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**Modeling Private Sector Development in  
the People's Republic of China**



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## ABSTRACT

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In this paper, a simplified mathematical model based on the behavioral pattern of firms in the PRC is used to discuss the impact of marketization and privatization on private sector development. The model demonstrates that private enterprises, SOEs, and other entities undergoing reform in the PRC are entities with multiple objectives. This pattern of behavior leads to firms that tend to use more capital and labor to produce more output compared with pure profit-maximizing firms, but which earn fewer profits or even register losses.

The impacts of firms' non-profit objectives and the "costs of entry" on the size and number of firms are also discussed. The problem of matching between managerial ability and firm size is introduced to explain why gradual reform in PRC has succeeded, whereas the "Big Bang" in Russia failed.

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# Modeling Private Sector Development in the People's Republic of China<sup>1</sup>

Toshiki Kanamori and Zhijun Zhao

## 1. Introduction

The development of private enterprises in the PRC has its own specific background. During the 1950s, the old Chinese capitalist economy essentially died out with the establishment of the PRC and the reconstruction of industry and commerce within the framework of a Soviet Union-style socialist economy. The socialist economy achieved miracles in some specific areas and historical periods, thanks to the guidance of socialist ideology, which advocated a spirit of dedication to others and society as a whole. However, in the long run this spirit ran against the intrinsic human nature of pursuing self-interest, and the traditional socialist planned economy was unable to attain economic growth on the level achieved by the capitalist economies.

Why weren't the traditional socialist countries able to compete with the capitalist economies? Traditional socialist theory assumed that people in socialist countries had common interests and would work hard to attain them. The relationship between people was considered to be cooperative rather than competitive. Communist party members were supposed to have no interests other than the people's interest as a whole. The motivation to work was to be promoted by a cooperative spirit. These assumptions were clearly different from those of neoclassical economics originating from Adam Smith, which regarded human beings as selfish entities pursuing self-interest. This behavioral pattern is seen as part of human nature, and not something that is influenced by what and how much education people receive.

Under Marxist dogma, people's activities aimed at attaining wealth, consumption goods, freedom and democracy were greatly suppressed. However, in spite of the ideology and theory people were not motivated to work hard for the common interest and may in fact have tried to work less. It can be concluded that traditional socialist practice was not successful, and that the promise of the Communist Party to improve the people's standard of living was never fully realized. However, at least one

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basic principle of the “materialism” advocated by traditional socialist economic theory seems to be relevant, i.e. “the economic base determines the social superstructure.” It seems that the Communist Party clearly understood that it would not be able to maintain its advantage and strengthen its political power without having a strong economic base, and satisfying people’s demand for food, clothes, housing, transportation, etc. People also have non-physical needs, such as democracy and freedom. In fact, ordinary Chinese people never abandoned the objective of improving their living standards. Even in the era of the planned economy, when the demand for goods was distorted and suppressed and private business was regarded as unlawful, the desire for a better life never seems to have disappeared. In most cases, private business existed underground.

The failure of traditional socialist economic practice led some members of the Communist Party of China to reconsider the road of socialism they had pursued. Deng Xiaoping, a great leader, recognized that only a reform and opening up policy could satisfy the people’s needs and maintain social and political stability. Under his leadership, economic reform and a policy of opening to the outside world were launched in 1978. However, with respect to the proper approach for developing the economy, it was not without controversy. Actually, there are many modes of reform in the world. Academically they can be classified into two main categories, gradualism and the “Big Bang.” What the PRC adopted was a reform characterized by gradualism and a problem-solving approach, in contrast to the “Big Bang” adopted in Russia. It began with the easiest part and then gradually expanded to others, making compromises with vested interest groups in the planned economy, and when difficulties were encountered, sought new approaches.

In carrying out privatization, there are two general approaches. The first is to privatize existing government agencies, and the second is to maintain existing agencies intact and allow private enterprises to enter into new areas (this is called the “dual system” or “双軌制” in Chinese). The PRC government adopted the second, which is more gradual and smoother than the first. At the early stage of reform, the government was very sensitive on this issue. Though the terms “opening up,” “reform” and “competitive forces” frequently appeared in official documents, the word “privatization” was seldom used.

However, in recent years the PRC has begun to accelerate the privatization of SOEs and to sell SOE assets through the Asset Management Commission, established in 2002. In the past, the provincial governments were simply agents entrusted with tasks by the central government. Now, however, as owners of SOEs, they are able to dispose of SOEs and put the sales earnings into their own budgetary resources. With the encouragement of the central government, revenue-hungry local governments have rushed to privatize small- and medium-sized SOEs under their jurisdiction. The South China Morning Post recently reported that 90% of provincial SOEs in the capital of Hunan province have been sold. The State Asset Commission indicated that 80% of small SOEs at the county level and 60% of municipal SOEs have been privatized.

As a result of the reform and opening, the PRC achieved a nearly 9% average annual economic growth rate over the past 26 years. The number of private enterprises grew from 90,000 in 1989 to 3 million in 2003, an increase of nearly 33 times, and the number of individual business increased from 12.47 million to 23.53 million, a near doubling during the same period. The number of foreign-funded enterprises increased

from 15,919 in 1989 to 226,373 in 2003, up almost 14 times. In contrast to the rapid growth of the private sector, the number of SOEs fell from 1.55 million to 1.05 million from 1992 to 2003, and the number of collective enterprises from 4.16 million to 1.63 million.

The development of the private sector can be also characterized by the relatively small size and decreasing trend in the average number of employees. In 2003, the average number of employees was 14 for private enterprises and two for individual enterprises, compared to 54 for SOEs in 2001. In 1989 on average, about 18 workers were employed in each private enterprise, but by 2004 this number had fallen to 14. In contrast, the average number of employees in SOEs was relatively stable during the same period, fluctuating within a narrow range between 49 and 56, except for 1992 when it registered a high figure of 76. It should also be noted that most small- to medium-sized SOEs have been privatized.

Although the private sector has attained rapid development, private enterprises, SOEs and foreign funded enterprises are competing on an uneven “playing field.” They still face many barriers. For example, private enterprises face high transaction costs including administration approval costs, barriers to entry, immaturity of the capital market, low management skills and a lack of credibility in the government sector.

There are also many macroeconomic phenomena that can be explained by looking into the private sector development and SOE reform. For example, the ‘township-village’ enterprises (TVEs), which were once considered to be new and efficient creatures by the PRC (Qian Yingyi, 2000), have been disappearing since reaching a temporary heyday in the 1980s. SOEs under the contract responsibility system are facing the same fate. The economy of the PRC has gone through a long period of inflation, and most SOEs and state-owned banks are now burdened by losses and huge non-performing loans.

In Section 2 of this paper, we begin by analyzing the objectives of enterprises based on the survey carried out by CASS and lay out some assumptions. In Section 2.1 we attempt to create a simple model that can be helpful in simplifying the issues. In Section 2.2, based on this model, we draw some propositions on the determination of output, investment and employment in the course of privatization. In Section 2.3, also based on the model, we discuss the determination of a firm’s residual profit and its implications for the banking sector. Then, in section 2.4, we discuss how the number and size of private enterprises in the PRC is determined. In Section 3, we summarize the findings and implications of the models.



