

CORRUPTION: ITS ROLE IN PUBLIC OWNERSHIP AND TRANSITIONAL ECONOMIES ¹

Yan Yu
Department of Economics
Hong Kong University of Science & Technology
Clear Water Bay
Kowloon Hong Kong
yanyu@ust.hk
(852)23587627(O)
(852)23582084(FAX)

last version March 1998
This version February, 2000

Using a game theoretical model, this paper introduces the factor of corruption into the comparison of public ownership and private ownership. I show that in a transitional economy corruption makes public ownership inferior to private ownership. The emergence of market and private ownership facilitates corruption and the existence of this corruption justifies privatization. Additionally, corruption affects the timing of privatization. Because of public officials' vested interest in bribery income, under a stable government, privatization is not carried out immediately. This paper explores the reasons for the autonomy of State-Owned Enterprises and the establishment of State-Share-Holding companies before massive privatization in China. This model provides a logical explanation for the reform path of SOEs in China.

¹I am grateful to Hervé Moulin for enormous help and encouragement. I would like to thank Lin Zhou and Wei Li for helpful comments and suggestions. All errors are mine.

1 Introduction

In the 1990's, the former socialist countries began to carry out large-scale privatization. Privatization is still taking place. In the midst of this wave of privatization, corruption spread, especially in some transitional economies. In China, anti-corruption was the theme during the 1989 student protest and this spawned a large anti-corruption campaign during the early 90's. Is corruption a catalyst for privatization? Does corruption in public ownership justify privatization? Does corruption have any effect on the selection of methods for privatization?

Current literature on the incentives for privatization has provided a comprehensive comparison between public ownership and private ownership under regulation. It is a well-observed fact that corruption is much more prominent under public ownership than under private ownership. However, there have been very few attempts to bring the factor of corruption into the comparison of different ownership regimes. Adding the factor of corruption to the cost-benefit analysis of public ownership is the major purpose of this paper.

The first two sections of this paper are an introduction and a literature review. Section 5 concludes the paper and summarizes its results. The main body of the paper has two parts. First, Section 3 explicitly models the causes and consequences of corruption between bureaucrats (public officials) and the managers of state-owned enterprises. Although corruption includes a variety of activities,¹ I focus on collusion of a public official (principal) and a manager (agent) of a SOE through bribery and abuse of control rights. Next, Section 4 examines the model in transitional economies. My model shows that due to the complexity of transitional economies, corruption erodes away any possible benefit from public ownership. At the same time, corruption provides bureaucrats with bribery income, which will be removed if SOEs are privatized. This redistribution effect has postponed privatization. Section 4 also provides explanations for the autonomy of public enterprises and the establishment of state-share-holding companies as part of China's economic reform.

¹see Gong[1994] for a recent classification of corruption activities.

2 Related Literature

Vickers and Yarrow [1991] proposes several factors through which privatization affects the efficiency of an enterprise. Those factors include owner's objectives, government intervention, monitoring managers, and competition. Summarized in Vickers and Yarrow[1991], the existing empirical evidence provides weak support for the hypothesis that public enterprise performs less efficiently than private enterprise.

Laffont and Tirole [1994] provides a collection of conventional wisdom on the benefits and costs of public versus private ownership. "Absence of capital market monitoring", "soft budget constraint", "expropriation of investments", "lack of precise objectives", and "lobby" are at the cost side of public ownership. "Maximizing social welfare" and "centralized control" stand for the benefits of public ownership. They formalized two insights. (1) The manager of a public firm invests less (no investment at all) in non-contractible investment, because government may divert the investment for social goals. (2) A regulated private firm suffers from the conflict of interests between shareholders and regulators.

Shapiro and Willig [1990] focuses on informational and incentive differences between public and private enterprises. Under public ownership there is no agency problem between the public official and the public manager; whereas under private ownership there are conflicts between the objectives of the regulator and those of the private manager. Information on profitability is available only to owners and managers (the insiders). Under public ownership, as an insider, the regulator can eliminate the manager's informational rent and choose socially optimal actions. The cost side of public ownership comes from the public official's private agenda. Therefore sometimes it is preferable to hamper the public official with informational limitations.

Schmidt [1996] takes an incomplete-contract approach. The manager chooses a cost-saving effort level in period 1; the owner makes output decisions in period 2. The manager's utility increases with output. Under public ownership, the manager has a smaller cost-saving incentive, since the manager knows that even when cost is high, the regulator will choose a corresponding optimal output level (high cost will be forgiven). After privatization, the regulator can successfully threaten to cut back the subsidy if cost is high, enforcing a lower

output level.² Therefore privatization gives the manager greater cost-saving incentives. The benefit of public ownership lies in the socially optimal output level. Soft budget constraint is the cost of public ownership.

