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**The Dynamics of Reforms of Large State-Owned
Enterprises in China: A Theoretical and Political
Economy Analysis**

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Thesis submitted for the degree of PhD in Development
Economics

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Abstract

Although the Chinese economy has grown dramatically in the last 40 years, the bulwark of the economy, large state-owned enterprises (SOEs), still encounter major dilemmas in the form of political, economic and social factors. This thesis offers a theoretical framework for understanding the reform of China's large SOEs and brings political economy and neo-classical economics approaches to the analysis. This thesis puts forward two main arguments. Firstly, the dramatic growth and expansion of large SOEs in China can be explained by drawing on notions of internal corporate governance and external state governance structures. Secondly, the dynamics of the partial-privatization reform of large SOEs is contingent upon the interaction of three factors: (1) the state's foreign ownership regulation policies towards partially privatized large SOEs; (2) the state's foreign ownership regulation policies towards domestic private firms and thirdly, and (3) the output dynamics of both domestic private and partially privatized large SOEs.

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Abbreviations

CEO: Chief Executive Officer

FDI: Foreign Direct Investment

GDP: Gross Domestic Product

ROA: Return on Assets

SOE: State-Owned Enterprises

SASAC: State-Owned Assets Supervision and Administration Commission

TFP: Total Factor Productivity

TVEs: Township and Village Enterprises

Chapter 1

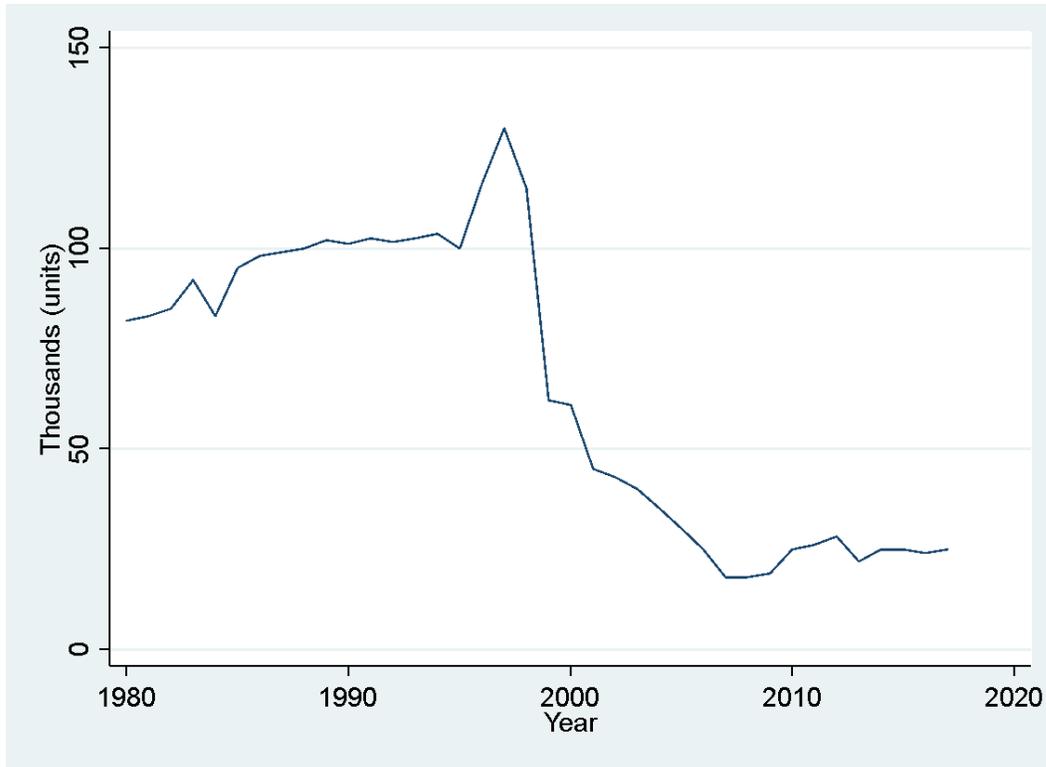
Introduction

1.1 Stylized Facts Regarding the Evolution of State Sectors in China under the Opening-up Policies and Research Objectives of the Thesis

1.1.1 Some Stylized Facts

China's economic transition, initiated in the late 1970s, is one of the most spectacular phenomena in modern economic history. The state sector and its role in shaping the dynamics of the structural transformation of the economy has been one of the most hotly debated topics in literatures on China's economic reforms. From the early 1980s to the late 1990s, the overall weight of the state sector in China remained high and dominant. This situation was reversed when the Chinese government initiated the privatization campaign: '*Grasp the Large and Get Rid of the Small*', in which only small-to-medium sized SOEs with annual turnovers below 500 million RMB were sold to private owners, whilst the remaining large SOEs with annual turnovers above 500 million RMB, remained state controlled (Hsieh and Song, 2015).¹ Figure 1 shows the overall trend in the number of SOEs in China since 1980; it shows a sudden drop towards the end of the 1990s as a result of the, '*Grasp the Large and Get Rid of the Small*' reform.

¹ The term 'SOE' used throughout this thesis refers to large state-owned enterprises which are either 100% state-owned or majority state-owned, and in which the state-owned share is at least 51%.



Source: *China Statistical Yearbook (1980-2017)*.

Figure 1.1: The Evolution of the Number of SOEs in China (1980-2017)

Figure 1.1 shows a generally decreasing trend in the number of SOEs in China since the 1980s. This is not surprising because the state sector which has been mainly dominated by small-to-medium SOEs, has been shrinking for several decades. However, what is less known is that since the 2000s, especially after the financial crisis (2008), there appears to have been a rise in the total number of SOEs in China, as shown by Figure 1.1. Furthermore, if we consider the distribution of SOEs across sectors, including upstream, high value-added and capital-intensive sectors, it can be seen that despite the absolute decline in the number of firms in these sectors, SOEs still play a very important role with a very high level of industrial output in 2017. The following Table 1.1 shows the distribution of SOEs across sectors in 1998 and 2017.

Table 1.1: China's SOEs in Selected Industries in 1998 and 2017

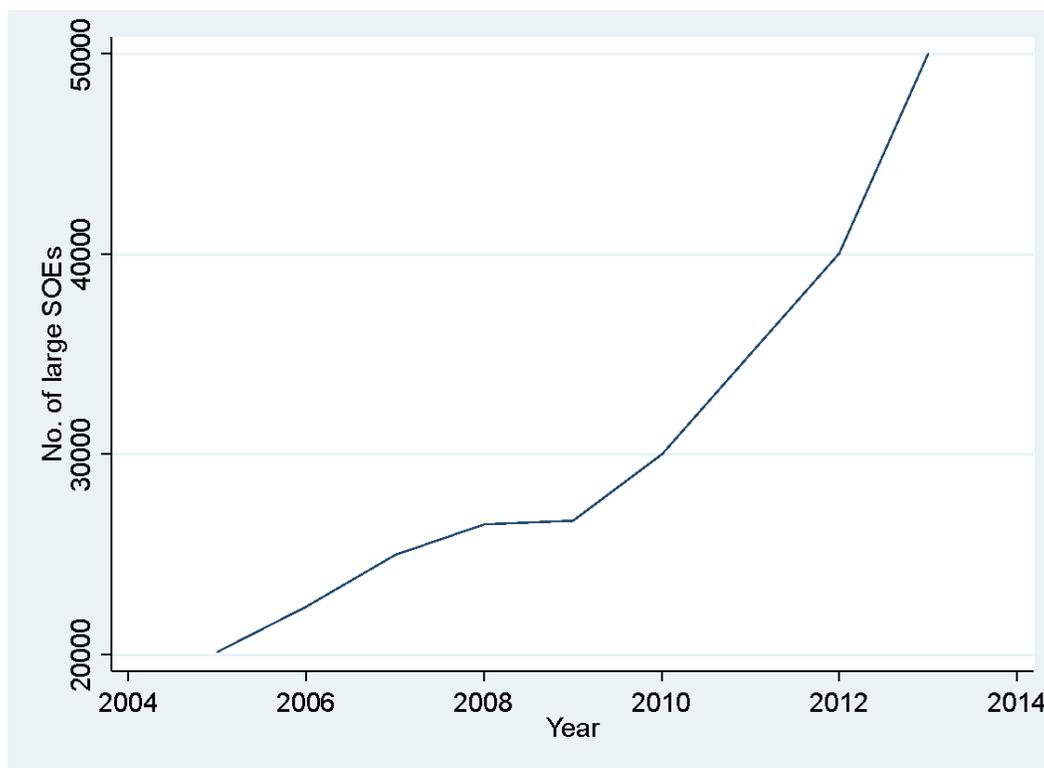
	Number of Firms		Gross Industrial Output		Total Assets	
	1998	2017	1998	2017	1998	2017
Mining and Washing of Coal	49.5	18.8	81.9	64.1	92.7	75.7
Extraction of Petroleum and Natural Gas	81.7	62.9	94.5	84.3	98.9	95.0
Manufacture of Food	44.1	3.7	29.7	6.0	41.1	8.5
Manufacture of Tobacco	87.2	77.0	98.3	99.3	98.2	99.1
Manufacture of Textiles	24	0.9	32.2	2.3	46.2	5.4
Printing, Reproduction of Recording Media	58	5.0	37.9	6.6	51.2	12.8
Processing of Petroleum, Cooking and Nuclear Fuel	28.3	12.2	91.0	56.2	90.3	51.8
Manufacture of Chemical Products	32.3	5.0	50.4	18.0	69.5	29.5
Manufacture of Medicines	45.3	5.7	49.6	8.7	60.8	15.0
Manufacture of Rubber	21	1.3	34.3	3.8	50.7	7.2
Manufacture of General Machinery	29.6	3.0	38.4	9.8	60.7	20.2
Manufacture of special machinery	40.9	3.9	41.2	12.5	63.3	24.6
Manufacture of Transport Equipment	40.1	11.1	67.0	41.8	78.2	60.5
Manufacture of Communication Equipment	29.8	3.9	37.7	9.1	51.0	17.4
Production and Supply of Electric Power and Heat Power	85.6	54.2	85.4	91.5	89.1	87.0
Production and Supply of Water	92.6	28.0	87.8	49.8	90.3	53.7
Production and Supply of Gas	84	59.3	71.6	69.0	93.7	81.6

Source: China Statistical Yearbook (1999 and 2018)

Notes: SOEs include both small-medium and large ones. The number of firms are measured in the units of 1 thousand, and both gross industrial output and total assets are measured in the units of 100 million RMB.