## 2. Modeling Private Sector Development

### 2.1 Objectives and Objective Functions of Private Firms in the PRC

There are a number of papers that focus on private sector development in the PRC. Most look into the issue using simple statistical tables or literal descriptions. These include the works of Zhang Houyi, Ming Lizhi, and Liang Chuanyun (2002, 2003 and 2004), Asian Development Bank (2003), and Stoyan Tenev and Chunlin Zhang (2002). However, there are few studies that provide a general theoretical framework either on SOEs or on private companies in the PRC based on mathematical models or behavior investigations of enterprises. Michael K. Y. Fang, Wai-Ming Ho and Lijing Zhu (1999) make a contribution on this issue by introducing a soft constraint assumption. However, since they assume that private enterprises are entities that pursue profit maximization, their model says nothing about institutional changes outside of some macroeconomic policy effects.

However, in accordance with basic economic principles, the first step for economists in studying firms should be to understand how they behave under specific circumstances. In mature private economies such as the U.S., Western Europe and perhaps Japan,<sup>2</sup> enterprises are usually “private” and are generally considered to be profit maximization seeking units.<sup>3</sup> Hence, in those economies, the goal pursued by enterprises is not seen as an issue for discussion.

However, for an economy in transition, such as the PRC, the simple assumption of profit maximization may not necessarily be reasonable because of strong government intervention. In fact, one of the purposes of economic reform in China is to remove obstacles that make enterprises depart from profit maximization.

In the PRC, the level of economic growth is directly linked to the motivation of local government officials. Some often use their power to force enterprises to produce more than the market equilibrium level. This is evidently corruption, as it involves the use of public power to seek self-interest, in the form of promotions. The GDP is usually a very important factor in the promotion of local government officials. In order to win promotions, they sometimes make great efforts to realize their personal objectives, manipulating the enterprises under their administration. In some cases they even inflate economic data. There is a well-known phrase, “the number produces the official and the official produces the number; the bigger the number, the bigger the official.” This vividly describes the important role that economic growth plays in the promotion of government officials.

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<sup>2</sup> In the case of Japan, it is widely argued that many companies try to maximize market share rather than short-term profits. The view of these companies seems to be that maximizing market share and establishing the status of the company in the market ultimately paves the way for maximizing profits in the long run. It should be noted that, from this long-term perspective, two goals, i.e. market share maximization and profit maximization, are not necessarily trade-off relationships, but are compatible.

<sup>3</sup> Without doubt, most standard economic models are based on the assumption of profit maximization, but the authors have doubts regarding the validity of this assumption. When one is not certain whether an enterprise is a profit maximization entity, as a secondary optimal choice one can regard profit maximization as a theoretical benchmark, so that the difference between reality and the theoretical benchmark can be identified (Zhao Zhijun, 2002).

There are also many other reasons why enterprises deviate from profit maximization objectives. For example, they may blindly try to enlarge their market share, marketization may be imperfect, or managers may place more emphasis on their personal interests or on workers' welfare. Our argument that PRC enterprises are not necessarily profit-maximizing units coincides with the idea of evolutionary economics, which argues that enterprises are profit-seeking units, rather than profit maximization units.

This idea is also supported by a survey conducted by the Institute of Economics, Chinese Academy of Social Sciences (CASS) in 2000, with the aim to investigate how the performance and behavior of enterprises in the PRC evolved since 1995. In consideration of the diversity of reform models and to reflect the effect of economic reform on SOEs, collective enterprises and private enterprises, a total of 451 enterprises were surveyed. One hundred and forty-one enterprises were selected in Jiangsu province, 83 in Wuxi (无锡), and 58 in Yancheng (盐城). Of these enterprises, 43 were from Hangzhou (杭州), the capital city of Zhejiang Province, 130 were from Zhengzhou (郑州) of Henan province and 137 from Jiangmen (江门) of Guangdong province. Each firm was asked to describe its main objective from seven choices: (1) Value added maximization, (2) Enlargement of market share, (3) Profit maximization, (4) Sales revenue maximization, (5) Enlargement of firm scale, (6) Maximization of employees' wealth, and (7) Others. This investigation of enterprise behavior is helpful for making reasonable assumptions on the objectives of Chinese enterprises.

The survey asked the firms which of the above choices was their primary objective, and which was the second, third, and so on. The outcome of the survey (see Table 1) shows that the number of enterprises choosing value-added maximization first was 40, or 9%. The number of enterprises choosing value added maximization second, third, fourth, fifth or sixth was 11%, 17%, 18%, 18% and 17% respectively. Forty-five, or 10% of the enterprises, did not choose value added maximization as an objective. A similar outcome can be seen for other choices. We also find that enterprises choosing profit maximization (Goal 3) as the first choice made up the largest proportion, 53%, followed by the enlargement of market share (Goal 4), sales revenue, value added, enlargement of firm size and employees' welfare, with 19%, 12%, 9%, 6%, 2% and 0.2% respectively.

**Table 1. Distribution and Ordering of Objectives of Surveyed Enterprises**

	Order	1	2	3	4	5	6	7	0	Sum
Goal-1	Count	40	50	75	83	80	78		45	451
	%	9	11	17	18	18	17		10	100
Goal-2	Count	55	129	122	72	35	14		24	451
	%	12	29	27	16	8	3		5	100
Goal-3	Count	239	65	69	37	17	8		16	451
	%	53	14	15	8	4	2		4	100
Goal-4	Count	86	140	79	78	31	13		24	451
	%	19	31	18	17	7	3		5	100
Goal-5	Count	26	34	30	58	104	146		53	451
	%	6	8	7	13	23	32		12	100
Goal-6	Count	9	31	54	78	121	107		51	451
	%	2	7	12	17	27	24		11	100
Goal-7	Count	1	0	1	1	3	0	23	422	451
	%	0.2	0.0	0.2	0.2	1.1	0.0	5	92.9	100

Note 1: Goal-1: “industrial value added maximization.”  
 Goal-2: “sales revenue maximization.”  
 Goal-3: “profit maximization.”  
 Goal-4: “enlargement of market share.”  
 Goal-5: “enlargement of firm size or scale”  
 Goal-6: “employee revenue and welfare maximization.”  
 Goal-7: others, if any, need to explain further.

Note 2: the numbers 1, 2, 3, 4, 5, 6, and 7 in the first row “order” represent the order of each objective chosen by the enterprises. 0 means that the choice is not considered. The “count” is the number of enterprises choosing the corresponding terms. For example, “40” in the second row means that 40 enterprises chose value-added maximization as their first place objective.