Current literature on the costs and benefits of public ownership has taken an optimal-contract approach and an incomplete-contract approach. All models assume inside information (which only owners and managers have) and the different objectives of a public owner and a private owner. Under public ownership, the regulator who as an owner has inside information. However, the manager knows that in the later stage the regulator will choose a socially optimal action that does not maximize his utility. Because of incomplete-contract, the manager lacks incentive to take efficient action in the initial stage (see Laffont and Tirole[1994] and Schmidt[1996]). That is the cost of public ownership. Under private ownership, the regulator does not have inside information. Even though the regulator can design an optimal contract, he cannot eliminate the manager's informational rent, and therefore cannot enforce a socially optimal action in the later stage. On the other hand, under private ownership, a manager has a greater incentive to take efficient action in the initial stage. In this paper, I adopt the incomplete-contract approach and model the trade-off between public and private ownership in the presence of corruption.

Current literature assumes that the public official and manager make decisions independently. It has ignored the implications of corruption and bargaining between the public official and the state-owned enterprises. My model differs from the literature in that it takes into account the bargaining between the public official and the manager. The public official is not benevolent in my model. Hence corruption may lead to the inferiority of regulating firms through ownership control rights.

This paper is also related to the literature on corruption, networking and influence activity. The literature on collusion in hierarchical agency takes the approach of asymmetric information. The principal hires an auditor to bridge the informational gap between him and the agent. A dishonest auditor may collude with the agent and extract the informational rent. Kofman and Lawarree [1996] shows that it may be optimal to allow collusion. The literature on corruption and rent-seeking activity has shown that though corruption has

²The optimal subsidy scheme under incomplete information distorts production below the socially efficient level if cost is high.

some detrimental effects and is bad for development, it also can be efficiency-improving.³ In my model, the direct collusion between the principal (public official) and the agent (manager of a SOE) reduces the degree of non-contractility. Therefore, in some cases, collusion may be welfare-improving. The literature has studied corruption from a variety of perspectives.⁴ My paper studies corruption in a new perspective: in the comparison of public and private ownership.

3 Corruption in Public Ownership

3.1 The Model

In this model, under public ownership, there are two players: a public official as the principal and a manager of the public firm as the agent. First, the agent decides his effort level that determines productivity. Then the principal chooses how to realize this productivity by dividing the total benefit into the firm's profit and its positive externality. Before the agent invests in research, the principal cannot credibly promise the agent a certain level of profit at the later stage. At the later stage when the principal decides how to divide benefit, the agent can get more profit by making an under-table transfer to the principal. Under private ownership, the public official plays no role and the manager of the firm makes decisions in both stages.⁵ Put formally:

Players

P: the public official who exercises ownership control rights of a state-owned enterprise.

A: the manager of a state-owned enterprise.

Production Technology:

The benefit of a SOE is two dimensional: (S, Π) . Π is profit of the firm. S is total benefit minus the profit of the firm. It includes consumer surplus, spillover effects on regional development, environmental damage, and employment provided by the SOE. S captures every effect that the operating of a SOE has on the society besides the firm's profit.

³See: Lui[1985], [1996], Tullock [1996], Shleifer and Vishny [1993],

⁴Laffont and Martimort [1997] and Bac [1996] focused on the optimal organizational structure in deterring corruption. Bhattacharya, Basu, and Mishra [1992] provided a recursive model of corruption. Manion [1996] provided a model of bribery in Chinese enterprise licensing.

⁵In fact, the shareholders have the decision right on the measures of realizing its productivity. In my model, there is no difference in objectives between shareholders and manager. Both maximize firm's profit.

The production technology consists of two steps:

1. research technology:

$W = (1 + e)a$, where a is a random variable with c.d.f. $G(a)$. $E(a) = 1, E(a^2) = \sigma^2$.

e is the agent's effort on research activity. $e \in [0, 1]$. W is the upper bound of potential benefit. W is a measure of productivity.

Let $C_A(e)$ denote the agent's private costs. $C'_A > 0, C''_A > 0$.

2. production strategies: First, I define two extreme production strategies:

- (S0): $(S, \Pi) = (W, 0)$
- (S1): $(S, \Pi) = (0, \rho W)$, where $\rho \in (0, 1)$.

Define $(S\beta) : (S, \Pi) = (1 - \beta)(S0) + \beta(S1)$, where $\beta \in [0, 1]$.

(S0) is the welfare-maximizing strategy, whereas (S1) is the profit-maximizing strategy.⁶

There is a continuum of production strategies: β .