The figures reported in Table 1.1 suggest that in most of the upstream and capital-intensive sectors in China such as gas, oil, water, tobacco, and the production of electric and heat power, SOEs still dominate most of the market share and still generate very high levels of industrial output and total assets. Moreover, if we look at how the absolute number of large SOEs with annual operating income over 500 million RMB evolves over time, in comparison to Figure 1.1, the

opposite occurs. Figure 1.2 shows how the number of large SOEs has increased since the beginning of the 2000s in China:

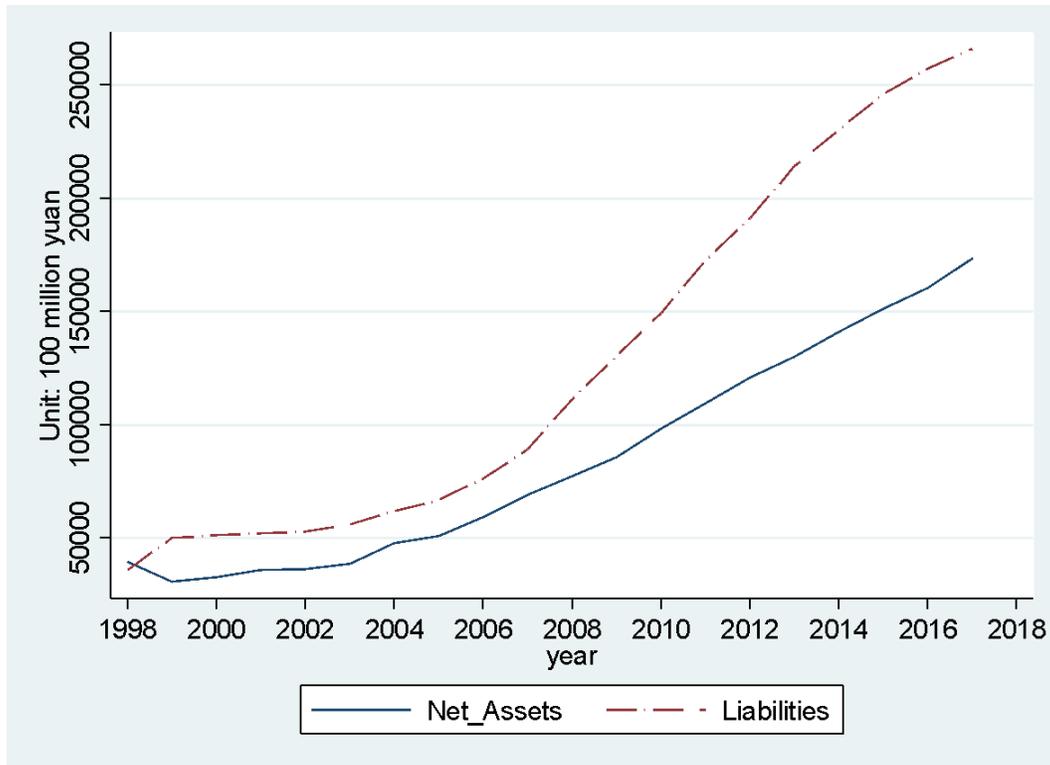


Source: China Statistical Yearbook (2005-2013).

Figure 1.2: Rise of the Number of Large-SOEs (2005-2013)

Figure 1.2 indicates that since the beginning of the 2000s, the influence of large SOEs within the Chinese economy has expanded dramatically. Hence, it has become necessary for researchers to study how they operate, and affect the dynamics of the growth of China's economy. Moreover, we can also see that the net assets as well as the liabilities of large SOEs, have escalated dramatically during the same period of time. ² Figure 1.3 shows this pattern:

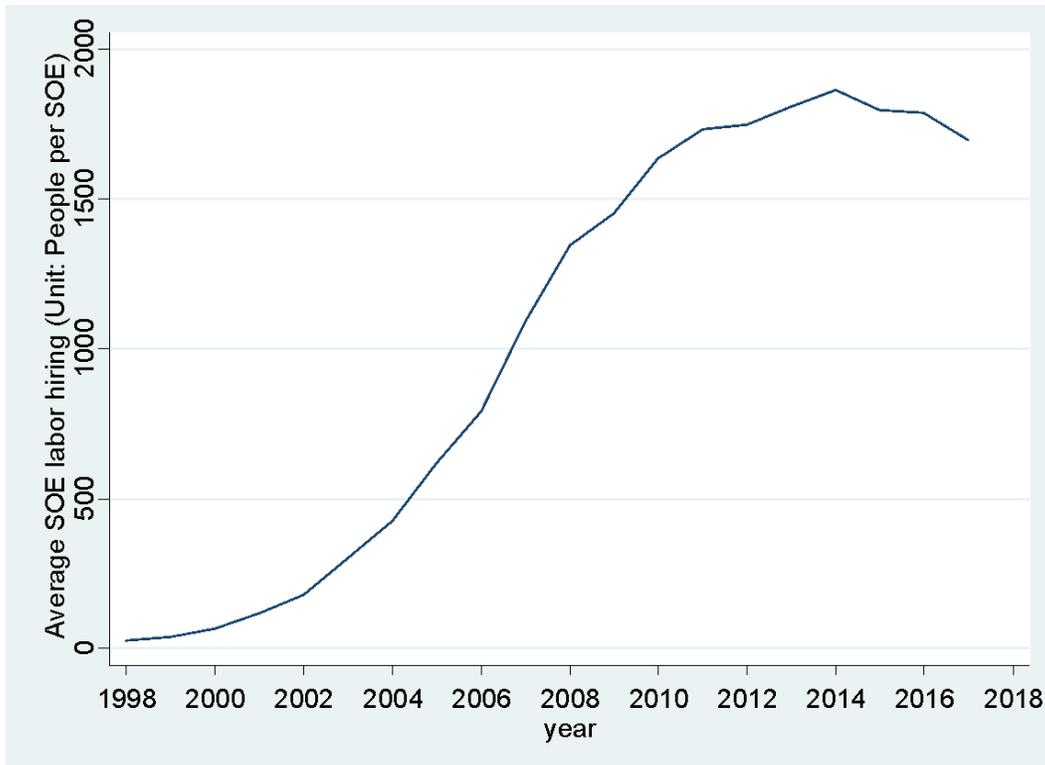
²² It is noted here that all the statistical monetary variables in this thesis are measured in real terms, which have already been deflated by the prices.



Source: China Statistical Yearbook (1999-2018).

Figure 1.3: Rise of large SOEs' Total Bank Loans (Liability) and Net Assets (1998-2017)

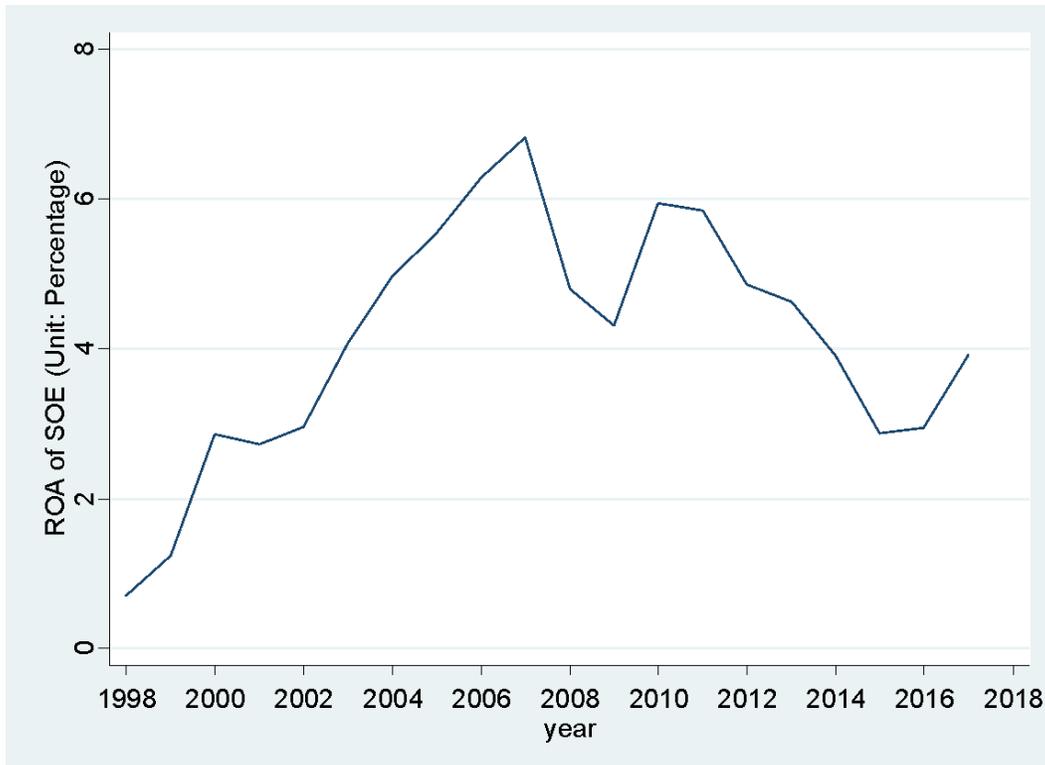
Figure 1.3 shows that the level of both net assets and liabilities of large SOEs have significantly increased in the past two decades. It should be noted that the increasing amount of large SOEs net assets, as well as the increasing level of their liabilities, indicates that the total level of large SOEs assets has increased more sharply in the past 20 years. This illustrates the fact that large SOEs have gained strategic importance in the structural transformation of China's economy. Such stylized facts could be further verified if we look at the average unit of workers employed by each SOE over the past two decades. Figure 1.4 shows how the average number of workers employed by each large SOE has increased over time:



Source: Author calculations. The data are collected from 'State-Owned Enterprises' from China Statistical Yearbook (1999-2018).

Figure 1.4: The Rise in the Average Number of Workers Hired by Each Large SOE in China (1998-2017)

Figure 1.4 shows that, since the end of the 1990s, large SOEs in China have on average absorbed a growing workforce; the increasing trend has risen dramatically since the financial crisis (2008). The dramatic expansion of large-SOE sectors within China's economy has also been accompanied by their rising economic performance after the 2000s. Figure 1.5 below shows how the profitability of large SOEs measured by the return of assets has increased since the end of the 1990s.



Source: Authors' own calculations. The data are collected from 'State-owned enterprises' from China Statistical Yearbook (1999-2017).