**Table 2. Number and Ratios of Different Classes of Enterprises Choosing Profit Maximization Objectives**

	Order	1	2	3	4	5	6	7	0	Sum
Type 1	Count	46	13	9	5	3	1	0	5	82
	%	56	16	11	6	4	1	0	6	100
Type 2	Count	41	11	9	8	3	0	0	0	72
	%	57	15	13	11	4	0	0	0	100
Type 3	Count	5	2	2		1	0	0	0	10
	%	50	20	20	0	10	0	0	0	100
Type 4	Count	76	18	22	13	6	5	0	5	145
	%	52	12	15	9	4	3	0	3	100
Type 5	Count	25	7	6	5	0	0	0	2	45
	%	56	16	13	11	0	0	0	4	100
Type 6	Count	16	6	5	3	1	1	0	2	34
	%	47	18	15	9	3	3	0	6	100
Type 7	Count	4	0	0	0	0	0	0	0	4
	%	100	0	0	0	0	0	0	0	100
Type 8	Count	10	2	6	1	0	0	0	1	20
	%	50	10	30	5	0	0	0	5	100
Type 9	Count	12	3	4	2	3	0	0		24
	%	50	13	17	8	13	0	0	0	100

Note: In accordance with registration status, enterprises are classified into nine types. Type 1: 82 SOEs; type 2: 72 collective enterprises; type 3: 10 cooperative enterprises; type 4: 145 limited liability corporations; type 5: 45 share-holding corporations; type 6: 34 share cooperative enterprises; type 7: 4 partnership enterprises; type 8: 20 private enterprises; type 9: 24 joint-venture enterprises with foreign investors.

Table 2 shows that all of the partnership enterprises (type 7) primarily pursue profit maximization. However this result cannot be generalized, due to the limited number of samples. All other types have a relatively stable proportion of enterprises pursuing profit maximization as the first choice, ranging from 47% to 57%.

The outcomes of the table give us at least two clues. First, many enterprises in the PRC, regardless of whether they are private or state-owned firms undergoing reform, are not pure profit maximization entities. In addition to profit maximization, other goals such as increasing market share, value added and sales revenue are also given attention. Second, toward the year 2000, after experiencing the so-called “Zhua Da Fang Xiao” (抓大放小) reform, SOEs and collective enterprises have grown close to private enterprises in their choice of objectives. In other words, small- and medium-sized SOEs have basically completed their transition process.

The objectives of the surveyed firms can be classified into three main categories. The first is closely related to the scale of the firm, and includes factors such as the enlargement of value added, market share, sales revenue, and firm scale. The second category represents the efficiency of the enterprise or returns on capital and manager’s ability, and includes factors such as profit maximization. The third category relates to the wealth of employees, including maximization of workers’ welfare.

This outcome helps us to develop an objective function for PRC enterprises. For the sake of simplicity, we assume that the objective function of these enterprises is a function of value added (output) and profit, or for simplification, a function of a weighted average of value added (output) and profit.

In our study, the typical planned economy is treated as one extreme case. In accordance with the above observation, we assume that the planned economy is a one firm-country system, meaning that the whole country is made up of only one firm. The amount produced by the firm is determined by the central government, based on a production function. Since there is no market in the planned economy, there is also no market price. Therefore, price is not a constraint. However, since resources are scarce, as in any other society, the planned economy also faces constraints on resources such as capital and labor. So-called state-owned firms are seen as production branches. What to produce, how to produce and how much to produce are all determined under the central government plan. As a result, resources are used so long as they are available to the government, which pursues high economic growth.

The other extreme case is the neoclassical market economy. Under this system, it is usually assumed that private companies take pure profit maximization as their final objective. This kind of enterprise, regardless of whether it exists in the real world, can be assumed as a standard for the purpose of comparison.

To model the development of the private sector in the PRC, we follow the method of Christina Gathmann (2001), which combines Lucas’s (Lucas, 1978) model of firm size with entrepreneurial talent, Luc Laeven and Christopher Woodruff (2004) with not only entrepreneurial talent but also the quality of legal system when determining optimal size of firms, and Fabiano Schivardi and Roobeto Torrini (2004), which investigate the role of employment protection legislation (EPL) in determining firm size distribution. All of these models assume that enterprises face a decreasing return to

scale.<sup>4</sup> Therefore, each enterprise is assumed to have a residual profit (income) after income is distributed among labor and capital. This residual profit pays for the manager's talent or technological level.

As stated above, people face considerable constraints, including lack of credit access and excessive administration processes, in starting up private enterprises. To represent the impediment faced by private enterprises, we introduce a proxy variable called "entrance cost" (C) into the model to represent all transaction costs other than labor and capital. Under a planned economy, the entrance cost can be unlimitedly high, so that private enterprises cannot be established in some sectors. With the progress of reform in the PRC, the entrance cost has fallen, making it easier for entrepreneurs to launch private enterprises.

We also introduce a variable that represents the degree to which an enterprise pays attention to profit maximization. Though many objective choices are presented for consideration, we believe that constructing a final or aggregate objective is helpful in the analysis of enterprise behavior. For the aggregate objective function, we simply assume that it is a weighted average of multiple choices. For the sake of simplicity, we assume that the objective function of a firm is a function of profit and output:

$$O = O(\pi, Y); \quad (1)$$

We further assume that an enterprise with labor (H) and capital (K) faces labor costs (W) and capital costs (R), and produces output (Y) with Cobb-Dougllass technology:

$$Y = AK^\alpha H^\beta, \quad \alpha + \beta < 1; \quad (2)$$

Following Lucas (1978), Managers finds a residual profit related to ability (A), and firms are assumed to have different sizes and to be controlled by different managers with different managerial abilities.

Considering the tax collected by the government, the after-tax residual profit function is:

$$\pi = (1 - \tau)AK^\alpha H^\beta - KR - HW - C \quad (3)$$

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<sup>4</sup> The model form of decreasing return to scale can be deduced from constant or increasing return to scale. For example, for constant return to scale technology  $y = AH^\alpha K^\beta L^{1-\alpha-\beta}$  (see Barro, Robert J., Sala-i-Martin, Xavier, 1995), where H: human capital, K: material capital, L: ordinary labor, managerial ability can be regarded as a function of human capital  $B = AH^\alpha$ . Thus, the production function can be rewritten as  $Y = BK^\beta L^{1-\alpha-\beta}$ , which is decreasing return to scale with respect to K and L (for  $\beta + (1-\alpha-\beta) = 1-\alpha < 1$ ). This assumption allows managers to share "a residual profit"  $\frac{\partial y}{\partial H} H = Y - (KR + LW)$ .

<sup>5</sup> In a competitive framework, the marginal return on capital is determined by the capital cost R. However, in the PRC, the money market price is almost completely controlled by the central bank, which represents the central government rather than the market. The interest rate as a benchmark of capital cost R is not determined by the market, but by the government. For this reason, in the relatively short run, R can be regarded as an exogenous variable individual that firms are not able to control.

Here  $\tau$  is the tax rate on output. Based on the above assumptions, the maximization problem faced by an enterprise can be written as:

$$\begin{aligned}
 \underset{K,L}{Max} O &= O(\pi, Y) \\
 &= (1 - \lambda)AK^\alpha H^\beta + \lambda[(1 - \tau)AK^\alpha H^\beta - KR - HW - C] \\
 &= (1 - \lambda\tau)AK^\alpha H^\beta - \lambda(KR + HW + C)
 \end{aligned} \tag{4}$$

Where  $\lambda$  is the privatization and marketization variable that represents the extent to which an enterprise pays attention to profit maximization, or the tendency of an enterprise toward profit maximization.