β is open to interpretations. Some candidates are:

- how much to produce and/or at what prices to sell.

As in the case of a monopoly, a welfare-maximizing regulator and a profit-maximizing manager would choose different quantities or prices. In the presence of externality, the socially optimal output level differs from the profit-maximizing output level.

- what kinds of input to employ.

To protect domestic industries or to promote area development, the regulator may prefer to use more domestic input, which may reduce the firm's profitability.

- the choice of customers and price.

The regulator may favor a prior industry in development strategies by forcing state enterprises to provide their products at a low price.

⁶It is the profit-maximizing strategy under regulation.

- personnel.

The regulator may keep the manager from down-sizing for social reasons, which hampers the firm's profitability.

P needs extra effort to justify his non-socially-optimal β . Moreover the non-socially optimal β can cause him trouble since he might lose the favor of electors, increasing the possibility of being perceived as accepting bribes. Let $C_P(\beta)$ denote the cost of choosing non-optimal β . $C_P(0) = 0$. $C'_P > 0$; $C''_P > 0$.

Description of the Game

Date 1: A chooses e .

Date 1 1/2: W is observed by both P and A .

Date 2: P and A bargain for the choice of β and the transfer t . Let $b, 1 - b$ denote P and A 's bargaining power respectively. The asymmetric Nash bargaining solution is implemented.⁷

Bribery Technology: θ

When the agent spends a dollar to bribe the principal, the principal may not get the full utility he would get from a dollar of private money. I assume a transfer rate θ . That is: to the principal, a dollar spent by the agent is equivalent to his wage income of θ dollar. $\theta \in (0, 1)$. This discount factor applies when bribery takes the form of meetings at a place of interest, a feast, or jobs offered to the principal's relatives. Moreover, the agent needs to invest in a network (or "guanxi", in Chinese) just to make the transfer to the principal possible and to be protected by the network. In this sense, what the principal gets is much less than what the agent invests in bribery activities. Furthermore, taking a bribe may cost the principal his job and party membership, or even get him in prison. The principal values the income of a \$1 bribe less than \$1 from his wages, because income from bribe bears risk.

Non-contractility

At date 1, it is impossible for the public official to commit himself to a contract with the SOE specifying a compensation rule between e and β . Non-contractility is the key assumption of this model.⁸ This non-contractility may result from the following situations.

⁷The use of any other bargaining solution does not affect my results. In this setting, the Nash bargaining solution coincides with the proportional split solution.

⁸See this type of argument in Grossman and Hart [1986] and Hart and Moore [1990]

(1) The lack of information (at date 1) about the possible states of nature at date 2; (2) the prohibitive costs of spelling out a complete contract for each possible state; (3) or the ignorance (at date 1) of what action implements a certain β at date 2. Another interpretation of this non-contractility is a lack of commitment. Ownership control rights entitle the public official to choose β at date 2. He cannot contract with the enterprise ex ante about how he will exercise the control rights, because the public official has the incentive and power to renegotiate the contract or force the enterprise to carry out his decision at date 2. In this sense, I assume the non-contractility of β .

Payoffs

P 's utility function takes the form:

$$(1) \quad \alpha(S + \Pi - t) + \theta t - C_P(\beta)$$

A 's utility function takes the form:

$$(2) \quad \alpha_A(\Pi - t) - C_A(e)$$

Notice that the manager does not pay the bribe from his pocket. It is very common that managers use the firm's money to build up a network.

α is a measure of the public official's utility from social welfare. $\alpha \in [0, 1]$. P prefers high social welfare because high social welfare helps his political career. Moreover, if social welfare is high, he can enjoy more perks (like a fancier office, or a luxury company car). Finally, ideological preference and the satisfaction from self-realization also contribute to α . α_A is a measure of the manager's private benefit from the profit of the firm, which includes bonus, perks, and other non-monetary benefit.

3.2 Equilibrium Analysis

3.2.1 Benchmark Equilibria

First, we look at two benchmark equilibria without considering the possibility of bribery.

- **The Equilibrium under Public Ownership without Corruption**

Without corruption, the principal's objective is simply to maximize social welfare. At date 2, P has a dominant strategy to choose $\beta = 0$. Predicting this, at date 1, A will

choose $e^0 = 0$. In reality, the agent may care about productivity, and invest a little in research. Here we view this $e^0 = 0$ as a normalization. Define social welfare to be:

$$(3) \quad S + \Pi - t - C_A(e).$$

Let SW^0 denote the expected social welfare at this equilibrium. $SW^0 = 1$.