Figure 1.5 Return of Assets (ROA) of Large SOEs in China (1998-2017)

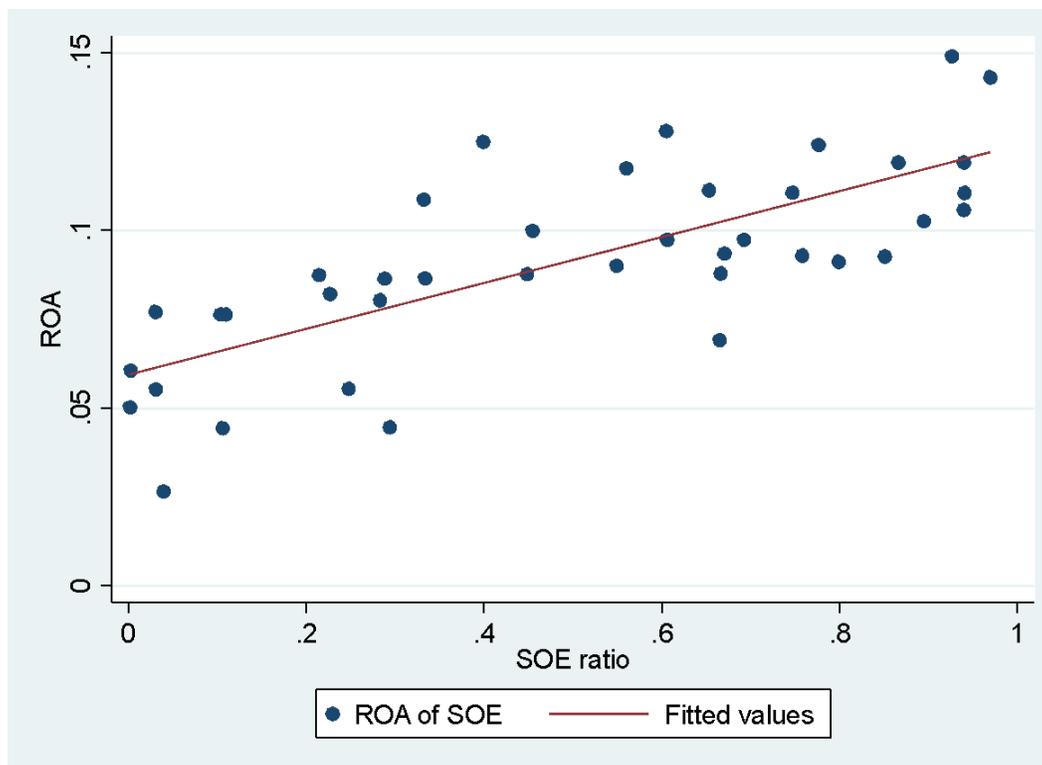
Figure 1.5 clearly shows that since the late 1990s, there has been a dramatic increase in the ROA of large SOEs in China, indicating that they exhibit very decent economic performance. Although the figures show a drop in during the financial crisis (2008), the general trend in the ROA of China's large SOEs in the past two decades has been rising substantially. It should be acknowledged that the weight of large SOEs in China's economy has remained significant. Our stylized facts presented previously are consistent with the argument contained within the literatures which is that throughout the 2000s, the SOE sector hired 40% of China's urban workforce (Sun and Tong, 2003; Holz, 2003). In addition, the top 100 large SOEs possess 35% of all corporate assets in China, while state-owned banks practically control all the capital in the banking sector

(Young, 2017). On the other hand, it should be noted that almost all Chinese companies within the *Fortune Global 500* are large SOEs.

Moreover, in line with the spirit of Lee et. al (2019), we also plot the relationship between ROA and SOEs ratio in the industries; results are presented in Figure 1.6. We see the large SOEs ratio is the total assets of SOEs to the sum of total assets of SOEs and private firms. In the industry with a high ratio of SOEs, the large SOEs could achieve a higher return on assets.

The following Figure 1.6 shows that the SOE's ratio is defined as the ratio of total assets of SOEs to the sum of total assets of SOEs and private firms. It can be seen that in the industries with a higher ratio of SOEs, SOEs obtain a higher return on assets.³

³ One should also be aware of the fact that the higher profitability does not necessarily lead to higher productivity of large SOEs, as profitability is not conceptually equivalent to productivity, and the former will be more affected by some external factors including the degree of ownership diversification, intensity of market competition and so on. Nonetheless, there are a vast amount of emerging literatures recently discussing the implication of high total factor productivity (TFP) amongst these very profitable large SOEs in China, especially after the financial crisis (2008) with reference to their international and indigenous technology expansions. (Zhou.et.al. 2007; Jefferson.et.al 2008; Zhang, 2003; Sachs and Woo, 1997; Hovey and Naughton, 2007). Hence, from this perspective, it is still reasonable to assume these profitable large SOEs in China as those who have a high level of productivity.



Source: Authors' own calculations. The data are collected from China Statistical Yearbook (2018).

Figure 1.6: SOEs Industry Ratio and Earnings Capacity

Source: Authors' own calculations. The data are collected from China's Statistical Yearbook (2018).

Note: $SOE\ ratio = \frac{\text{Total assets of all large SOEs average per industry}}{\text{Total assets of all large SOEs and private firm average per industry}}$.

1. $\text{Total assets of all large SOEs per industry} = \frac{\text{Total level of total assets of large SOEs aggregating for all industries}}{\text{Total number of industries in the economy}}$.
2. $\text{Total assets of all large SOEs and private firm average per industry} = \frac{\text{Aggregate level of total assets of large SOEs and Private firms across all industries in the economy}}{\text{Total number of industries in the economy}}$.

1.1.2 Research Objectives of the Thesis

It is worth mentioning that the operating mechanism of large SOEs in China is surprisingly un-explored within current literature. Realizing that until now large SOEs have played an increasingly solid role in the dynamics of China's economy, the main purpose of this thesis is to fill the current gap in the literature, and provide a comprehensive assessment of how large SOEs operate and function both from the external and internal governance perspectives.

In terms of the internal governance mechanism of large SOEs, Chapter 2 studies the trade-off between centralized and decentralized governance structures within large SOEs. Under a principal-agent organizational economic model, we reveal the trade-off between the decentralized governance structure of large SOEs (which may lead to ex-post moral hazard behaviours, including empire-building activities undertaken by large SOEs), and the centralized governance structure of those under the direct political control of officials from the State-owned Assets Supervision and Administration Commission (SASAC)⁴, which could undermine the incentives of large SOEs to take the initiative in terms of local investments. In other words, we present a framework under which large SOEs face the trade-off between loss of control and initiative-taking, by choosing either a centralized or decentralized governance structure, both of which would lead to the misalignment of interests between SASAC officials and large SOE managers.

In Chapter 2, we introduce the constrained delegation governance mechanism. This illustrates how SASAC officials could partially delegate decision-making to large SOE managers by ruling out some of the empire-building investment choices, potentially chosen by large SOE managers to maximize their private control of benefits within the firms. Such a constrained delegation mechanism, could resolve the trade-off between the loss of control by SASAC officials and initiative-taking by large SOE managers. We also discuss the relevant policy implications of constrained delegation as an internal organizational governance structure in large SOEs. We find that the constrained delegation mechanism could potentially work by introducing middle layers of state-owned asset companies between SASAC officials and large SOE managers, and establishing

⁴The state could be embodied in the form of officials from the State Asset Committee, under the direct control of the central government. Hereafter, the term ‘state’ automatically implies the bureaucratic sectors such as the State Asset Committee. The full name of this committee is the “State-owned Assets Supervision and Administration Commission of the State Council (SASAC)” In Chinese, it is known as, “国务院国有资产监督管理委员会”.

party committees within large SOEs; this would help officials rule out empire-building investment projects which deviate from the overall organizational interests.

In Chapter 3 we build an incentive contract model to study how large SOEs at local state level could enable the formation of decentralized authoritarianism in China from the angle of central-local state relations. We argue that the tax-sharing reform in 1994 has enabled the continual fiscal local state support from large SOEs, thus compensating for the loss of fiscal control by the central state through central-local tax-sharing schemes. Subsequently, despite the central state retaining political authority over local state regimes, fiscal decentralization by the local state and political centralization by the central state could co-exist, thus resolving the trade-off between the loss of control by the central state and initiative-taking by the local state. We also study determinants of the optimal level of inter-governmental competition, in addition to the optimal level of fiscal decentralization present within the authoritarian economic structure of China's economy. We demonstrate that the amount of shared tax revenues stemming from local large SOEs between the central and local state, the degree of alignment between their interests, in addition to the benefits which they could each derive from investing in their preferred projects, would all affect the governing of China's economy by the co-existence of political centralization and economic decentralization.

Chapter 4 extends our analysis into an open-economy setting. We develop a 3-stage dynamic game model to illustrate how foreign ownership regulation policies over domestic private firms, and partial privatization policies over large SOEs, could interplay with each other. We argue that there exists an empire-building effect whereby increasing the level of foreign shares over large SOEs, could increase the degree to which they are partially privatized. Secondly, we explore the so-called substitution effect in which increasing the level of foreign shares over private domestic

firms would reduce the corresponding decline in foreign shares over the partially privatized large SOEs in China. Overall, we have provided a comprehensive assessment of how large SOEs may interact with domestic private firms, as well as joint-venture policies of foreign firms, within an open-economy setting.

1.2 Institutional Background and Trajectory of China's Large-SOE

Reforms Since 1978

1.2.1 Reforms of Managerial Autonomy Enlargement (1978-1984)

Following the opening-up policies of 1978, the transformation of China's large SOEs proceeded in several stages. During the first stage (1978-1994), the Chinese Communist Party (CCP) formally introduced the socialist market economy system. Throughout this period, according to Wang (2005), the first reform package set out to increase the level of managerial autonomy in large SOEs. The first reform package comprised of three sub-periods, the first being from 1979-1980, during which time managerial enlargement reforms were piloted in the Sichuan province.⁵ According to Wang (2005), in the last three months of 1978, the local government in Sichuan increased the managerial autonomy of six particular SOEs. They could retain profits and pay bonuses to their workers. As a result, their economic performance was substantially improved, thus inducing local governments to extend the reforms to more than 100 SOEs in the Sichuan province. By the end of 1979, the industrial output of 84 SOEs under the pilot scheme had risen

⁵ Although, during the pre-reform period, Chinese orthodox Marxist economists such as Gu (1957) and Sun (1956, 1961, 1978), had already highlighted the importance of granting some managerial autonomy to SOE managers in order to improve the economic performance of their large SOEs in a socialist economy; long before the opening-up policies, these views had been persistently labelled 'revisionist' and anti-Soviet ways of management.

by 14.9% compared with output in the previous year, and profits had risen by 33%; both figures were higher than those in enterprises unaffected by the initiative.