We believe that the assumption made here is suitable for both private enterprises and SOEs in the process of reform. In fact, the objective function can be adjusted with the variable  $\lambda$  to suit the characteristics of both private enterprises and SOEs:

- a) When  $\lambda = 1$ ,  $\underset{K,L}{Max} O = (1 - \tau)AK^\alpha H^\beta - (KR + HW + C)$ . This corresponds to residual profit maximization, the normal or standard pattern of behavior under a mature market economy, such as the U.S. and Japan.
- b) When  $\lambda = 0$ ,  $\underset{K,L}{Max} O = AK^\alpha H^\beta$ . This corresponds to output (value added) maximization. This is what a pure planned economy pursues. In this case, enterprises ignore constraints of factor price and government tax, and demands for both labor and investment are unlimited, notwithstanding the fact that the enterprise will eventually have to face constraints from supply: for example,  $K < K_0, L < L_0$ .
- c) In general cases,  $0 < \lambda < 1$ , we have  $\underset{K,L}{Max} O = (1 - \lambda\tau)AK^\alpha H^\beta - \lambda(KR + HW + C)$ . This expression reflects what current PRC private enterprises and non-private enterprises are pursuing, namely output maximization and profit maximization. A larger  $\lambda$  may represent the behavior of non-private enterprises under transformation, which tend to place more emphasis on profit maximization.

We also believe that with the deepening of market-oriented economic reform and the perfection of the legal system, the overall objective of PRC enterprises will move toward profit maximization, which means that  $\lambda$  will increase. That is why  $\lambda$  in this paper can be regarded as a variable representing the extent of privatization and marketization. Thus, the assumption here is suitable for both private and non-private enterprises.

## 2.2 Determination of Output, Investment and Employment in the Course of Privatization

The first order condition of problem (4) is

$$\frac{\partial O}{\partial K} = 0, \quad \frac{\partial O}{\partial H} = 0$$

or

$$\alpha(1 - \lambda\tau)AK^{\alpha-1}H^{\beta} = \lambda R \quad (5)$$

$$\beta(1 - \lambda\tau)AK^{\alpha}H^{\beta-1} = \lambda W \quad (6)$$

Under the first order condition (5) and (6), When  $\lambda < 1$ , then  $\frac{\partial F(K,H)}{\partial K} = \frac{\lambda R}{1-\lambda\tau} R < \frac{R}{1-\tau}$ ,  $\frac{\partial F(K,H)}{\partial H} = \frac{\lambda W}{1-\lambda\tau} < \frac{W}{1-\tau}$ ; That is, both capital and labor marginal productivity are below  $R/(1-\tau)$ <sup>6</sup>, which is exactly the cost of capital that a profit maximizing firm faces after tax. One might wonder how an enterprise can survive if investment is pushed to the point where marginal returns are below the cost of capital and entrepreneurs lose the ability to service loans and cover the opportunity cost of capital. In our opinion, this situation is likely related to the phenomenon called “soft budget constraints.” This phenomenon, which existed widely under the socialist system, means that the supply of funds is constrained in a soft manner and that the excessive demand for loans is easy to satisfy, if enterprises or persons near the group in power are able to cooperate with the government sector. To understand this phenomenon, readers need to understand the original conditions of the Chinese economy, where the national government owned almost all assets and could tolerate some losses for the sake of macroeconomic efficiency. Taking the state-owned economy as an example, in the beginning period of reform all investment was made by the government using fiscal funds, all profits were gained by the government, and all losses were compensated through fiscal funds. Because of these losses, large budget deficits occurred. When the government was unable to bear the losses from state owned enterprises, a policy or reform called “Bo Gai Dai” (拨改贷), meaning “replacing the appropriation of government funds for enterprises by banking loans to enterprises” was implemented. This reform cleared the difficulties of the fiscal sector. However, because there was little change in the operation mechanism of firms (gradualist reform) and losses still existed, the reform only transferred the fiscal burden to the banking sector, leading to large non-performing loans (over 25% of total bank assets). Under market rules, banks should have gone into bankruptcy. However, since they were mostly owned and guaranteed by the central government, both firms and banks were able to survive for a relatively long time as long as the state’s assets, including banking assets, were sufficient to bear their loss. With the prolonged accumulation of non-performing loans,

<sup>6</sup> Michael K. Y. Fang, Wai-Ming Ho and Lijing Zhu (1999) directly assume that the interest rate on loans is set so low that there is an excess demand for bank loans. This means that excessive demand is caused by the low interest rate and bears no relation to the behavior of firms. Here, we can conclude that excessive demand is caused by a deviation of firm objectives from profit maximization, and that excessive demand is satisfied with a soft constraint supply.



the banking sector now seems to have lost the ability to continually bear the losses. Considering the pressure from the accession to the WTO, reform of the banking sector has become an urgent task.

This objective deviation from profit maximization combined with soft budget constraints has had a double effect on the economy: on one hand it has led to a loss of state-owned assets, and on the other hand it has forced the government to reform the economic system toward privatization. Privatization has then forced firms to pay more attention to profit maximization and to promote marginal return to capital and cut losses.

Solving (5) and (6), the demand for investment, capital and labor are respectively:

$$K_\lambda = \frac{\alpha(1-\lambda\tau)Y_\lambda}{\lambda R} = A^{\frac{1}{1-\alpha-\beta}} \left( \frac{1-\lambda\tau}{\lambda} \right)^{\frac{1}{1-\alpha-\beta}} \cdot \left( \frac{\alpha}{R} \right)^{\frac{1-\beta}{1-\alpha-\beta}} \cdot \left( \frac{\beta}{W} \right)^{\frac{\beta}{1-\alpha-\beta}} \quad (7)$$

$$H_\lambda = \frac{\beta(1-\lambda\tau)Y_\lambda}{\lambda W} = A^{\frac{1}{1-\alpha-\beta}} \left( \frac{1-\lambda\tau}{\lambda} \right)^{\frac{1}{1-\alpha-\beta}} \cdot \left( \frac{\alpha}{R} \right)^{\frac{\alpha}{1-\alpha-\beta}} \cdot \left( \frac{\beta}{W} \right)^{\frac{1-\alpha}{1-\alpha-\beta}} \quad (8)$$

$$Y_\lambda = A^{\frac{1}{1-\alpha-\beta}} \left( \frac{1-\lambda\tau}{\lambda} \right)^{\frac{\alpha+\beta}{1-\alpha-\beta}} \cdot \left( \frac{\alpha}{R} \right)^{\frac{\alpha}{1-\alpha-\beta}} \cdot \left( \frac{\beta}{W} \right)^{\frac{\beta}{1-\alpha-\beta}} \quad (9)$$