- **The Equilibrium under private ownership**

Under private ownership, the public official no longer has decision right on β . At date 2, to maximize profit the agent will choose $\beta = 1$. Hence, at date 1, A chooses e^1 according to:

$$(4) \quad \alpha_A \rho = C'_A(e^1)$$

Let SW^1 denote the expected social welfare at this equilibrium. $SW^1 = \rho(1 + e^1) - C_A(e^1)$.

SW^1 can be greater, equal, or less than SW^0 .

“ e ” is a productive efficiency parameter in the sense that the larger the “ e ”, the greater the potential benefit. “ β ” is an allocative efficiency parameter in the sense that the smaller the “ β ”, the greater the social welfare. Then public ownership entails better allocative efficiency, while private ownership provides better productive efficiency. This pair of trade-offs is well established in the literature. Now let’s take a look at how corruption affects this comparison.

3.2.2 Subgame-perfect Equilibrium Analysis

1. Nash bargaining solution at date 2:

At date 2, W is common knowledge. If the public official and the manager cannot agree, the public official will choose $\beta^* = 0$ and the manager will choose $t^* = 0$. Hence the disagreement point in this bargaining game is $(U_P^0, U_A^0) = (\alpha W, 0)$.

Let $b, 1 - b$ denote the bargaining power of P, A respectively. The generalized Nash bargaining solution is the (β^*, t^*) that solves the following maximization problem:⁹

$$(5) \quad \max_{\beta, t} \{(\theta - \alpha) t - \alpha\beta(1 - \rho)W - C_P(\beta)\}^b \{\alpha_A(\beta\rho W - t)\}^{1-b}$$

The F.O.C.s are:

$$(6) \quad \frac{(\theta - \alpha) t - \alpha\beta(1 - \rho)W - C_P(\beta)}{\beta\rho W - t} = \frac{b}{1 - b} \frac{\alpha(1 - \rho)W + C'_P(\beta)}{\rho W}$$

$$(7) \quad \frac{(\theta - \alpha) t - \alpha\beta(1 - \rho)W - C_P(\beta)}{\beta\rho W - t} = \frac{b}{1 - b} (\theta - \alpha)$$

Solve β^* from:

$$(8) \quad C'_P(\beta) = (\theta\rho - \alpha)W$$

Then t^* is a function of β^* ¹⁰:

$$(9) \quad t^* = b\beta^*\rho W + \frac{1 - b}{\theta - \alpha} [(\beta^*\alpha(1 - \rho)W + C_P(\beta^*))]$$

Corner solutions are possible:

If $\theta < \frac{\alpha}{\rho}$ holds, the status quo is unchanged. $t^* = 0, \beta^* = 0$.

If $C'_P(1) \leq [\theta\rho - \alpha]W$, then

$$(10) \quad \beta^* = 1$$

$$(11) \quad t^* = b\rho W + \frac{1 - b}{\theta - \alpha} [(\alpha(1 - \rho)W + C_P(1))]$$

2. Optimal effort level at date 1:

when $\theta \leq \frac{\alpha}{\rho}$, there is no corruption. Hence, the principal chooses $\beta = 0$. Anticipating this, the agent chooses an optimal effort level of 0. The outcome is the same as in the benchmark equilibrium without considering corruption.

If $\theta > \frac{\alpha}{\rho}$, denoting e^* the optimal effort level, then e^* solves the following maximization problem:

$$(12) \quad U_A^* = \max_e \alpha_A E[\beta^*(e, a)\rho(1 + e)a - t^*(e, a)] - C_A(e) \\ = \max_e \alpha_A E\left[\frac{\theta\rho - \alpha}{\theta - \alpha}(1 - b)\beta^*(e, a)(1 + e)a - \frac{1 - b}{\theta - \alpha}C_P(\beta^*)\right] - C_A(e)$$

⁹The utility feasible set is a triangle; therefore, a Nash solution exists and coincides with the proportional split solution.

¹⁰We can check that $t^* \leq \rho\beta^*W$ always holds, provided $C_P(\beta^*)$ is convex.

Let $m = \frac{\theta\rho-\alpha}{\theta-\alpha}(1-b)$. The first order condition is:¹¹

$$(13) \quad mE[\beta^*a] - \frac{C'_A}{\alpha_A} + (1+e) m E\left[a * \frac{\partial\beta^*}{\partial e}\right] - \frac{1-b}{\theta-\alpha} E\left[C'_P * \frac{\partial\beta^*}{\partial e}\right] = 0$$

Since we have $C'_P(\beta) = (\theta\rho-\alpha)W$, the last two terms in the above first order condition are canceled out. Now the first order condition is simplified to:

$$(14) \quad m \alpha_A E[\beta^*a] = C'_A$$

3.3 Comparative Statics

Proposition 1: Corruption (bribery) enhances a manager's effort as long as the manager has some bargaining power. That is when $b \neq 1$; $e^* > e^0$.

