delta_1} \geq (F_2 - F^*)^{\delta_1}(G_2 - G^*)^{1-\delta_1} \tag{a1}$$

and

$$(F_1 - F^*)^{\delta_2}(G_1 - G^*)^{1-\delta_2} \leq (F_2 - F^*)^{\delta_2}(G_2 - G^*)^{1-\delta_2}. \tag{a2}$$

(a1) can be re-written as

$$(\frac{F_1 - F^*}{F_2 - F^*})^{\delta_1}(\frac{G_1 - G^*}{G_2 - G^*})^{1-\delta_1} \geq 1 \tag{a3}$$

and (a2) becomes

$$(\frac{F_1 - F^*}{F_2 - F^*})^{\delta_2}(\frac{G_1 - G^*}{G_2 - G^*})^{1-\delta_2} \leq 1. \tag{a4}$$

Combining (a3) with (a4) gives:

$$(\frac{F_1 - F^*}{F_2 - F^*})^{\delta_1-\delta_2}(\frac{G_1 - G^*}{G_2 - G^*})^{\delta_2-\delta_1} \geq 1. \tag{a5}$$

Since $\delta_2 > \delta_1$, (a5) implies that

$$\frac{F_1 - F^*}{F_2 - F^*} \le \frac{G_1 - G^*}{G_2 - G^*},$$

which directly contracts the assumption that $F_1 > F_2$ and $G_1 < G_2$. Thus, the only possibility is that $F_1 < F_2$ and $G_1 > G_2$.

We thus proved that $\frac{\partial F}{\partial \delta} \ge 0$. In order to prove that $\frac{\partial x_0}{\partial \delta} \ge 0$, we only need to show that $\frac{\partial F}{\partial x_0} \le 0$, which is easily verified in the following. Notice that

$$\frac{\partial F}{\partial x_0} = \frac{\partial E(\pi_R)}{\partial x_0} = \frac{dE(\pi_R)}{d\pi_0}\frac{\partial \pi_0}{\partial x_0}.$$

From appendix A1, we know that $\frac{dE(\pi_R)}{d\pi_0} \ge 0$. As for $\frac{d\pi_0}{dx_0}$, it is

$$(k-1)\pi_m'(x_0) < 0$$

when $x_0 < x_1$; or

$$k\pi_m'(x_0) < 0$$

when $x_0 > x_1$. Therefore, $\frac{\partial F}{\partial x_0} \le 0$.

One corollary of this proof comes handy in later proofs. The first order condition for x_0 is:

$$\frac{\delta}{E(\pi_R) - F^*}E'(\pi_R)_{x_0} + \frac{1-\delta}{\lambda E(\pi_G) + (1-\lambda)f(x) - G^*}[\lambda E'(\pi_G)_{x_0} + (1-\lambda)f_{x_0}'(x)] = 0. \quad (a6)$$

Define the left-hand-side as FOC, then take derivative on both sides of (a6) with respect to δ, we have:

$$\frac{\partial FOC}{\partial \delta} + \frac{\partial FOC}{\partial x_0}\frac{\partial x_0}{\partial \delta} = 0$$

or

$$\frac{E'(\pi_R)_{x_0}}{E(\pi_R) - F^*} - \frac{\lambda E'(\pi_G)_{x_0} + (1-\lambda)f_{x_0}'(x)}{\lambda E(\pi_G) + (1-\lambda)f(x) - G^*} + \frac{\partial FOC}{\partial x_0}\frac{\partial x_0}{\partial \delta} = 0. \quad (a7)$$

Notice that $E'(\pi_R)_{x_0} < 0$ and therefore from the first order condition (a6)

$$\lambda E'(\pi_G)_{x_0} + (1-\lambda)f'(x_0) > 0.$$

Combined with (a7) and the fact that $\frac{\partial x_0}{\partial \delta} \le 0$, the above implies that

$$\frac{\partial FOC}{\partial x_0} < 0. \quad (a8)$$

This inequality will be used time and again in later proofs.