Where,  $Y_\lambda$ ,  $K_\lambda$  and  $H_\lambda$  represent the equilibrium solutions to the maximization of (4) with parameter  $\lambda$ .  $\lambda = 1$  means that the only thing that enterprises pursue is profits and that no other factors are taken into account. The capital investment, labor demand and output corresponding to  $\lambda = 1$ , are respectively:

$$K_1 = A^{\frac{1}{1-\alpha-\beta}} (1-\tau)^{\frac{1}{1-\alpha-\beta}} \cdot \left( \frac{\alpha}{R} \right)^{\frac{1-\beta}{1-\alpha-\beta}} \cdot \left( \frac{\beta}{W} \right)^{\frac{\beta}{1-\alpha-\beta}} \quad (10)$$

$$H_1 = A^{\frac{1}{1-\alpha-\beta}} (1-\tau)^{\frac{1}{1-\alpha-\beta}} \cdot \left( \frac{\alpha}{R} \right)^{\frac{\alpha}{1-\alpha-\beta}} \cdot \left( \frac{\beta}{W} \right)^{\frac{1-\alpha}{1-\alpha-\beta}} \quad (11)$$

$$Y_1 = A^{\frac{1}{1-\alpha-\beta}} (1-\tau)^{\frac{\alpha+\beta}{1-\alpha-\beta}} \cdot \left( \frac{\alpha}{R} \right)^{\frac{\alpha}{1-\alpha-\beta}} \cdot \left( \frac{\beta}{W} \right)^{\frac{\beta}{1-\alpha-\beta}} \quad (12)$$

It is easy to show, under  $0 < \lambda \leq 1$ , that

$$\frac{\partial Y_\lambda}{\partial \lambda} < 0; \quad \frac{\partial K_\lambda}{\partial \lambda} < 0; \quad \frac{\partial H_\lambda}{\partial \lambda} < 0; \quad (13)$$

$$\frac{\partial Y_\lambda}{\partial \tau} < 0; \quad \frac{\partial K_\lambda}{\partial \tau} < 0; \quad \frac{\partial H_\lambda}{\partial \tau} < 0; \quad (14)$$

$$\frac{\partial Y_\lambda}{\partial W} < 0; \quad \frac{\partial K_\lambda}{\partial W} < 0; \quad \frac{\partial H_\lambda}{\partial W} < 0; \quad (15)$$

$$\frac{\partial Y_\lambda}{\partial R} < 0; \frac{\partial K_\lambda}{\partial R} < 0; \frac{\partial H_\lambda}{\partial R} < 0; \quad (16)$$

and therefore,

$$Y_\lambda = A^{\frac{1}{1-\alpha-\beta}} \left( \frac{1-\lambda\tau}{\lambda} \right)^{\frac{\alpha+\beta}{1-\alpha-\beta}} \cdot \left( \frac{\alpha}{R} \right)^{\frac{\alpha}{1-\alpha-\beta}} \cdot \left( \frac{\beta}{W} \right)^{\frac{\beta}{1-\alpha-\beta}} \geq Y_1 \quad (17)$$

$$K_\lambda = \frac{\alpha(1-\lambda\tau)Y_\lambda}{\lambda R} > \frac{\alpha(1-\tau)Y_1}{R} = K_1 \quad (18)$$

$$H_\lambda = \frac{\beta(1-\lambda\tau)Y_\lambda}{\lambda W} > \frac{\beta(1-\tau)Y_1}{W} = H_1 \quad (19)$$

Proposition 1: from equations (13)-(19), we can conclude that:

- 1) In equilibrium, the supply of output, demand for capital investment and demand for labor in  $\lambda < 1$  are larger than those at  $\lambda = 1$ . This implies that both private enterprises and SOEs undergoing reform in the PRC create greater investment and employment than enterprises pursuing profit maximization as their only objective. This may be one reason why the PRC often faces overheated investment and a resulting overheated economy.
- 2) In equilibrium, the supply of output, demand for capital investment and demand for labor are decreasing functions of tax on output. The higher the tax rate, the lower the output supply, and the lower the demand for investment and labor.
- 3) Production costs also have a significant influence on output, demand for investment and demand for labor. Output and demand for investment and labor are also decreasing functions of labor and capital costs. This implies that lower labor and capital costs are factors behind the rapid private sector development of the PRC.
- 4) As the manager's ability ( $A$ ) increases, more workers are hired, greater investment is made and more goods are produced.

We have noted that in the roughly quarter century of reform beginning in 1978, the PRC economy experienced a long period of inflation, which was sometimes called economic overheating. This overheating was basically caused by excessive investment under the influence of the government. One important reason for this phenomenon is that, as a result of strong government interference and incomplete marketization and privatization, enterprises in the PRC could not pursue profit maximization as their sole objective. Furthermore, soft constraint mechanisms on the supply side pushed actual investment far above the equilibrium of profit maximization, leading to excessive investment and marginal productivity below the equilibrium of profit maximization. Clearly, this proposition also gives us two other reasons for the rapid development of the private sector, i.e., the lower costs of labor and capital.

### 2.3 Determination of the Residual Profits of Firms and Their Impact on the Banking Sector

It is well known that a profit maximization-seeking enterprise can efficiently use the resources available to it. However, this is not necessarily true for non-profit maximization-seeking enterprises. We can see from the following that in the lack of adequate marketization or privatization, even if a firm employs more labor and more capital inputs, it may obtain negative profits.

According to the residual profit function:

$$\begin{aligned}\pi_\lambda &= (1-\tau)AK^\varepsilon H^\beta - (KR + HW + C) \\ &= \left[ (1-\tau) - (\alpha + \beta) \cdot \left( \frac{1-\lambda\tau}{\lambda} \right) \right] \cdot A^{\frac{1}{1-\alpha-\beta}} \left( \frac{1-\lambda\tau}{\lambda} \right)^{\frac{\alpha+\beta}{1-\alpha-\beta}} \cdot \left( \frac{\alpha}{R} \right)^{\frac{\alpha}{1-\alpha-\beta}} \cdot \left( \frac{\beta}{W} \right)^{\frac{\beta}{1-\alpha-\beta}} - C\end{aligned}\quad (20)$$

It is easy to show that the first term of the right side of the above equation is negative when  $\lambda < (\alpha + \beta)/[1 - (1 - \alpha - \beta)\tau]$  and then  $\pi_\lambda < 0$ . In addition, since  $0 < \lambda \leq 1$  and  $\frac{1}{\lambda} > 1$ , the partial derivative of residual profit with respect to  $\lambda$  is an increasing function of the privatization variable  $\lambda$  due to:

$$\frac{\partial \pi_\lambda}{\partial \lambda} = \frac{\alpha + \beta}{1 - \alpha - \beta} \cdot \left( \frac{1-\lambda\tau}{\lambda} \right)^{\frac{1}{1-\alpha-\beta}} \cdot \left( \frac{1}{\lambda} - 1 \right) \cdot \left( \frac{1}{(1-\lambda\tau)^2} \right) \cdot A^{\frac{1}{1-\alpha-\beta}} \left( \frac{\alpha}{R} \right)^{\frac{\alpha}{1-\alpha-\beta}} \cdot \left( \frac{\beta}{W} \right)^{\frac{\beta}{1-\alpha-\beta}} > 0\quad (21)$$