Proof: The optimal effort level e^0 under public ownership without corruption is normalized to 0. The optimal effort level e^* satisfies equation (14). To get $e^* > e^0$, we only need $m > 0$, which holds when there is corruption and $b \neq 1$.

Q.E.D.

Intuitively, bribery enhances the low incentive caused by non-contractility. As long as he can benefit from bargaining through briber, the manager will work harder than in a situation where bribery is impossible.

Proposition 2: (effect of anti-corruption campaigns) Any anti-corruption campaigns with the purpose of making bribery more difficult and costly (causing a decrease in θ) reduce managers' efforts. They may effectively eliminate corruption if θ decreases enough such that $\theta < \frac{\alpha}{\rho}$. An anti-corruption campaign can reduce the allocative distortion (β^*), but its effect on the amount of bribery (t^*) is ambiguous.

Proposition 2 is a direct result of equations (8), (9), and (14).¹² Therefore, anti-corruption activities with the objective of making corruption more costly to the agents by improving audits and increasing the fine for conviction) could be harmful to the society. The focus of anti-corruption should not be how to improve auditing technology but how to design the

¹¹The second order condition is satisfied under the convexity assumption of $C_A(e)$ and $C_P(\beta)$.

¹²Notice that $m = (\rho - \frac{1-\rho}{\theta-\alpha}\alpha)(1-b)$.

structure of public officials' interests to make it corruption-proof. In other words, removing the motivation for corruption is more important. As anti-corruption activities consume resources, changing the objectives of public officials seems a more promising way to reduce corruption.

Proposition 3: The larger the θ , the larger the principal's utility.

From equation (8), we know that the larger the θ , the larger the β^* . From equation (14), we know that the larger the θ and β , the larger the agent's effort e^* . Great efforts in research and low transferring costs increase the principal's utility. This result explains the fact that many relatives of high-ranking cadres are managers of large state-owned enterprises. This phenomenon may result from the smaller transferring costs incurred by relatives of high-ranking cadres, since they have a better network to reduce the possibility of conviction of bribery. Notice that the firm also benefits from having a manager with a better network.

Proposition 4: Corruption may be either welfare increasing or welfare reducing.

Since corruption increases productive efficiency e , but at the same time decreases allocative efficiency β , the overall impact on social welfare could be positive or negative.

Proposition 5: When $\beta^* = 1$, public ownership is inferior to private ownership.

Proof: Let SW^* denote the expected social welfare under public ownership with corruption.

$$SW^* = \rho(1 + e^*) - C_A(e^*) - t^*$$

$$SW^1 = \rho(1 + e^1) - C_A(e^1)$$

e^1 is chosen to maximize SW^1 . e^* is not even maximizing SW^* . And $SW^1 > SW^*, \forall e$. Therefore, $SW^* < SW^1$.

Q.E.D.

4 Corruption in Transitional Economies

Privatization was a trend during the 1980's in developed economies and during the 1990's in former socialist economies. In China, the reform has proceeded in a way that has Chinese characteristics. Without clarifying property rights by privatization, by 1985 most state-owned enterprises (SOEs) had autonomy. SOEs have discretion over output quantities,

variety, production technology, etc.,¹³ while the bureaucrats control SOEs through appointing managers, quotas, bargaining over contracts, subsidies, and tax policies. Corruption also stands out as a prominent feature. In 1993, thirty-three state-share-holding companies were established in Shanghai. Among them, 16 were transformed from former administrative agencies.¹⁴ The performance of SOEs has been going downhill. In 1993, 30% of SOEs were losing money. In recent years, the percentage of loss-making SOEs has increased.¹⁵ Even after massive layoffs, a large percentage of SOEs still cannot pay salary on time. Finally, in 1997, Chairman Jiang Zemin announced the intention to privatize SOEs on a large scale. This section analyzes the role of corruption in this process of privatization.

4.1 Justification

One key feature of an economy in transition is that when market and plan co-exist, the economy is in an irregular state. A transitional economy is much more complex than a mature market economy. Since the beginning of economic reform in 1978, private ownership sprang up and developed quickly in China. Over a long period,¹⁶ a dual-track system existed. Economy-wise, there were two price systems: one from market and the other from plan; and two resource allocation mechanisms: market and plan. Enterprise-wise, a SOE produced some goods for the plan and some residuals for the market, getting some inputs from the plan and some from the market. In terms of individuals, it was typical that a SOE worker to have a secondary career on the side, either running his own business or working part-time in a private firm. Confusion was the common feeling. One of Deng Xiaoping's famous logo, crossing a river by grouping stones, fully demonstrated the complexity of an economy in transition. Even the policy makers did not know what to expect. The most appropriate word to describe the situation is "chaotic". Even economists know much less about transitional economies than about mature market economies.