The success of these reforms led to continued reforms of more than 6,000 enterprises. All of China (excluding Tibet) piloted reforms which increased managerial autonomy. According to official statistics, 5,777 SOEs increased their industrial output by 6.89%, and profit growth increased by 11.8% (Wang, 2005). The second sub-period (1981-2) encompassed the establishment of an industrial economic responsibility system (*gong ye jing ji ze ren zhi*). This system has three main elements: profit retention (*li run liu cheng*); profit-and-loss complete rationing system (*ying kui bao gan*) and thirdly, the replacement of profits by tax payments (*yi shui dai li*). The core goal of the industrial economic responsibility system, is to incentivise workers through linking their compensation and bonuses with the indexes of economic performance in their SOEs. Consequently, the fiscal situation of the local state with improved sustainably and the egalitarianism system within the enterprises were fundamentally transformed. The third sub-period (1983-85), saw the wide promotion of the system of replacing profits by tax payments. The consequence of such a system was that the proportion of profits retained by SOEs increased from 5% during the pre-reform period to 25% (1984) (Liu and Liu, 1996).⁶

However, the managerial autonomy reforms of large SOEs were limited to micro-aspects, which did not coordinate well with the delayed macro-level reforms. As argued by Dong (1999), the micro-level-oriented reforms of SOEs did not cure their low efficiency. Like Dong (1999), Liu (1995) and Duan (2002) further demonstrated that increasing the level of managerial autonomy, and delegating decision authority to SOE managers, would only worsen the problems of insider

⁶ A paper by Z.Liu and G.Liu (1996) used the stochastic frontier production function to illustrate that the Chinese industrial reforms of the 1980s improved both the allocative and technical efficiency of SOEs.

control, leading to perk consumption, empire-building (excessive investment/higher levels of strategic policy burdens), and favouritism within firms.⁷

1.2.2 Reforms of the Contractual Responsibility System and Lease Management System (1985-1992)

During the period 1985-1992, two reform packages were instituted to improve the efficiency of the large SOEs. One of the reforms involved the introduction of a contractual responsibility system in the SOEs. In 1987, after two years of piloting such systems in certain large SOEs, the whole country adopted this kind of system. According to Wang (2005), the large SOEs which had installed the household contractual responsibility system performed much better in 1987 than those which had not. Until the end of 1988, according to a statistical survey of 9,937 large SOEs, around 9,021 had introduced the contractual responsibility system, accounting for 90.8% of the total. The large SOEs found that having introduced the new system, their industrial output had increased by 12.5%, which was 0.5% greater than those which had not done so. The tax revenue generated by the reformed bodies in 1988 also increased by 20.8% over the previous year, which was 2% greater than that generated by the unreformed large SOEs.⁸

The other reform which needs to be mentioned was the introduction of the lease-management system for small-to-medium sized SOEs, the purpose of which was to further separate the ownership and control over large SOEs; the extent to which ownership and control are separated through the introduction of household contractual responsibility system is not

⁷ One of the most recent studies by Shen et al. (2018) constructed a theoretical model to demonstrate that once managerial autonomy (if measured by the degree of partial privatization), has increased beyond a certain threshold, ex-post agency inefficiencies such as empire-building inevitably arise.

⁸ These data all come from the *Chinese Statistical Yearbook (1988)*, pp10 and 37.

particularly high.⁹ The effectiveness of such micro-level reforms of SOEs in China is supported by several papers. Yao (1997) argues that half of the value-added growth of large SOEs in the 1980s could be accounted for by the bonus incentives. He also empirically documented that labour quality is another important driver of the performance of large SOEs.

There is evidence of the weakness of the contractual responsibility system. According to Wu (2003) and Duan (2002), the contracts for this system were normally short-term and compensation of sub-contractors depended on annual profits. Consequently, sub-contractors were interested only in maximizing their own short-term benefits, at the expense of the long-term interests of the large SOEs as a whole. Secondly, although the contractual responsibility system and lease management system separated state ownership and control, the state still dominated principal-agent relations, and large SOEs were still under strict administrative control.¹⁰ As a result, the ex-post agency costs arising from moral hazard, empire-building activities and perk consumption by SOE managers, all tended to escalate.¹¹ The persistently unresolved problem of high agency costs in large SOEs has been highlighted in several papers. Zhou and Wang (2000) revealed that collusion between two agencies (SOE managers and local government officials), in addition to the poor functioning of the managerial incentives scheme, resulted in the highest agency costs in China's SOEs since the beginning of the enterprise reforms of 1978. Likewise, Lee (1993) illustrated the relevance of a similar agency problem.

⁹ Hay and Liu (1998) constructed a theoretical model to show that even under the government's partial control over SOEs, the limited degree of production autonomy and profit-bonus incentives in the 1980s were able to make the SOEs more cost-minimization oriented.

¹⁰ One thing to note is that, according to Wang (2005), some of the local large SOEs in China also undertook joint-stock pilot reforms. Since the scope of such reforms was wholly confined within particular regions, the effect of such reforms was not as significant as other reforms, such as that of the contractual responsibility system.

¹¹ Another paper by Liu and Zhuang (1998) empirically demonstrates that the devolution of managerial autonomy at the firm level actually lowered the efficiency of SOEs.

1.2.3 The Reforms of Commercialization and Corporatization of SOEs (1993-2008)

Realizing the difficulties and inherent weakness of the first two rounds of reforms of large SOEs, the central government in China decided to formally introduce corporate law and modern corporate institutions. The formal usage of modern corporation institutions has two institutional advantages. Firstly, there is a dramatic change in the governance of large SOEs; commercialization and corporatization of large SOEs has meant the traditional way of bureaucratic control and purely market-oriented corporate governance have been separated. In this case, the large SOEs could act as privately owned firms.¹² According to the China Economic Statistical Yearbook (2001), amongst a sample of 4,371 firms, corporatization had been undertaken in 3,322 (76% of the total). Secondly, according to Wang (2005), the central government implemented reforms in 1998 which further deregulated political control over large SOEs. Moreover, since the end of 2001, a formal corporate governance structure and a property rights system, have both been institutionalized in 3,118 out of the total of 3,322 reformed large SOEs; enterprise shareholder systems were also established in the 3,118 large SOEs. One more thing worth mentioning is that by the end of 2001, 1,987 of these large SOEs had established shareholder boards, 3,196 had set up boards of directors, and 2,786 had installed boards of supervisors, accounting for 80.93%, 96.2%, and 83.9% respectively of the total. In accordance with the corporate governance reforms, the regulation framework for large SOEs has also been developed. Its large SOEs were at the time under the direct supervision of the newly established SASAC at both the central and local state levels. More importantly, a 3-layered state-sector governance system was implemented. The SASAC operates

¹² The Japanese economist, Komiya (1987), even argued that there were in the 1980s no firms, in the proper sense, operating in China, since all these enterprises were under such heavy administrative control.

at the top of the governance hierarchy. The middle layer is composed of various sorts of operating investment companies, and the bottom layer is made up of SOEs.

Nonetheless, the corporatization and commercialization of large SOEs did not essentially reform the negative aspects of the policy burdens borne by the large SOEs. This reflected the tendency on the part of large SOEs to de-politicize as they commercialized, which resulted in considerable managerial autonomy being granted to their managers. Nevertheless, when this happens the policy burdens, including social and strategic, are not lifted. This implies that, even though managers may have more decision-making authority, they are still obliged to carry out state-imposed duties. For instance, employing so many technically redundant workers while controlling excessive amounts of capital, would lead large SOE reforms to engage in anti-efficiency practices no matter how large an increase in managerial autonomy they were granted. This logic is consistent with the observations by Lin et al. (1998), who argue that viability issues affecting SOEs could not be resolved due to remaining policy burdens.

Acknowledging what amounted to a fundamental paradox, the central state merely mounted a privatization campaign for the small-to-medium SOEs, most of which were transferred to private hands. During the privatization campaign, ten detailed policy schemes were featured: (1) absorb other types of investment such as private investment and establish limited liability companies according to ‘corporation law’, but still protect the original state shareholders; (2) establish joint-ownership structures between state and private capital; (3) promote inter-sectorial, inter-regional mergers and acquisitions; (4) transfer control rights to private hands; (5) transfer capital ownership to private hands through open auctions; (6) encourage small state-owned enterprises to form joint ownership arrangements with private or foreign capital; (7) implement bankruptcy proceedings for unprofitable SOEs; (8) delegate the right to manage some unprofitable

and unproductive SOEs to other more competitive ones; (9) maintain the status quo if SOEs are profitable; and (10) use all other means of improving the efficiency of SOEs.

The results of the privatization campaign substantially improved the economic performance of small-to-medium SOEs, despite the controversy over the efficacy of reforming large SOEs. For example, using the World Bank data (1996-2001) of nearly 300 SOEs as their panel data samples, Hu et al. (2006) documented three stylized facts regarding the improved efficiency of small-to-medium SOEs after privatization: (1) better-performing SOEs would be given privatization priority; (2) the privatization of these SOEs led to increased turnover and reduced costs, which improved their profitability; and (3) the fully privatized SOEs performed better than those partially privatized and those still state-owned.

Similarly, Bai et al. (2006) empirically found that between 1998-2003, great reductions were made in agency costs faced by firms, implying that administrative costs declined following the privatization and restructuring of small-to-medium SOEs. Although they found that the privatization campaign may have brought certain social costs, such as a rising unemployment rate, the rise was not particularly high by international standards.¹³

1.2.4 Rise of State-owned Conglomerates and Re-nationalization Process (2008-2019)

An interesting phenomenon observed after the 2008 financial crisis was the unprecedented expansion of SOEs and the state sector in China; strong financial support was provided by the central state. As argued by Shen et al. (2018) in their paper about the rise of the red zaibatsu, the SOE sector went into overdrive following the financial crisis. Two new strategies were implemented in the reform of the state sector: (1) creating bigger and stronger SOEs to expand

¹³ Jefferson and Su (2006) and Driffield and Du (2007), empirically demonstrate a similar argument.

beyond China's borders (*zuoda zuoqing, zou chuqu*) and, (2) expanding SOEs (predominantly large SOEs), at the expense of the private sector (*guojin mintui*), concurrently benefitting from the support of a government fiscal stimulus package of 4 trillion RMB yuan. Meanwhile, the privatization and restructuring campaign ceased after 2008, in contrast being replaced a re-nationalization campaign. According to Huang et al. (2014), there was a large-scale re-nationalization of previously privatized firms between 1999-2007; they argued that although re-nationalization could to some degree lower the unemployment rate, its economic benefits would not be sustainable in the long term.

1.3 Contributions of this Research and a Critical Review of Theories of China's Large-SOE Reforms Since 1978

1.3.1 Contribution to the Ownership School Literature on China's Large-SOE Reforms

This thesis is not intended to generalize the contribution of the analysis of non-Chinese large SOEs. Instead, we try to make very significant contributions in the literature focusing on Chinese large SOEs. Therefore, we have critically reviewed five bodies of work in the literature concentrating on China's large-SOE reforms, and presented the respective contributions in terms of what sets our thesis apart from each stream of literature. One prevailing view within the literature on the proper reform of large SOEs, is from the perspective of changing the ownership or property rights structures. This line of literature follows closely the neoclassical theories of firms initiated by Coase (1937). Firm theorists such as Williamson (2000), Alchian and Demsetz (1972; 1973), and Grossman and Hart (1986; 1988), have exerted far-reaching influence on the ownership approach to reforming large SOEs; the central argument of such an approach is that

the low efficiency of the large SOEs must be ascribed to their state ownership structure, because they lack the incentive mechanism of a private right to own property.¹⁴

It is worth mentioning the work of several economists: Zhang (1997; 1998) and, Zhang and Ma (1999). Zhang (1998) constructs a principal-agent model studying how the transfer of decision rights and residual claims from the central government (the principal) and inside members or managers of SOEs (the managers), improved the economic performance of SOEs through an incentive mechanism, and the hardening of soft-budget constraints. He also argued that the key condition enabling SOEs to achieve a Pareto-optimum outcome is privatization, transferring authority from selected professional state-appointed managers to capitalists. Zhang and Ma (1999) demonstrate in a simple model that the dominance of SOEs in the market will lead to yardstick competition between firms, thus leading to a decline in their allocative efficiency.