To assure the existence of enterprises,<sup>7</sup> it is reasonable to assume that the firm produces a positive residual profit to pay for the manager's ability. Therefore, a reasonable assumption is  $(1-\tau) - (\alpha + \beta) \cdot \left( \frac{1-\lambda\tau}{\lambda} \right) > 0$ , or  $\lambda > \frac{\alpha + \beta}{1 - (1 - \alpha - \beta)\tau}$ <sup>8</sup> in the case of  $0 < \lambda \leq 1$ . We have

$$\begin{aligned}\frac{\partial \pi_\lambda}{\partial A} &= \frac{1}{1 - \alpha - \beta} \left[ (1-\tau) - (\alpha + \beta) \cdot \left( \frac{1-\lambda\tau}{\lambda} \right) \right] \cdot \left( \frac{1-\lambda\tau}{\lambda} \right)^{\frac{\alpha+\beta}{1-\alpha-\beta}} \cdot A^{\frac{\alpha+\beta}{1-\alpha-\beta}} \left( \frac{\alpha}{R} \right)^{\frac{\alpha}{1-\alpha-\beta}} \cdot \left( \frac{\beta}{W} \right)^{\frac{\beta}{1-\alpha-\beta}} \\ \frac{\partial \pi_\lambda}{\partial A} &\geq 0, \lambda \geq (\alpha + \beta)/[1 - (1 - \alpha - \beta)\tau]\end{aligned}\quad (22)$$

<sup>7</sup> It is difficult for an enterprise to survive with a negative residual profit. Negative profit means that nothing can be paid for the manager's ability and that no one with that ability would wish to become a manager.

<sup>8</sup> If  $\lambda < (\alpha + \beta)/[1 - (1 - \alpha - \beta)\tau]$ , no residual profit will be paid for the manager's ability. This type of firm has no reason to exist in the long run. This explains why SOEs eventually go bankrupt: they pay too much attention to nonprofit objectives.

$$\frac{\partial \pi_\lambda}{\partial \tau} = \frac{-[(1-\alpha-\beta)\lambda(1-\tau) + (1-\lambda)]}{(1-\alpha-\beta) \cdot (1-\lambda\tau)} \cdot A^{\frac{1}{1-\alpha-\beta}} \left(\frac{\alpha}{R}\right)^{\frac{\alpha}{1-\alpha-\beta}} \cdot \left(\frac{\beta}{W}\right)^{\frac{\beta}{1-\alpha-\beta}} < 0 \quad (23)$$

$$\frac{\partial \pi_\lambda}{\partial C} = -1 < 0 \quad (24)$$

Proposition 2: from the discussion above, we have:

- $\lambda < \frac{\alpha + \beta}{1 - (1 - \alpha - \beta)\tau}$
1. When  $\lambda$  is small enough such that  $\lambda < \frac{\alpha + \beta}{1 - (1 - \alpha - \beta)\tau}$ , residual profit is negative. When  $\lambda = 1$ , the residual profit is maximized.
  2. Lowering the entrance cost promotes residual profit or income of the enterprise manager.

- $\lambda > \frac{\alpha + \beta}{1 - (1 - \alpha - \beta)\tau}$
3. If  $\lambda$  is large enough such that  $\lambda > \frac{\alpha + \beta}{1 - (1 - \alpha - \beta)\tau}$ , the manager's ability is positively related to the residual profit. This implies that the manager's income can be connected to the enterprise's residual profit. This conclusion accords well with firm contract theory. If  $\lambda$  is small enough and capital is financed by banking loans, enterprises might not have enough money to pay back their loans and might go to bankrupt if they do not carry out further reform.
  4. The profit of enterprises decreases when output tax goes up.

#### 2.4 Determination of the Number and Size of Private Enterprises

Let us now turn to how the number and average size of enterprises is determined. In the labor market, each individual has to decide whether to opt to be hired as a worker and earn wages or to run an enterprise and earn residual profits. The decision depends on how much the individual can earn in either of the two choices. If one chooses to be a worker one earns a wage  $W$ ; if one chooses to run an enterprise one earns a residual profit  $\pi_\lambda$ .<sup>9</sup> The rule therefore is that a person will choose to be a manager if the residual profit owned by the manager  $\pi_\lambda \geq W$ ;<sup>10</sup> otherwise, he or she will choose to be a worker. Rewriting this formula, we find:

$$\left[ (1-\tau) - (\alpha + \beta) \cdot \left( \frac{1-\lambda\tau}{\lambda} \right) \right] \cdot A^{\frac{1}{1-\alpha-\beta}} \left( \frac{1-\lambda\tau}{\lambda} \right)^{\frac{\alpha+\beta}{1-\alpha-\beta}} \cdot \left( \frac{\alpha}{R} \right)^{\frac{\alpha}{1-\alpha-\beta}} \cdot \left( \frac{\beta}{W} \right)^{\frac{\beta}{1-\alpha-\beta}} - C \geq W \quad (24)$$

<sup>9</sup> Following modern firm contract theory, if control rights are separated from ownership, residual income is related to the ability of managers. Thus, the contract of a firm with managers should indicate that the residual income should be at least partly owned by the managers, in order to encourage them to work hard for the firm. Here just for the sake of ease of explanation, we assume that the residual income (profit) totally belongs to the managers.

<sup>10</sup> From an accountant's view, the profit is divided into two parts, the normal profit  $KR$  and the residual profit  $\pi_\lambda$ . The contribution of capital is the normal profit  $KR$ , which accrues to ownership.

This formula implies that a manager earns a residual profit that is not smaller than the wage earned by a worker. If all other conditions are equal, we can find the solution of A in the equation:

$$\left[ (1-\tau) - (\alpha + \beta) \cdot \left( \frac{1-\lambda\tau}{\lambda} \right) \right] \cdot A^{\frac{1}{1-\alpha-\beta}} \left( \frac{1-\lambda\tau}{\lambda} \right)^{\frac{\alpha+\beta}{1-\alpha-\beta}} \cdot \left( \frac{\alpha}{R} \right)^{\frac{\alpha}{1-\alpha-\beta}} \cdot \left( \frac{\beta}{W} \right)^{\frac{\beta}{1-\alpha-\beta}} - C = W \quad (25)$$

We assume that the solution of (25) for A is  $\bar{A}$ , which can be called the marginal managerial ability or ability threshold for a person to be a manager. This means that there is a person with ability  $\bar{A}$ , who can be called a marginal manager (Christina Gathmann, 2001), and who is indifferent to the choice of being a manager or a worker. In both professions the person will have the same income. Now we can solve for the location of a marginal manager with ability  $\bar{A}$ . Still assuming