I argue that it is hard for outsiders to tell whether socially optimal actions have been taken in a state enterprise. The public official who has been controlling the enterprise has

¹³See: Gordon and Li [1991]

¹⁴See: Yu[1997], Han [1996]

¹⁵Official data is not available. The widely held estimation is between $\frac{1}{2}$ to $\frac{2}{3}$.

¹⁶From 1980 to early 90's. By 1993, 85% percent of the producer goods were transacted at market prices. Li[1996]

no difficulty justifying his choice of β ., but outsiders may not know what kind of action corresponds to $\beta = 0$. Even if outsiders have some information about an action taken by a state enterprise that is not socially optimal, the public official may justify the action by emphasizing the need to improving the firm's competitiveness in the emerging markets. Hence in a transitional economy, $C_P(\beta)$ is very low. We look at the model when $C_P(\beta) = 0$.

The Nash bargaining solution is then:

when $\theta < \frac{\alpha}{\rho}$; $t^* = 0, \beta^* = 0$.

when $\theta > \frac{\alpha}{\rho}$; then $\beta^* = 1$;

$$(15) \quad t^* = b \rho W + \frac{1-b}{\theta-\alpha} \alpha(1-\rho)W.$$

The optimal effort level e^* is then determined by:

$$(16) \quad \alpha_A(1-b)\left(\frac{\theta\rho-\alpha}{\theta-\alpha}\right) = C'_A$$

When corruption is rampant, and a public official can freely justify his choice of a non-socially optimal β , he will choose the profit maximizing strategy to maximize surplus from bargaining. Therefore, β^* is 1. As shown in proposition 5, in this circumstance private ownership dominates public ownership no matter whether public ownership without corruption is better or worse than private ownership. This justifies privatization.

Theorem 1: In a transitional economy, public ownership with corruption is inferior to private ownership.

Can an anti-corruption campaign help? Unfortunately, the answer is no if an anti-corruption campaign does not eliminate corruption.

Proposition 6: In a transitional economy, any anti-corruption campaign with the purpose of making bribery more difficult and costly (a decrease in the transfer efficiency parameter θ) is detrimental to society unless it eliminates corruption.

Proof: If θ decreases such that $\theta < \frac{\alpha}{\rho}$, then bribery is eliminated. Otherwise, corruption exists and a profit-maximizing strategy ($\beta = 1$) is adopted. $SW = \rho(1+e)a - C_A(e) - t$ where $t = b\rho(1+e)a + \frac{\alpha}{\theta-\alpha}(1-b)(1-\rho)(1+e)a$. It is straight-forward that $\frac{\partial SW}{\partial \theta} > 0$.

4.2 Detours

As corruption justifies privatization, it also influences the path of reform. In the mid 1980's, SOEs had autonomy. In the early 1990's, State-share-holding companies were established. Let's see what role corruption played. If corruption justifies privatization, why was not large scale privatization carried out in China immediately? One obvious reason is that due to stable government, public officials have the power to protect their vested interest. Privatization will remove a public official's bribery income. Any reform measure that will bring large redistribution is difficult to carry out, especially when it endangers public officials' vested interests. A stable government is more likely to adopt a Pareto-improving reform measure. Now, we turn to the analysis of corruption's effects on the path of reform. We investigate the logic of why SOEs had autonomy and state-sharing-holding companies were established before massive privatization.

4.2.1 Detour 1: Autonomy of SOEs

Fully delegating the control rights to managers¹⁷ improves productive efficiency ($e^1 > e^*$, as shown in proposition 3) and social welfare. However, delegating control rights fully to managers dramatically reduces a public official's income from bribes. This makes such a reform difficult to carry out, especially since public officials have a strong influence on policy-makers, if they are not policy-makers themselves. As mentioned earlier, in the mid 1980's, most SOEs had autonomy in the sense that they had discretion over output quantities, variety, production technology, etc. Did SOEs have full ownership control rights? Certainly not. Public officials still controlled SOEs through appointing managers, allotting quotas, limiting lay-offs, etc.