Li (2003) examined the determinants of privatization in Chinese rural industry using data collected from southern China in 1998; he found the probability of a firm being privatized increases with the degree of product-market competition, and the hardness of the government's budget constraints. Li (2003) identifies an important point in terms of market competition and the degree of privatization. Most large SOEs in China are concentrated in the input market, where there is no market competition for final products, and therefore the degree of privatization for these upstream SOE sectors is not high.¹⁵ Liu et al. (2006) show how the privatization of SOEs can be successfully triggered and completed. Firstly, they demonstrate that whether or not local

¹⁴ One of the classical works in the spirit of using the ownership school to examine the efficiency implication is Jefferson (1998).

¹⁵ The restriction of entry into upstream high value-added industries, including oil, telecommunication and so on, leads to a situation in which the state and SOE managers share monopolistic rents. This rent-sharing makes it impossible to privatize the SOE-dominated industries because the current stakeholders will resist the further privatization reforms that might potentially reduce the expected monopolistic rents.

governments are motivated to privatize their SOEs depends on whether the ownership transfer is expected to stimulate sufficiently high growth in local tax revenues without sacrificing the benefits of bureaucrats from private control. Secondly, a specific privatization programme can only succeed if it satisfies the managerial cooperation constraint, worker compensation constraint and, the bank-debt-servicing constraint. The first motive proposed by Liu et al. (2006) is partially consistent with the argument proposed in Chapter 3, where we also emphasize the benefits (tax revenues) which a local government may derive from local large SOEs. However, we set this thesis apart from Liu et al. (2006) in Chapter 2, by arguing that the partial privatization of large SOEs inevitably results in the loss of the private control of benefits, or the undermining of empire-building activities enjoyed by local large SOE managers. The argument proposed within several chapters throughout this thesis also partially agrees with the second set of motives for privatization proposed in their paper, because we both base the feasibility of partial privatization on the constraints of the various stakeholders involved in the reforms. However, rather than considering the workers and banks as the only two relevant players in the privatization process, this thesis argues that SOE managers, as well as local and central governments, are the three most relevant stakeholders, whose incentives and interests may directly affect the progress of partial privatization.

Che and Qian (1998) develop a theory of firm ownership in an environment which lacks property rights which are secure against state encroachment. They assert that private ownership leads to revenue-hiding, and that central state ownership fails to provide credible incentives for managers and local government. They find that the optimal ownership structure during a transition is local government ownership, as substantiated by Chinese experience in the 1990s. We agree that private ownership is liable to intentionally hide revenue, which is incompatible with the revenue maximization objectives of local government, as well as those of SOE managers. However, we

disagree that managers and local governments cannot benefit personally from state ownership. Such a view reflects that there is no way in which policy burdens can link the interests of SOE managers and local governments to the national ownership of firms. Chapter 3 takes this argument a step further, incorporating the endogenous formation of decentralized authoritarianism into the framework, enabling us to see that national ownership at local level in fact does provide incentives for the local government to collect the central-shared tax revenues, and then surrender most of them to the central state to obtain the return of local fiscal autonomy. Without local state ownership, economic decentralization with regards to the local fiscal autonomy enjoyed by the local state, could not persist in the Chinese economy.

Several empirical studies in line with this school of thought are also worth mentioning. Tong (2009) establishes a panel dataset composed of 50,000 Chinese SOEs (1998-2003), and demonstrates that the speed and scale of privatization improved the performance of SOEs in China. Bennet et al. (2005) also suggest that changes in state ownership do not necessarily compromise a government's revenue objectives, and thus the state has little to lose. Smyth and Shi (2002) also conduct an empirical showing that ownership reforms (privatization) had a highly positive impact on the growth of total factor productivity (TFP) in Chinese industry.

The privatization solution proposed by Zhang (1997) and other economists could be described as “market fundamentalism”. However, this theory has at least two shortcomings.¹⁶ Firstly, it ignores the environment in which Chinese SOEs operate, including the intensity of market competition, the characteristics of the industrial structure, and so on. Based on results reported by several theoreticians, the degree of market competition would have a great effect on

¹⁶ Similar views could be seen from other authors, such as Alchian and Demsetz (1972, 1973), who consider that a firm's bilateral contract between employees and employers are intended to facilitate the input production of a firm's products.

the degree to which privatization could improve a firm's performance (Zhang and Wang (1998); Zhang and Harrigan (2004); Fershtman (1990)). Fershtman (1990) demonstrated in a theoretical model that in some imperfect competitive markets such as a duopolistic market, a nationalized firm might realize higher profits than a counterpart private firm. In addition, he also suggested that the market structure could be endogenously determined by the alternation of ownership status of the firms within it. These theoretical arguments regarding interaction between privatization and market structure may be empirically supported by the stylized facts about the failure of privatization in Russia and Eastern Europe. For instance, the privatization of monopolistic SOEs has turned firms into new private market monopolies, leading to welfare losses. Lin and Tan (1999) criticized the ownership-school approach from the perspective of soft-budget constraints. They extended the argument regarding the unchanged monopolistic nature of firms facing privatization, and proposed that privatizing firms without creating a competitive market structure would not only result in the emergence of private monopolies, but would also subsequently leave soft-budget constraints intact. Therefore, in order to ensure the operations of these newly privatized monopolies, the state still must subsidize them to maintain viability.

The ownership school of thought not only overlooks the fact that privatization may leave the worse economic performance of SOEs unchanged, but also the political feasibility of implementing privatization. As argued by Shen et. al (2018), the large SOEs are not business enterprises, but parts of the state apparatus. Whether or not privatization could be undertaken is purely determined by officials. Since privatization implies the relaxing of political control over SOEs, the subsequent undermining of the interests of officials, could induce them to hinder any progress.

This thesis agrees in part with the views that privatization could incentivize large SOE managers to exert greater effort in improving firm profitability. Nevertheless, this thesis differs from such literature in two respects. Firstly, we argue that the degree of partial privatisation matters more than the counterpart degree of privatization; it has never been politically feasible for the Chinese government to implement a full privatization campaign such as that of Russia in the early 1990s. Secondly, a recent series of partial-privatization reform packages initiated by China's government towards large SOEs have been enacted. Therefore, from a policy perspective, it is more necessary to examine the impact of partial privatization on the operations of large SOEs. Particularly, in contrast to existing studies which use the ownership structure of large SOEs as a benchmark against which to assess their efficiencies, we use a principal-agent model to demonstrate that the key function of partial privatization in terms of raising large SOEs efficiency, is to mitigate the losses brought by their centralized governance structure. This means that, even though a lack of knowledge amongst SASAC officials owing to the over-centralized governance structure could lead to losses, those arising from centralization could be compensated for through the transfer of private shares to large-SOE managers. Furthermore, what distinguishes our work from other privatization studies focusing on large SOEs is that we extend the conventional firm-level analysis of the change in ownership structure into an open-economy setting. We argue that the degree of partial privatization of large SOEs would be affected substantially by the level of shares owned by foreign firms. In other words, one could not isolate the dynamics of ownership restructuring from the impact of foreign firms.

1.3.2 Contributions to the Policy Burdens and Competition School Literature on Reforms of Large SOEs in China

One of the most influential streams of literature regarding SOE reforms is the policy burden and competition school, initiated by Lin and Tan (1999), Lin et al. (1996; 1998; 2003), Lin (2003; 2010) and Gu (2001a; 2001b). In contrast with the ownership school's advocacy of outright privatization as the panacea for improving efficiency, the policy burden and competition school came up with the view that the key premise for large-SOEs in China to operate efficiently is through the removal of policy burdens, including both strategic and social ones, whilst creating an externally competitive market structure.

According to Lin and Tan (1999), the policy burdens imposed by the state on SOEs could be divided into two types: social policy burdens and strategic policy burdens. The former relate to the concept that large SOEs employ too many workers, some of whom are technically redundant. Additionally, social policy burdens include social welfare packages of various kinds, such as housing, insurance, pensions, and so on. Strategic policy burdens are related to the state obliging large SOEs to operate in excessively capital-intensive industries which do not share the comparative advantage of the factor endowment structure of the Chinese economy.¹⁷ For the SOEs, the direct negative consequence of the social policy burdens is that they would cause soft-budget constraints. The argument is that when an SOE is on the brink of bankruptcy, its managers ascribe

¹⁷ According to Lin and Tan (1999), both types of policy burden are endogenous results of the economic system during the planned economic era before the opening-up policies began. They argue that during that era the central state had a development agenda which prioritized SOEs' investment in capital-intensive industries such as military and defence equipment. This imposition of strategic policy burdens on SOEs made them deviate from the optimal factor endowment structure of the Chinese economy, which was labour-intensive. Yet, for the sake of social stability, large SOEs at the time also had to employ excessive numbers of technically redundant workers. Both these policy burdens were in those days financed by the state. However, after the opening-up policies in 1978, the state stopped automatically subsidizing the firms that bore these policy burdens and instead made the SOEs responsible for them.

poor performance to the weight of policy burdens rather than to their own sub-standard efforts, making it much easier for SOE managers to obtain subsidies from banks. As a result, the soft-budget constraint problems become more severe. To illustrate this argument, Lin and Li (2008) demonstrated in a Cournot theoretical model that the subsidies received by the state are endogenously determined by the weight of the social policy burdens imposed by the state in the context of free-entry policies. Liu et al. (2016) illustrate a similar idea, arguing that, even after the joint-stock reforms of some SOEs, their economic performance did not improve and a Nash bargaining model was constructed to show that reversing the poor performance of SOEs depends on removing their social policy burdens.

Some empirical studies in support of this school are worth reviewing. Li (2008) employed a panel dataset based on a survey of some SOEs demonstrating that social policy burdens cause soft-budget constraint. The shortcoming of the identification strategy in the empirical part of this paper is the risk of multi-collinearity arising from the relationship between state ownership and the social policy burdens. Perotti et al. (1999), Bai et al. (2000), and Dong and Putterman (2003) also illustrated the idea that soft-budget constraints cannot be intensified unless the social policy burdens are removed.

There are two drawbacks not addressed by this school of literature. Firstly, it ignores the fact that ownership reforms and policy burdens are not isolated from each other. In other words, the degree to which policy burdens are removed depends on the level of privatization being undertaken.¹⁸ Through using a theoretical model, Boycko et al. (1996) demonstrated that

¹⁸ The inherent intertwining of privatization and the employment level is not confined to China. For instance, Bhaskar and Khan (1995) detect a channel through which privatisation affects the employment level of public enterprises in Bangladesh. The implication of this paper is that privatisation in emerging economies often has a far-reaching impact on local socio-political conditions.

privatization is conducive to the removal of policy burdens such as excessive levels of employment, because managers become more profit-oriented than labour-oriented.