$\lambda > \frac{\alpha + \beta}{1 - (1 - \alpha - \beta)\tau}$  as before, we have

$$\bar{A} = \frac{(C + W)^{1-\alpha-\beta}}{\left[ (1-\tau) - (\alpha + \beta) \cdot \left( \frac{1-\lambda\tau}{\lambda} \right) \right]^{1-\alpha-\beta} \cdot \left( \frac{1-\lambda\tau}{\lambda} \right)^{\alpha+\beta} \cdot \left( \frac{\alpha}{R} \right)^{\alpha} \cdot \left( \frac{\beta}{W} \right)^{\beta}},$$

and

$$\frac{\partial \bar{A}}{\partial \lambda} < 0 \quad (26)$$

$$\frac{\partial \bar{A}}{\partial w} > 0 \quad (27)$$

$$\frac{\partial \bar{A}}{\partial R} > 0 \quad (28)$$

$$\frac{\partial \bar{A}}{\partial C} > 0 \quad (29)$$

$$\frac{\partial \bar{A}}{\partial \tau} > 0 \quad (30)$$

Formula (26) implies that the more attention an enterprise pays to profit (that is, the larger  $\lambda$ ), the lower is the marginal manager's ability (that is, the smaller  $\bar{A}$ ). The logic behind this conclusion is: as an enterprise pays more attention to profit, its residual profit (the portion over normal profit "KR") increases (see Proposition 1), and this means that even a person with low managerial ability to run an enterprise can earn residual profits exceeding the wages he or she would earn as a worker. Equivalently, the threshold for becoming a manager falls with the progress of privatization and marketization. With progress in these areas, government intervention decreases, and more and more people can be expected to join the group of managers. This means that

more enterprises will be established. This may be one of the reasons why the number of private enterprises in the PRC has risen so quickly.

Formulas (27), (28), (29) and (30) tell us that marginal managerial ability increases with labor, capital and entrance costs. Hence, the rapid development of the private sector in the PRC can be at least partly attributed to lower labor and capital costs. Formula (29) also implies that higher costs to entry and uneven treatment of the private sector lead to higher marginal managerial ability, and therefore the establishment of fewer private enterprises. The logic behind the conclusions induced from (27), (28), (29) and (30) is almost the same: lower costs, including factor costs, taxes and costs to entry, make the production process more profitable, allowing persons with low managerial ability to earn more as managers than as workers. This implies that lower marginal management ability is required for a person to run an enterprise and earn the same profit as before. In other words, the marginal manager's ability is reduced.

In considering the difference of managerial ability “ $A$ ” among people and also taking account of the learning effect of managerial ability with the progress of privatization and marketization (i.e. managerial ability is assumed to grow with privatization and marketization), it is relevant to assume that managerial ability in a population is a random variable distributed with a continuous probability distribution function  $F(x; \lambda)$ <sup>11</sup> with parameter  $\lambda$ , representing the probability of a person's managerial ability being less than  $x$

$$P(A < x) = F(x; \lambda)$$

and a continuous density function of  $A$

$$\frac{\partial F(x; \lambda)}{\partial x} = F'_x(x; \lambda) = f(x; \lambda)$$

where “ $f(x; \lambda) > 0$ ” means  $F(x; \lambda)$  is an increasing function of  $x$  in light of the characteristics of the distribution function and “ $\frac{\partial F(x; \lambda)}{\partial \lambda} < 0$ ” means  $F(x; \lambda)$  is a decreasing function of  $\lambda$ . In other words, given a level of managerial ability  $x$ , if there is a learning effect, the ratio of people with managerial ability above  $x$  will increase with privatization and marketization. It is clear that this result accords with our intuition.

Since the ability of people in the economy follows a probability distribution function  $F(x; \lambda)$ , which is an increasing function of  $x$ , all people with ability below marginal level  $\bar{A}$  in the distribution will become workers and those with ability above  $\bar{A}$  will become managers. Therefore, if the total number of people looking for jobs in the economy is  $N$ , the numbers of workers will be  $N_l = NF(\bar{A}; \lambda)$ , and the numbers of firms will be  $N_m = N(1 - F(\bar{A}; \lambda))$ . Taking the partial derivatives of  $N_l$  and  $N_m$  with respect to independent variables, we find:

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<sup>11</sup> The precise distribution of  $A$  should be a discrete distribution because we assume a limited number of people.

$$\frac{\partial F(\bar{A}; \lambda)}{\partial \bar{A}} = f(\bar{A}; \lambda) > 0, \quad (31)$$

$$\frac{\partial N_m}{\partial N} = 1 - F(\bar{A}; \lambda) > 0, \quad (32)$$

$$\frac{\partial N_l}{\partial N} = F(\bar{A}; \lambda) > 0 \quad (33)$$

$$\frac{\partial N_l}{\partial \bar{A}} = Nf(\bar{A}; \lambda) > 0, \quad (34)$$

$$\frac{\partial N_m}{\partial \bar{A}} = -Nf(\bar{A}; \lambda) < 0, \quad (35)$$

$$\frac{\partial N_l}{\partial \lambda} = N \cdot \left[ f(\bar{A}; \lambda) \frac{\partial \bar{A}}{\partial \lambda} + \frac{\partial F(\bar{A}; \lambda)}{\partial \lambda} \right] < 0 \quad (36)$$

$$\frac{\partial N_m}{\partial \lambda} = -N \cdot \left[ f(\bar{A}; \lambda) \cdot \frac{\partial \bar{A}}{\partial \lambda} + \frac{\partial F(\bar{A}; \lambda)}{\partial \lambda} \right] > 0 \quad (37)$$

$$\frac{\partial N_m}{\partial C} = \frac{\partial N_m}{\partial \bar{A}} \cdot \frac{\partial \bar{A}}{\partial C} < 0 \quad (38)$$

$$\frac{\partial N_m}{\partial R} = \frac{\partial N_m}{\partial \bar{A}} \cdot \frac{\partial \bar{A}}{\partial R} < 0 \quad (39)$$

$$\frac{\partial N_m}{\partial W} = \frac{\partial N_m}{\partial \bar{A}} \cdot \frac{\partial \bar{A}}{\partial W} < 0 \quad (40)$$

Formulas (36) and (37) indicate that the number of private enterprises is an increasing function of  $\lambda$ , and the number of workers is a decreasing function of  $\lambda$  (the variable of marketization and privatization). Formulas (38), (39) and (40) indicate that the number of private enterprises is a decreasing function of factor cost  $R$ ,  $W$  and entrance cost  $C$  faced by private enterprises. Thus, we have proposition 3.

Proposition 3: all other conditions being constant, both the number of enterprises and laborers will increase with total employment. The progress of marketization and privatization, and decreasing labor costs, capital costs and entrance costs will cause the number of private enterprises to rise, but the progress of marketization and privatization cause the demand for workers to go down and the demand for managers to go up.