In my model, granting autonomy to SOEs splits control rights $\beta \in [0, 1]$ into two parts. The public official controls one part, $\beta_P \in [0, \gamma]$, $\gamma \in (0, 1)$, while the manager of the SOE controls the other part, $\beta_A \in [0, 1 - \gamma]$.¹⁸ The SOE definitely benefits from gaining partial

¹⁷It serves as an alternative to privatization. Privatization is one means by which government commits itself to leaving the control rights to shareholders. I assume government can at date 0 choose whether to delegate the control right to managers or not, but without delegation, government cannot commit itself to choose a certain β at date 2.

¹⁸This γ is not a choice variable for the public official. Rather, it is determined by the economic environment. I assume that government can at date 0 choose whether or not to delegate control rights. If delegates, government retains γ share of control rights. Otherwise, government has full control rights.

discretion power over control rights. What is a public official's stake in this reform measure? I give three grounds where public official's interests may lie.

First, without clearly defined property rights, the autonomy of SOEs further complicated the economic situation. This further justifies my model for a transitional economy. By granting autonomy to a SOE, a public official fully eliminates his responsibility to choose socially optimal actions, because to outsiders, the SOE is now responsible for the choice of β .

Second, to the public official, a decrease in control rights (from full discretion power $\beta \in [0, 1]$ to partial discretion power $\beta_P \in [0, \gamma]$) may not be bad news. When the production frontier (W) is the same, the public official gets less transfer, and hence enjoys less utility than when he has full control rights. However, when the public official has less control rights, the manager of the SOE has a greater incentive. Hence, the production frontier expands. (W increases.) As a consequence, the overall effect to the public official could be positive.

Last, delegating partial control rights to SOE, a public official may even improve his bargaining power (an increase in b). In the mid 1980's, the government still had control rights over a large portion of resources, such as the bank system and basic raw materials. The rules, regulations and policies for controlling and guiding firms' production either were very vaguely defined or covered only a few scenarios. Public officials have a great deal of discretion in interpreting and applying these rules, regulations, and policies on an enterprise.¹⁹ Thus, though SOEs had autonomy in the sense of determining production, SOEs still depended on a good relationship with public officials. When public officials were exercising control rights, they had the responsibility to provide SOEs with a friendly environment. When SOEs had autonomy, how to interpret rules or policies became a bargaining tool for public officials. Hence, public officials had more bargaining power to demand bribes. In this sense, delegating control rights to SOEs may also be in the public officials' best interest.

Therefore, granting autonomy to SOEs can be beneficial to both SOEs and public officials. It is a Pareto optimal reform measure.

¹⁹See: Tian[1996]

4.2.2 Detour 2: State-Share-Holding Companies

As time passed, more and more resources have become available from the market, rules and regulations have become more clearly and completely defined, and public officials have less and less bargaining power. Moreover, after the 1989 student protest, the government had to carry out a large anti-corruption campaign. Therefore, in the early 1990's, establishing state-share-holding companies and appointing themselves as managers of those holding companies served as a better way for public officials to extract rent from ownership control rights. It is difficult to effectively connect the salary of a public official to the performance of a state-owned enterprise. However, the compensation package to the manager of a state-share-holding company can be easily based on the performance of the state enterprise. If the formal public official becomes the manager of a state-share-holding company, this reform should have a very small redistributive effect, and therefore meet with fewer obstacles. In fact, among 33 state-share-holding companies established in 1993 in Shanghai, 16 were transformed from former administrative agencies. It is fair to say that public officials legalized their bribery incomes as their shares of SOEs' profits.

Although there has been a debate over what the objectives of state-share-holding companies (SSHCs) should be; there is no doubt that managers of SSHCs value the profit of SOEs more than former public officials. Legalizing bribery by establishing SSHCs is a Pareto improvement, because the transfer is made without discount θ . The incentives of the principal and the agent are almost aligned, hence the agent has less incentive to bribe the principal, and the efficiency of SOEs is improved. When incentives of principal and agent are fully aligned, SOEs perform as if they are private. As long as managers of SSHCs have objectives other than profit maximization, which is more likely the case, the potential for bribery exists. As a consequence, SOEs are still inferior to private ownership.

In short, the complexity of the transitional economy granted public officials the freedom to select non-socially optimal actions ($\beta^* \neq 0$), which entails rampant corruption and erodes any possible benefit from public ownership. Privatization is called for. However, to avoid large redistribution, the reformer chose delegating control rights to SOEs and establishing state-share-holding companies as alternatives to privatization under different circumstances. These two reform measures could be Pareto improving under different circumstances as

analyzed earlier. In China, privatization was not carried out immediately.²⁰ However, is massive privatization unavoidable at some point?