In their famous paper published at *Quarterly Journal of Economics*, Shleifer and Vishny (1994) presented a Nash Bargaining Model to argue that the restructuring and privatization of large SOEs could work by undermining the corruption and subsidization behaviours between SOE managers and top officials. It would therefore seem that a higher degree of privatization or commercialization could greatly improve the efficiencies of large SOEs.¹⁹

The second drawback to this stream of literature is their failure to consider the problem of incentive compatibility between SOE managers and top officials. Neither side is incentivised to remove the social or strategic policy burdens, since both could derive political as well as personal benefits from them. From the perspective of government officials, they require large SOEs to bear the social policy burdens for social stability and to obtain political benefits. Likewise, the strategic policy burdens imposed on the SOEs could enable officials to implement more of the catching-up policies designed to hasten the country's industrial development. In other words, if large SOEs could operate in more capital-intensive industries, they could pay more state taxes, allowing the state to more quickly accumulate capital required for local and national industrial development.

At the same time, from the perspective of large-SOE managers, they could also derive more personal benefit from sustaining the policy burdens. This is because the compensation, remuneration or promotion of the political careers of SOE managers depend on the size of their firms. This positively correlates with the weight of the social and strategic policy burdens imposed

¹⁹ In addition, it should be noted that the intensity of market competition would also affect the extent to which social policy burdens are imposed upon the SOEs. According to Shen et al. (2018), the entry of private enterprises into a market initially dominated by SOEs would force them to improve their own efficiency through laying off workers and upgrading technology. This is what they call 'structural reform at a gradualist speed'.

upon the SOEs. For instance, the more people are employed by the state, the larger firms will be. Similarly, SOEs are more capable of expanding in size when higher amounts of capital are invested in more capital-intensive industries. Therefore, it is impossible for SOE managers to take the initiative in removing the policy burdens.²⁰

Our thesis contributes to this stream of literature by considering the governance-structure to examine the role and subsequent impact of policy burdens on managerial and state behaviours. In Chapter 2, we assume that managers under the decentralized governance structure would be interested in empire-building activities such as size maximization through hiring more workers (social policy burdens), and a willingness to invest in capital-intensive industries (strategic policy burdens) to maximize their personal private control over benefits. This means that large-SOE managers themselves would not be willing to remove the policy burdens if the internal organizational structure is too decentralized. This provides a unique angle from which to attribute the emergence of policy burdens to the adoption of organizational structures by large SOEs.

In Chapter 3, we argue that the local state has incentives to keep large SOEs operating in capital-intensive industries because the local large SOEs, with the presence of strategic policy burdens, could pay their high level of value-added and resource taxes to the local state, meaning the latter could use central-local shared taxes to compensate for the loss of fiscal control by the central state. Thus it possible for the central state to delegate local fiscal autonomy to the local state; the local state must compensate for the loss of fiscal control by transferring a fixed proportion of central-local shared tax revenues collected from local capital- and resource-intensive SOEs to

²⁰ According to Shen.et.al. (2018), the inclination on the part of SOE managers to employ more redundant workers could be re-named the empire-building effect of SOEs, a concept stemming from Baumol's theory (1959) with respect to the sales maximization behaviours of the US managerial class.

the central state. In this case, strategic policy burdens borne by local large SOEs, including those mandated to operate in capital-intensive industries, will be endogenous to the co-existence of fiscal decentralization and political centralization of the governance system of China's economy.

Similarly, in Chapter 4, it is assumed that even though large SOEs are partially privatized, managers still attach more importance to revenue maximization. This means they care more about the expansion of firm size than profitability. More importantly, we derive results under which, owing to the presence of such an empire-building effect, the increasing level of foreign shares over large SOEs would lead to a higher degree of partial privatization. This is consistent with conventional theoretical findings in literature stating that ownership restructuring and policy burdens interplay with one another. However, these existing studies fail to acknowledge that they do not provide the channel through which the policy burdens and partial-privatization could interplay. In Chapter 4, we argue that the empire-building effect, which would make large-SOE managers attach more importance to revenue maximization, mainly through the maintenance of policy burdens, would lead to an increase in the level of foreign ownership of large SOEs thus substituting certain gains which the state could obtain from revenue maximization. Therefore, the state has incentives to partially privatize large SOEs to counteract the losses brought about by foreign firms stealing domestic profits through joint-venture policies.

1.3.3 Contribution to the Partial Reform Equilibrium with the Power-Sharing School Literature on China's Large-SOE Reforms²¹

²¹ The terminology of partial reform equilibrium in connection with China's state-owned enterprises was first coined by Liu and Zhuang (1998), and used to evaluate the effectiveness of the partial reforms of SOEs, including a limited enlargement of managerial autonomy and reform of the contractual responsibility system etc. The approach that I take here is different from their concepts of partial reform in two ways: (1) All the recent literature focuses more on why such partial reform could be trapped in an equilibrium from which no players, including bureaucrats and the SOE managers, are willing to deviate; and (2) the paper by Liu and Zhuang (1998) does not make the partial reform syndrome endogenous to the policy burden.

It is noted that both the ownership and policy burden school of thought, and the market-competition school pay little attention to the power division structure of the governance system of large SOEs. There are two ways to interpret this structure. The first is from the angle of power sharing between officials from the Chinese National State Asset Council, and SOE managers. The second is power sharing between large SOEs and private enterprises. Although literature touching on the reforms of large SOEs from the perspective of these two structures is largely underdeveloped, several recent papers are worth mentioning. Firstly Zhang et al. (2017) suggested that two factors have caused SOEs in China to be trapped into a “Partial Reform Equilibrium”. The first factor is an interest group which derives substantial political benefits from the expansion of large SOEs. As mentioned previously, imposing both social and strategic policy burdens on large SOEs may offer top officials the legitimacy to rule (on grounds of social stability), as well as the chance to implement catching-up policies (accumulation of the capital required for national industrial development). The second factor is the adaptive power-sharing mechanism, whereby officials may flexibly appoint SOE managers to various high-ranking positions within the SOE hierarchical systems of their firms. Such an official personnel recruitment system, the so-called nomenklatura stemming from Soviet Union, ensures that joint vested interests link top officials with SOE managers.

One critique of the policy-burdens school by the power-sharing school is that they ascribe social policy burdens to the emergence of the power-sharing mechanism and therefore, unless the policy burdens are removed by state mandate, they remain in place and neither side has any incentive to lift them. Shen et. al (2018) establish a cooperative game-theoretic framework in which they show that social policy burdens generate an urge for empire-building amongst managers, because employing more workers by the state makes SOEs larger, thus delivering

greater private control over benefits to SOEs' managers. In the meantime, by investing excessively in projects for capital-intensive industries, thus bearing the strategic policy burdens, SOE managers pay more taxes to the state. Consequently, SOE managers demonstrate a higher level of loyalty to top officials; they are then more likely to be promoted afterwards. From the perspective of the state, they could also derive both political and economic benefits from the policy burdens. Insofar as the policy burdens make the incentives of the officials and the SOE managers compatible, according to scholars of this persuasion, policy burdens cannot be removed.

Similar views may be also seen in Shen et al. (2017), which discusses why SOEs expanded so quickly after the financial crisis (2008), and tended to form big conglomerates known as, 'red zaibatsu'. Shen et al. (2017) construct a two-stage sequential game model demonstrating why SOE managers tend to share empire-building behaviours, including investing in unprofitable projects or inefficient mergers, once they observe that the state is reluctant, given its rent-seeking motivation, to privatize SOEs. They find a sub-game perfect Nash equilibrium from which both the state and the managers have no incentive to unilaterally deviate.

The sub-game perfect Nash equilibrium resembles the concept of partial reform equilibrium proposed by Zhang et al. (2017). Both the papers by Shen et al. (2017) and Zhang et al. (2017) advocate the view that there is no feasible solution to sufficiently improve the performance of SOEs in China such that they can achieve Pareto-Optimum efficiency without the mandatory removal of the policy burdens.

From the perspective of the structural power division between SOEs and private enterprises, it is worth making reference to Li et al. (2013); they develop a general equilibrium framework for investigating the unequal division of gains between SOEs and private enterprises in Chinese industry chains. They demonstrate in a theoretical model that most Chinese SOEs are concentrated

in high value-added upstream industries and also enjoy monopolistic status. Meanwhile, most Chinese private enterprises are specialized in downstream industries, which are open to competition. Under this ownership structure organized amongst industry chains, they argue that the greater monopolistic power in the input market and the more capital-intensive nature of upstream industries, result in SOEs earning much more than downstream private enterprises. However, one apparent shortcoming of this paper is the failure to realize that ownership structure along value chains is endogenous to the legacies of Soviet systems in China's economy. The state deliberately forces SOEs to operate in more capital-intensive industries to accumulate the capital required for national industrial development. That is to say, the state's assignment of strategic policy burdens naturally results in the concentration of most SOEs in capital-intensive upstream industries where they enjoy monopolistic status.

In terms of the contribution made by this thesis in line with the literature focusing on the partial reform equilibrium phenomenon of the reform of large SOEs, it makes a theoretical advancement by demonstrating that both internal and external governance structures of large-SOE sectors might possibly lead to the partial reform equilibrium of large SOEs in China. Firstly, regarding the internal governance structure of large SOEs in China, Chapter 2 argues there exist conflicts of interest between SASAC officials and large SOE managers; the former are interested in their personal payoffs deriving from the maximized profitability of firms, whereas the latter only care about their own private control over benefits by undertaking empire-building activities. Such misalignment of interests between large SOE managers and SASAC officials inevitably leads to a situation in which either side has unilateral incentives to further implement the reforms, possibly enabling them to pursue their own interests. However, as argued in Chapter 2, the policies based on the constrained-delegation mechanism, including the introduction of middle-layer state-

owned asset companies throughout the state-sector governance hierarchy, as well as the partial recentralization of authority by establishing the party committee within large SOEs, have managed to resolve the conflict between managers and SASAC officials; the elimination of the misaligned interests between both sides results in the emergence of partial reform equilibrium within the internal governance system of large SOEs.

This realignment is attributable to the presence of the constrained-delegation mechanism, whereby the interests of both SASAC officials and large SOE managers converge on the organizational interests of firms in which both could maximize their benefits. As a result, they have bilateral incentives to stick to the current status quo of large SOEs. Secondly, it should be noted that Chapter 2 also argues that even on the absence of the elimination of misalignment of interests between large-SOE managers and SASAC officials, as long as they collude with each other to jointly deriving sufficiently large payoffs from their empire-building investment choices, the decentralized governance structure might still be more optimal for the large SOEs to adopt. This is because the losses incurred by SASAC officials resulting from ex-post empire-building behaviours of managers, could be compensated for by this mutual collusion mechanism between large-SOE managers and officials.