Now let us look at the determination of average firm size. There are many indicators for measuring firm size; one is the average number of workers per firm, which is attained by dividing the total number of workers in the economy by the total number of firms (managers), denoted by  $S$ :

$$S = \frac{F(\bar{A}; \lambda)}{1 - F(\bar{A}; \lambda)} \quad (41)$$

Taking the derivative of S, we have:

$$\frac{\partial S}{\partial \bar{A}} = \frac{f(\bar{A}; \lambda)}{(1 - F(\bar{A}; \lambda))^2} > 0, \quad (42)$$

and

$$\frac{\partial S}{\partial \lambda} = \frac{\partial S}{\partial \bar{A}} \cdot \frac{\partial \bar{A}}{\partial \lambda} + \frac{1}{(1 - F(\bar{A}, \lambda))^2} \frac{\partial F(\bar{A}; \lambda)}{\partial \lambda} < 0 \quad (43)$$

$$\frac{\partial S}{\partial C} = \frac{\partial S}{\partial \bar{A}} \cdot \frac{\partial \bar{A}}{\partial C} > 0 \quad (44)$$

$$\frac{\partial S}{\partial W} = \frac{\partial S}{\partial \bar{A}} \cdot \frac{\partial \bar{A}}{\partial W} > 0 \quad (45)$$

$$\frac{\partial S}{\partial R} = \frac{\partial S}{\partial \bar{A}} \cdot \frac{\partial \bar{A}}{\partial R} > 0 \quad (46)$$

Formula (41) expresses how firm size varies with marginal managerial ability and the privatization and marketization parameter  $\lambda$ . (42) indicates that firm size S is positively related to marginal managerial ability  $\bar{A}$ ; in other words, the higher the marginal managerial ability, the higher the threshold for a person to be a manager, or the harder for a manager to create a firm. The higher threshold for people to establish a firm means that fewer people have management ability higher than  $\bar{A}$ . Because the number of managers equals firm number, as assumed, fewer enterprises are established.

Formula (43) shows that the deepening of privatization and marketization ( $\lambda$ ) has two effects on firm size. One is the threshold effect. That is, privatization and marketization directly lower the threshold for establishing an enterprise. The other is a learning effect. In other words, managerial ability rises with privatization and marketization, making people more likely to start up firms and less likely to be workers. Since both effects make it easier to set up firms, privatization and marketization will lead to more and more new firms being established. On the other side, new firms are usually relatively small, making the average size of enterprises small as well. In the PRC, the average firm size of private enterprises decreased from 18 in 1989 to 14 in 2002; this can be at least partly attributed to the privatization and marketization process. This process increases firms' profits and lowers the threshold or marginal managerial ability (required ability to create an enterprise). We can provide a similar but much easier explanation for (44), (45) and (46): the lower the cost, the more residual profit the manager will earn and the lower will be the ability required for a person to run a profitable enterprise. More people will become managers and more firms will be established. To summarize the above analysis, we obtain the following conclusions from (41)-(46).

Proposition 4: at equilibrium, the average firm size is determined by the marginal manager's ability and the "leaning by doing" effect of marketization and privatization. Since marginal managerial ability depends on marketization and privatization, labor costs, capital costs and entrance costs, all other factors being equal,



the threshold for creating a new company will fall with the deepening of marketization and privatization, meaning that it will become easier to create a new company, and the average size of firms will fall. With the fall of entrance, labor and capital costs, the average firm size will decrease as well. Additionally, a learning effect will lift people's managerial ability and mean that fewer will be workers, so the learning effect will also lead to a smaller average size of firms.

In addition, under the model there is a managerial ability threshold (marginal level of manager's ability) for creating firms and all firms with a managerial ability over the threshold can survive. In accord with the real world, firms of different sizes can co-exist at the same time. Of course, if the firm's manager's ability falls below the threshold, the firm will not survive. The difference between firms with different managerial ability can be found in different residual profits and manager's revenue. Only if an individual has greater managerial ability than the marginal level, can he or she earn more than a worker's wages.

### **3. Implications and Conclusions**

As far as the CASS survey is concerned, it seems that all firms pursue, roughly speaking, three objectives: maximization of profit, sales revenue and market share. Though the difference in behavior between firms may be large, we do not see a significant difference in behavioral patterns among sectors. From the model analysis, we find that enterprises with multiple objectives have larger demand for investment and labor, and tend to produce more output than do those with the single objective of profit maximization. This accords with the objectives of the government sector to pursue higher economic growth and increased employment opportunities. However, enterprises with multiple objectives may be less competitive than those with the single objective of profit maximization, since they earn smaller profits. Worse, since the marginal productivity of capital is lower than its cost, profits tend to become negative, and enterprises may be unable to repay their loans to the banks. This results in a weakening of the foundation for the existence of the enterprise, or in non-performing loans in the banking sector. In other words, SOEs actually redistribute state-owned assets through negative profits and relatively high salaries that cannot be justified from the real contribution of labor to output.

This model helps to explain why the number of private enterprises has increased so rapidly along with the scaling down of size. The factors behind the increase in the number of enterprises are privatization and marketization, labor and capital costs, entrance costs and the tax rate. The deepening of privatization and marketization, relatively lower labor and capital costs, and falling entrance costs, all contributed to increases in the number of private enterprises, while the fall in marginal manager's ability and deepening of privatization and marketization, fall of entrance costs and other costs all contributed to a decrease in firm size.

The model also at least partly helps to explain why the "big bang" reform in Russia led to the sudden and widespread collapses of privatized SOEs, and to some extent helps to explain why gradual reform has been somewhat successful in the PRC. According to this model, the development of private enterprises depends not only on privatization and marketization, but also on a variety of other factors, such as capital cost, labor cost, entrance cost, tax and especially manager's ability. Holding other

conditions constant, bigger enterprises require higher managerial ability and skill, and thus only firms with appropriate marginal ability can survive in a market economy. If a big firm is run by a manager with low ability, it will lose profits and eventually go bankrupt. The collapse of privatized SOEs in Russia may be attributed to this matching problem. As is well known, in the early period of reform, most private enterprises in Russia were created from the privatization of very large SOEs, and therefore required high managerial ability. However, most of the managers only had experience running enterprises under a planned economy, and had little knowledge about running them under market conditions. Eventually, they ended up being unable to manage big private enterprises. In contrast, when the PRC started to privatize its SOEs, it not only trained a mass of high-level managers in private enterprises to match the size of enterprise, but also accumulated a great deal of wealth to prepare the physical conditions for the privatization of SOEs.

Due to the rather high political profile of SOEs in the early period of reform, the PRC did not privatize them immediately, but left their nominal ownership unchanged and instituted a so-called contract responsibility system. As a result, many SOEs inevitably faced losses. However, unlike the big bang reform, where individuals took the losses, under the gradual reform in the PRC, the government typically absorbed them. This process quickly eroded the state's financial resources, including fiscal and banking, and the state's liabilities came increasingly close to assets. Once the government (including state-owned banks) became unable to absorb the losses incurred by SOEs, the acceleration of privatization became inevitable. This is the background of the so-called "Zhuan Da Fang Xiao" reforms.

In summary, this model has strong policy implications. SOEs, TVEs and the banking sector should all actively and continuously carry out market-oriented reforms. Private enterprises need to promote market awareness, and thereby transform themselves into pure profit-maximization entities.

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