4.3 Privatization: The Way

As pointed out in theorem 1, in a transitional economy, public ownership is inferior to private ownership due to corruption, and so privatization should be carried out. However, due to the large redistributive effect of privatization, other reform measures that are Pareto-improving were used first. In fact, SOEs with autonomy are still inferior to private ownership due to corruption. A small portion of SOEs were supervised by State-Share-Holding companies. Even those SOEs were at no better position than private firms and could not compete with comparable private firms on the market. As the performance of SOEs deteriorated, public officials could no longer gain from controlling SOEs and SOEs could not benefit from being state-owned. At that point, privatization becomes a mutually desired solution: the one and only way. In this sense, corruption not only justifies privatization, but also paves the way to privatization. In an economy where plan and market coexist, corruption leads to privatization. Corruption makes the diminishing of a plan economy and the taking over of a market economy an irrevocable process. This is to say that a centrally planned economy cannot be opened to the competition of market economy, or it will cease to exist because of corruption. The route from the chaos of the coexistence of market and plan, to the spread of corruption, then to the worsening of SOE performance, and finally to privatization, is exactly the locus of the reform of SOEs in China.

5 Conclusion

In summary, using a simple model, this paper addresses two important issues: corruption's role in the cost-benefit analysis of public ownership and corruption's role in transitional economies.

First, one pair of stylized trade-offs between public ownership and private ownership is identified. Public ownership has more allocative efficiency in the sense that it chooses welfare-maximizing allocation while private ownership provides better incentives to improve

²⁰In countries with less stable governments, massive privatization was carried out immediately.

productivity. When corruption is introduced into the model, because the manager may gain by persuading the public official to exercise ownership control rights in favor of the firm, he now has an incentive to bribe the public official. This will reduce allocative efficiency. However, since profits are higher after the introduction of corruption, the manager now has a stronger incentive to invest in research. Therefore, productive efficiency is enhanced. Corruption can be viewed as a black market for privatizing ownership control rights. According to my model, corruption in public ownership can be either welfare-improving or welfare-reducing in a non-transitional economy.

In a transitional economy, under the cover of a complex economic situation and with appropriate bribery income, the public official is willing and able to completely neglect his duty of maximizing social welfare and select actions that maximize the firm's profit. Hence, the advantage of public ownership—allocative efficiency—disappears if corruption occurs. As a result, corruption in transitional economies justifies massive privatization. Anti-corruption campaigns can only make the situation worse. Privatization is called for. However, privatization will remove the public official's bribery income. Hence, in an economy with a stable government, privatization cannot be carried out immediately. Instead, some Pareto-improving reform measures are more likely to succeed. For example in China, granting autonomies to SOEs and establishing state-share-holding companies were Pareto-improving measures when they were adopted. However, as long as corruption exists, SOEs are less efficient than private firms. Lacking of competitiveness with comparable private firms, SOEs will not survive. In China, during the mid 1990's, the proportion of loss-making SOEs was between $\frac{1}{2}$ and $\frac{2}{3}$. With SOEs losing money, corrupt public officials could no longer benefit from controlling SOEs. As a result, privatization became the natural and only choice.

Appendix: Reading in Chinese

- Chang, Jinzhou and Xiao, Jincheng: Thinks of Establishing the Company of State-owned Assets Operating. *Economics Research Journal* No.4 1996;
- Cui, Zhiyuan: The Theoretical Background of the Reform of Corporation Acts in Twenty-nine States in America. *Economics Research Journal* No.4 1996
- Fei, Fangyu: On Regulation on Insider Control Rights in Enterprises. *Economics*

Research Journal No.6 1996

- Han, Xiaoming: On the Transformation From Industry Administrative Agent to Industry Share-holding Company. *Economics Research Journal* No.6 1996
- Nan, Bingjun: “Game Playing in Enterprises and Formation of Business Behaviors. *Economics Research Journal* No.8 1996
- Qian, Jin: On the Formation and Development of State-share holding Corporation in China. *Economics Research Journal* No.6 1996
- Yu, Guoqiang: state-share-holding company and the realization of state property ownership rights. *China Industrial Economy* No.1 1997
- Yue, Ru: From Authorized Running Enterprises to Authorized Investment Organizations. *China Industrial Economy* No.5 1996
- Wang, Baoxi: On Trusteeship Operation of State-owned Economy. *China Industrial Economy* 7 1996
- Wu, Jiajun: Modern Enterprise Systems and Corporation Property Rights. *Economics Research Journal* No.2 1996
- Zhang, Jixiang: On Governmental Function of State-owned Holding Company. *China Industrial Economy* No.8 1996
- Zhang, Weiying: Ownership, Governance and Principal-agent Relationship. *Economics Research Journal* No. 9 1996