A3.2 $\frac{\partial x_0}{\partial \lambda} \ge 0$

By the first order condition (a6), taking derivative on both sides with respect to λ, we have

$$\frac{1-\delta}{(G(x_0) - G^*)^2}\{[E'(\pi_G)_{x_0} - f_{x_0}'(x)](G(x_0) - G^*) - [\lambda E'(\pi_G)_{x_0} + (1-\lambda)f_{x_0}'(x)][E(\pi_G) - f(x)]\}$$
$$+\frac{\partial FOC}{\partial x_0}\frac{\partial x_0}{\partial \lambda} = 0. \quad (a9)$$

From the proof in A3.1, we know that $\frac{\partial FOC}{\partial x_0} < 0$. We only need to prove the numerator of the first term in the above expression is negative. We know from A3.1 that $\lambda E'(\pi_G) + (1-\lambda)f_{x_0}'(x) > 0$. Also, $E'(\pi_G)_{x_0} = E'(\pi_G)_{\pi_0}\pi_{0x_0}' < 0$. Therefore, In the case that $E(\pi_G) \ge f(x)$, we can conclude that $\frac{\partial x_0}{\partial \lambda} \ge 0$.

In the case that $E(\pi_G) < f(x)$, which implies that $f(x) \ge G^*$ (otherwise $\lambda E(\pi_G) + (1-\lambda)f(x) \le G^*$). Let's concentrate on the numerator of the first term of (a9). Its derivative with respect to x_0 is:

$$[E''(\pi_G) - f_{x_0}''(x)][\lambda E(\pi_G) + (1-\lambda)f(x) - G^*] + (E'(\pi_G) - f_{x_0}'(x))[\lambda E'(\pi_G) + (1-\lambda)f_{x_0}'(x)]$$
$$-[E'(\pi_G) - f_{x_0}'(x)][\lambda E'(\pi_G) + (1-\lambda)f_{x_0}'(x)] - [E(\pi_G) - f(x)][\lambda E''(\pi_G) + (1-\lambda)f_{x_0}''(x)]$$
$$= [E''(\pi_G) - f_{x_0}''(x)][\lambda E(\pi_G) + (1-\lambda)f(x) - G^*] - [E(\pi_G) - f(x)][\lambda E''(\pi_G) + (1-\lambda)f_{x_0}''(x)]$$
$$= [f(x) - G^*]E''(\pi_G) - [E(\pi_G) - G^*]f_{x_0}''(x) \le [f(x) - G^*]E''(\pi_G) - [f(x) - G^*]f_{x_0}''(x)$$
$$= [f(x) - G^*][E''(\pi_G) - f_{x_0}''(x)] < 0.$$

Thus, the numerator decreases with x_0. The numerator is negative when $E(\pi_G) \ge f(x)$ and therefore, it must be also be negative when $E(\pi_G) < f(x)$ since in the later case x_0 is bigger.

Thus, the desired result is proved in all cases.

A3.3. The Sign of $\frac{\partial x_0}{\partial k}$

The partial derivative of FOC with respect to k is:

$$\frac{\partial FOC}{\partial k} = \frac{\delta}{[E(\pi_R) - F^*]^2}\{E''(\pi_R)_{x_0k}[E(\pi_R) - F^*] - E'(\pi_R)_{x_0}E'(\pi_R)_k]\}$$
$$+\frac{1-\delta}{[\lambda E(\pi_G) + (1-\lambda)f(x) - G^*]^2}\{\lambda E''(\pi_G)_{x_0k}[\lambda E(\pi_G) + (1-\lambda)f(x) - G^*] -$$
$$[\lambda E'(\pi_G)_{x_0} + (1-\lambda)f_{x_0}'(x)][\lambda E'(\pi_G)_k]\ \}. \quad (a9)$$