In Chapter 3, we develop a theoretical framework under which there exists an incentive-compatibility mechanism between the local and central state. The key point behind this incentive-compatibility mechanism is that the local state has incentives to maintain the operations of local capital and resource-intensive large SOEs, as they contribute the most central-local shared tax revenues to the local state. The local state could surrender most of the central-local shared tax revenues to the central state to compensate for their loss of fiscal control. In other words, what sets Chapter 3 far apart from existing literature about the partial reform equilibrium of large SOEs, is

that we argue that the existence of strategic policy burdens borne by large SOEs is endogenous to the institutions of decentralized authoritarianism in the Chinese economy. More specifically, the rise of decentralized authoritarianism, along with the co-existence between economic decentralization and political centralization, largely relied upon whether the local state could maintain strategic policy burdens by forcing large SOEs to operate within capital- and resource-intensive industries. This is because if large SOEs could operate within these highly capital-intensive industries, they would be able to pay more in tax revenues to the local state, enabling it to pay greater compensation to the central state in return for more fiscal revenue. In this case, if both the local and central states have strong incentives to maintain the status of local large SOEs to avoid the losses brought about by the trade-off between the loss of fiscal control by the central state and initiative-taking by the local state, neither the central nor local state has the intention to deviate from the current state-ownership status of large SOEs in China.

1.3.4 Contributions to the Sub-optimal Institutional Arrangement School Literature on China's Large-SOE Reforms

One aspect that the power-sharing school tends to ignore is that the current state ownership structure does not necessarily imply that SOEs are inefficient. In contrast, a number of papers argue that SOEs in China are endowed with the kind of sub-optimality that best fits the imperfect institutional arrangements of the Chinese economy, such as the absence of the rule of law.

One of the papers reflecting such research is Li (1996), which proposes a theory of ambiguous property rights in a transitional economy, with particular reference to the case of Chinese township enterprises. According to Li (1996), the absence of a clearly defined private property rights system in China arises from the imperfect institutional settings of the economy. He goes on to argue that the immature condition of China's economy made an ambiguous property

rights system work more efficiently than private enterprises would have because the ambiguous property rights system is more responsive to high transaction costs and high uncertainties in the marketplace.

Similar views have been developed by Weitzman and Xu (1994). They propose the idea that the ambiguous property rights of township village enterprises (TVEs) stand at the centre of the Chinese model of economic development. The rationale behind such an ambiguous property rights system is that such enterprises are better described as ‘vaguely defined cooperatives’ than as disguised capitalist institutions of some kind. They use examples from repeated game theory to explain that as a group, these vaguely defined cooperatives are able to solve potential conflicts internally, relying on the absence of explicit rules, laws, rights, procedures and so forth.²²

Naughton (1994) argues that the success of TVEs could be attributed to the fact that they are a set of institutions which are effective at adapting to one of the most distinctive characteristics of the complete Chinese transition: the early creation of product markets, which exist for a prolonged period without a fully developed market for the factors of production. However, one thing requiring further explanation is that most of the TVEs were privatized in the late 1990s, even without a fully developed market for the factors of production.

Tian (2000; 2001) proposed a framework for an alternative property rights theory which fits a transitional economy such as that of China. He observed that the optimal ownership

²² Likewise, Nee (1992) proposed the idea that TVEs as income-sharing communities may be optimal in the absence of a well-developed rule of law.

arrangement is a function of varying degrees of institutional imperfection. He provided a rationale showing why township village enterprises may dominate private ownership during a transition.²³

Some papers go much further and illustrate that SOEs in China may have some advantages in terms of their welfare criteria. Lo (1999) argues that SOEs could sustain a high level of welfare, vital for the institutional transformation of China's economy. However, the problem with this line of research is that its adherents over-emphasized the merits of temporary institutions as these imperfect institutional settings would exist only during a period of transition. For instance, most TVEs have been privatized over the past few decades; hence it is not worth discussing whether TVEs *per se* have their own efficiency implications.

What aligns the contribution of our thesis with the spirit of the sub-optimal institutional arrangement literature is that in Chapter 2, we introduce the so-called concept of a constrained-delegation governance mechanism as an organisational structure within large SOEs, providing the rationale for party-committee control in large SOEs as a sub-optimal institutional arrangement. We argue in Chapter 2 that the introduction of party committees within large SOEs was adopted by SASAC officials to partially re-centralize the decision-making authority without undermining local initiatives taken by large SOE managers. The basic function of party committees within large SOEs is to increase the degree of monitoring over their managers by ruling out the possibility of empire-building investment choices; such pro-investment choices could lead to an investment level which deviates from the firm's overall organizational interests. We further point out that the

²³ Smyth (1997) provides a very interesting framework to ask why TVEs in the 1990s succeeded despite poor institutional arrangements. He argues that TVEs are strategic alliances which reflect a much broader sense of regionalism for a transitional economy like that of China. Under such a system, TVEs could more flexibly adapt to local economic conditions, which may to some extent save some transaction costs through the wider division of labour. But such strategic alliances, he argues, are also limited to core assets, namely reputational capital. If TVEs were unable to commit to some informal obligations, extra quotas were imposed on them. In this way, the mechanism of reputation efficiently monitors the operations of each set of firms within these strategic alliances.

absence of an externally independent regulatory or supervisory board in China of the type which are typical in corporations within advanced Western economies, means the establishment of party committees within China's large SOEs could be deemed a sub-optimal institutional arrangement, which could play a counterpart role as independent supervisory boards in terms of preventing large-SOE managers from engaging in ex-post moral hazard behaviours.

1.3.5 Contribution to the Political Economy Approach Literature on China's Large-SOE Reforms

It should be noted that all streams of literature mentioned so far have failed to contextualize the role of SOEs along the particular developmental and historical path of the Chinese economy. In other words, all these studies offer some sort of explanation based on existing neoclassical theories, and neglect the equally important historical, cultural, political and social aspects of the economy. A vast amount of heterodox and Chinese literature has emerged with a view to resolving this problem: Lo (1999); Lo and Smyth (2004); Cheng and Lo (2002); Smyth (1998; 1999; 2000); Smyth et al. (2004); Nolan and Wang (1999); Brodsgaard (2012); Koppell (2007) and, Nolan and Yeung (2001a; 2001b).

The first cohort of papers which followed this line of research was produced by Lo (1999). Lo (1999) sought to reappraise the performance of SOEs between 1980-1996. He contended that if all the performance indicators for SOEs are seen in the context of the country's specific path of economic reform and industrial growth, the SOEs did not perform as badly as the existing literature represented it, and the performance of the SOEs was at least comparable to that of the acclaimed collectively state-owned enterprises, which are much more market-oriented than the SOEs, but had an unclear status from the private ownership standpoint. To support his argument, Lo (1999) commented that large-medium SOEs have been playing a positive role in generating economies of

a scale which could be conducive to Chinese economic growth. It may be said that Lo (1999) makes it possible to interpret the reform of Chinese enterprises in line with the “collective learning paradigm” of the literature on late industrialization, based essentially on combining market and non-market institutional arrangements.

Cheng and Lo (2002) presented an argument unifying the macro-level demand conditions and micro-level analysis of the industrial configuration to provide an alternative to the two opposing explanations for the inefficiency of Chinese SOEs: (1) inefficient institutions cause poor financial performance, and (2) increasing competition reduces profitability. Using this unified framework, three findings in Cheng and Lo (2002) contribute the following to existing literature: (1) the financial performance of SOEs has been quite close to the rest of Chinese industry over the reform era; (2) at the sector level, the extent of the presence of non-SOEs and profit rates are negatively correlated; (3) sector-level profit rates and loss-making are negatively correlated, conditional upon expanded demand and the industrial configuration. According to its own theories, the ownership-school approach is misleading because further reducing labour costs would further reduce consumption, thus bringing losses to yet more enterprises. Secondly, the competition-centre story also needs revisiting as it overlooks the negative impact of the associated profitability decline on long-term economic development.²⁴

²⁴ Lo et al. (2009) claim similar views in which SOEs have played an important role in improving social welfare by absorbing a large number of redundant workers, thus ensuring social stability during the economic transition. Smyth et al. (2004) illustrates from the perspective of the reforms of equity-for-debt swaps, the importance of making SOEs bear the functions of hiring redundant workers to ensure the basic level of social welfare. Similarly, the argument by Shi and Liu (2012) provides a unique insight regarding the maximisation of social welfare and wealth through a socialization reform approach to the SOE reforms in China. The central theme of their argument is that, rather than privatizing the SOEs, state assets should be supervised by a third, independent, party such as a state asset council or trustee. They propose the concept of ‘surrogate owners’ in place of the real owners of SOEs and regard it as the key to improving their efficiency. They demonstrate three ways of facilitating the real functions of surrogate owners: incentives in the capital market; a competition selection mechanism for surrogate owners in the capital market, and a smoothly functioning liquidation mechanism. One could argue that the ultimate idea of their socialization reform strategy is to ensure that every member of society is a beneficiary of the appreciation of state assets.

Smyth et al. (2004); Nolan and Wang (1999), and Nolan and Yeung (2001a) present several case studies of large Chinese SOEs, including firms in the shipping and steel industries. Rather than treating the big SOEs as sources of economic inefficiency, they reach the consensus that large SOEs performed much better than earlier literature implied. Unlike some empirical studies which provide evidence supporting the continuous efficiency improvements amongst large SOEs throughout the past twenty years, the case studies used demystify the more micro-level reasons for large SOEs beginning to address their poor economic performance after 2000.²⁵ For instance, Smyth et al. (2004) argue that large SOEs have persistently targeted output growth, enabling them to expand rapidly. Nolan and Wang (1999) and Nolan and Yeung (2001b) examine the efficiency implications of large SOEs from the angle of the legacy of organizational and motivational capabilities of the Chinese Communist Party control over SOEs. The problem with these case-study-oriented papers is a total lack of rigorous empirical evidence to support their theoretical conclusions. Apparently, they risk over-generalizing their conclusions with unduly small SOE samples.

Smyth (2000) provides a theoretical framework and reveals that large SOEs have been amongst the most important engines driving Chinese economic growth. He compares the performance of Chinese large SOEs with the failure of SOEs in South Korea and Japan, and points out strong empirical evidence that large SOEs in China have performed much better than the state sector as a whole. This suggests that one ought to be more cautious about feasible alternatives such as massive privatization despite the notional benefits of private firms being quite obvious. Secondly, Smyth (2000) argues that because of difficulties involved in designing a working system

²⁵ Two of the most representative empirical papers in support of this argument are Jefferson et al. (2008) and Zhou,et,al (2007).

consistent with the tenets of individual property rights systems in Eastern Europe and the Soviet Union, one must not over-value market fundamentalism based on evidence from successful private firms simply because China has a totally different relational governance system from those of the Soviet Union and Eastern Europe.