It is easy to show that

$$E''(\pi_R)_{x_0k} = [\int_{-\pi_0}^{+\infty}\beta f_\epsilon(s)ds + \int_{-\infty}^{-\pi_0}\gamma f_\epsilon(s)ds]\ \pi_m'(x_0);$$

$$E''(\pi_G)_{x_0k} = [\int_{-\pi_0}^{+\infty}(1-\beta)f_\epsilon(s)ds + \int_{-\infty}^{-\pi_0}(1-\gamma)f_\epsilon(s)ds]\ \pi_m'(x_0);$$

$$E'(\pi_R)_k = [\int_{-\pi_0}^{+\infty}\beta f_\epsilon(s)ds + \int_{-\infty}^{-\pi_0}\gamma f_\epsilon(s)ds]\ \pi_m(x_0);$$

and

$$E'(\pi_G)_k = [\int_{-\pi_0}^{+\infty}(1-\beta)f_\epsilon(s)ds + \int_{-\infty}^{-\pi_0}(1-\gamma)f_\epsilon(s)ds]\ \pi_m(x_0).$$

Meanwhile, by using the first order condition(a6), equation (a9) can be re-orgainized into the following:

$$\frac{\partial FOC}{\partial k} = \frac{\delta}{E(\pi_R) - F^*}E''(\pi_R)_{x_0k} + \frac{\lambda(1-\delta)}{\lambda E(\pi_G) + (1-\lambda)f(x) - G^*}E''(\pi_G)_{x_0k}$$

$$-\frac{\delta}{E(\pi_R)-F^*}E'(\pi_R)_{x_0}\{\frac{E'(\pi_R)_k}{E(\pi_R)-F^*}-\frac{\lambda E'(\pi_G)_k}{\lambda E(\pi_G)+(1-\lambda)f(x)-G^*}\}. \qquad (a10)$$

Plugging the expressions of the partial derivatives with respect to k into (a10), we have

$$\frac{\partial FOC}{\partial k}=\{\ \frac{\delta}{E(\pi_R)-F^*}[\int_{-\pi_0}^{+\infty}\beta f_\epsilon(s)ds+\int_{-\infty}^{-\pi_0}\gamma f_\epsilon(s)ds]$$

$$+\frac{\lambda(1-\delta)}{\lambda E(\pi_G)+(1-\lambda)f(x)-G^*}[\int_{-\pi_0}^{+\infty}(1-\beta)f_\epsilon(s)ds+\int_{-\infty}^{-\pi_0}(1-\gamma)f_\epsilon(s)ds]\ \}\pi'_m(x_0)$$

$$-\frac{\delta}{E(\pi_R)-F^*}E'(\pi_R)_{x_0}\{\ \frac{\int_{-\pi_0}^{+\infty}\beta f_\epsilon(s)ds+\int_{-\infty}^{-\pi_0}\gamma f_\epsilon(s)ds}{E(\pi_R)-F^*}$$

$$-\lambda\frac{\int_{-\pi_0}^{+\infty}(1-\beta)f_\epsilon(s)ds+\int_{-\infty}^{-\pi_0}(1-\gamma)f_\epsilon(s)ds}{\lambda E(\pi_G)+(1-\lambda)f(x)-G^*}\ \}\ \pi_m(x_0).$$

When λ is close to 0, the second large term is positive ($E'(\pi_R)_{x_0}<0$); furthermore when $x_0 \leq x_1$, $\pi'_m \geq 0$. In other situations, it is possible that $\frac{\partial FOC}{\partial k}<0$.

A3.4 $\frac{\partial x_0}{\partial F^*}\leq 0$ **and** $\frac{\partial x_0}{\partial G^*}\geq 0$

It suffices to check that $\frac{\partial FOC}{\partial F^*}\leq 0$. It is

$$\frac{\partial FOC}{\partial F^*}=\frac{\delta}{[E(\pi_R)-F^*)]^2}E'(\pi_R)_{x_0}$$

which is obviously non-positive. The similar exercise can be done with G^*.

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