Smyth (1999) reveals the paradox of the power decentralization reforms of large SOEs in the late 1990s: that the purpose of laying off redundant workers through market-oriented reform is incompatible with the rigid state employment policies. Smyth (1999) reflects the need to maintain the status of the SOE sector because it ensures the basic welfare level of Chinese society in the absence of a solid social security system.

The shortcomings of these two papers (Smyth 1999; 2000) are that Smyth seems to ignore the efficiency implications of SOEs, and over-emphasizes their welfare implications. One could argue that, although the employment of redundant workers may ensure the basic welfare level of workers, it should also be noticed that such state imposed policy burdens are amongst the fundamental causes inefficiency amongst large SOEs.

Most existing literature focusing on the political economic perspective of China's large-SOE reforms, fails to incorporate the interplay between the structure and essential features of the state, and the functioning of large SOEs. This thesis fills that gap, contributing to the theoretical underpinning of the political economy and late industrialization theory in relation to the nature of the Chinese state. One of the biggest debates regarding large SOE reforms in China involves the relationship between large SOEs and state functioning. This inevitably leads us to the next question: whether or not the role of large SOEs in China would be contextually different if the Chinese state were different.

According to Gerschenkron (1982), if a developing country wants to escape the low-equilibrium-level growth trap, the key is to distort the pricing mechanism and wrongly set prices. A similar argument may be found in Amsden (1992; 1994), Johnson (1995) and Wade (1990), who postulate the view that successful industrialization and conversion to high-income status in Taiwan and South Korea may be attributed to their state interventionist policies, which systematically distorted the pricing mechanism, and made it compatible with the state catch-up and late developmental policies. Such a process and conditions, according to these scholars, are essential for a developmental state to emerge. If one applies the concept of this distortion to the case of the Chinese SOE reforms, it is not difficult to see that the large SOEs provide the economic means adopted by a developmental state to systematically set the pricing wrongly. For instance, one of the key assumptions stated in Chapter 2 is that large SOE managers without legal entitlement to residual claims of the rights of firms, will be interested in maximizing firm size through empire-building investment behaviours instead of investing at the optimal level of the firms. Despite opinions that conflicts between large SOE managers and SASAC officials could lead to efficiency loss within these firms, the managerial entrenchment behaviour could enable the large SOEs to produce at levels beyond the privately optimal level. This is because the pro-investment behaviours of large SOE managers normally make it possible for large SOEs to achieve the objective of output maximization, which is consistent with the growth-enhancing objectives of a developmental state.

Similarly, we argue in Chapter 3 that as most large SOEs at the local level in China are concentrated in the monopolistic upstream, capital-intensive, and highly value-added industries such as telecommunications, oil, gas, and so on,²⁶ they provide major tax revenues to the local

²⁶ These large SOEs, the dominant players in the upstream sectors of the economy, provide the key intermediate inputs including raw materials for the downstream industries dominated by competitive private firms. (Liu et.al., 2013; Shen.et.al., 2017) Such a

state, which enables the latter to compensate for the fiscal losses by the central state to maintain local fiscal autonomy. This leads to the local state being willing to provide continuous political and economic support for local SOEs. As Wade (2005) makes clear, one of the key features of the East Asian developmental experience is the critical economic and political state support for key economic sectors. China is very similar in this respect, with most key sectors dominated by large SOEs receiving subsidies and financial assistance from the state on a continual basis. This enables the state to show that it can credibly implement its development policies.²⁷ Baek (2005) even demonstrated that China shares many characteristics with the East Asian model of the developmental state. Key elements include state control over finances, direct support by the government of SOEs, import-substitution industrialization, and so on.

The other way to examine the function of large SOEs in China is from the perspective of the predatory nature of the Chinese state. Although one may object that the nature of the Chinese state greatly reflects developmental features, whether or not the economic outcomes of such features are shared equally amongst social groups in Chinese society remains an open question. In other words, if gains derived from this developmental state are not evenly distributed and are concentrated exclusively in certain key sectors or in elite groups, then the nature of the state in China will inevitably be predatory to some degree.

vertical production structure forms the distinct dual-pricing system within the Chinese economy in that large SOEs, on the one hand, distort the pricing mechanism in the upstream sectors to extract the surplus from the downstream private firms and, on the other hand, use this dual-pricing system in the vertical production structure to accumulate the required capital for the state in China to implement its developmental and catching-up policies. From this angle, it may be argued that the state in China is indeed endowed with the strong features of a developmental state.

²⁷ As argued by Grabowski (1994), one of the pre-conditions for a developmental state to emerge in some countries is to maintain a high level of credibility for the state's policies. Without credibility, the state is unable to discipline firms in the economy.

According to Robinson (1999), a predatory state is more likely to emerge in a society where income is low and income distribution is highly unequal. It may be argued that the monopoly of large SOEs in the key upstream sector of China's economy leads to two economic outcomes which could lead to a predatory state. Firstly, violations of private ownership seem to naturally result in agency conflict between large SOE managers and SASAC officials. Large SOE managers are not interested in maximizing profits, which is an organizational interest. Instead, they are more likely to take advantage of SASAC officials and undertake empire-building investment choices which could maximize only their personal interests. Judged on this standard, large SOEs operating in China imply the predatory state nature in the sense that particular managerial groups could maximize their own interests at the expense of others, which could be viewed as unequal division of the gains across social groups (Acemoglu, 2003a, 2003b).²⁸

Secondly, it is widely known that the Chinese economy is characterized by decentralized authoritarianism, featuring co-existence between economic decentralization and political centralization. In Chapter 3, we will demonstrate that the local state will rely heavily on tax revenue generated by local large SOEs to maintain fiscal autonomy. As a result, the local state has powerful incentives to extract resources and value-added taxes from local large SOEs. This creates a fundamental feature of a predatory state in that the local state becomes the rent extractor from local firms embodied in tax collection.

Another function of large SOEs in China, based on work by heterodox economists, is to sustain the welfare state features of the economy, or at least to gradually escalate them, as has happened over the last decade (Smyth, 1999; Lo, 2007; Lo and Li, 2011; Lo and Smyth, 2004;

²⁸ Most managers of large SOEs are in essence state bureaucrats and their privileges in terms of political power and economic compensation directly reflect the predatory tendencies of the state.

Phillion, 1998; Gu, 2001; Lee, 2000; Leung, 1994). Although mainstream literature conventionally argues that since the mid-1990s, responsibility for implementing most social security insurance arrangements for China's working class has shifted from large SOEs to the government, the process of laying off workers which began in the mid-1990s with the privatization of SOEs, has largely been reversed since 2008, with particular reference to the rise and rapid expansion of large SOEs. For example, Gu (2001), Lee (2000), and Leung (1994), argue that ever since the transition started in the late 1970s, China's government has been under increasing pressure to reshape the welfare system of work-place units into a genuine welfare state whereby the state is fully accountable for welfare provision to workers. The direct result of this process is that most SOEs began laying off workers on a massive scale in the late 1990s.

As shown in the previous section regarding the stylized facts on the evolution of state sectors in China, this did not apply to large SOEs, and after the economic crisis (2008) it even reversed. Shen et al. (2018) argued that one explanation for the expansion of large SOEs in China has been the state requirement to maintain its social policy burdens such as the excessive employment of technically redundant workers. Such burdens may to some degree function as an umbrella protecting workers from unemployment, partially reflecting state social welfare provision. This argument is in line with the spirit of Chapter 4, where it is argued that the objective function of the government is to maximize aggregate social welfare, rather than SASAC officials or large SOE managers.

Surprisingly, Gu (2001) refuted the idea that most SOEs in the 1990s had abandoned their welfare functions for workers, arguing instead that after the reform embarked on in the late 1970s, SOEs had to bear increasingly heavy burdens of welfare provision to their employees. Similar arguments may be found in Smyth (1999), supporting the view that the restructuring process for

SOEs in the 1990s was undertaken largely because China's SOEs were under too heavy a social welfare burden, and subsequently this had led to their massive losses. Using panel data for the 1995–1999 period, Bo et al. (2009) examine the corporate social responsibility investments of the Chinese SOEs, mainly in social welfare; the studies found that social welfare or social objectives still dominate the profit concerns that motivate large SOE investments. Therefore, one may argue that it is still unclear whether large SOEs in the 1990s became fully independent of social objectives such as welfare coverage for their workers. At least, according to the analysis due to be discussed in Chapter 2, the large SOE managers are inclined to maintain the social policy burdens insofar as, in the absence of real owners, managers as agents tend to expand firms, requiring them to maintain higher levels of social policy burdens, including hiring technically redundant workers.

1.4 Conclusions

This chapter first reviews stylized facts about the evolution of state sectors in China over the past four decades since the opening-up policies were instituted. These stylized facts, including the increasing level of assets deployed by large SOEs, the increasing size of the workforce hired by large SOEs and other indicators, all demonstrate the increasing importance of the role of large SOEs in shaping both the institutional and structural transformation of the Chinese economy. We also present the institutional background as well as the dynamics of policy environments on state sectors in China by classifying the SOE reforms into three stages. This chapter also provides a synthesised framework for reviewing the theoretical, empirical, and political economy literature on SOE reforms with a particular focus on the context of the Chinese SOE reforms which have taken place since 1978. We review articles relating to theories of SOE reforms in China with strong emphasis on several strands of thought in light of the opening-up policies. Five schools of thought in the literature on SOE reform are discussed: (1) the ownership school; (2) the policy

burdens and competition school; (3) the rent-seeking and power-sharing school; (4) the sub-optimal institutional arrangement school; and (5) the political economy school.

It may be seen that each of these schools has its own plausible way of explaining the SOE reforms in China, although the ownership school owes more to the neo-classical approach, which posits privatization as the key method for improving the efficiency of SOEs. The policy burdens and competition school adopt a broader and sharper perspective in detecting the reason for the state imposing heavy policy burdens which may make SOEs inefficient. They ascribe the fundamental causes of poor SOE performance to policy burdens rather than to ownership structure. Yet both these schools fail to realize that ownership change and the removal of policy burdens are inherently and inseparably intertwined. The sub-optimal institutional arrangement school is the least convincing because it fails to capture the persistent reform trajectories of SOEs, focussing only on the effectiveness of the institutional setting, which is a feasible choice only during periods of transition. The massive privatization of TVEs, which are characterized by ambiguous property rights, is the best illustration of this school's fatal weakness. According to our analysis, although the political economy school provides very solid alternatives for investigating the positive role played by large SOEs in China's economy, it seems that it over-emphasizes the welfare implications of the SOEs, thus overlooking their efficiency.

The most promising school appears to be the rent-seeking and power-sharing school. Firstly, it reveals why large SOEs maintain their strategic status in China's economy given the formidable vested interest from the central state, together with those who oversee the large SOEs. Secondly, it notes the importance of the "equilibrium concept". Whether it is called 'partial reform equilibrium', or 'sub-game perfect Nash equilibrium', it implies the inherent power-sharing and the possibility of leaving too much space for rent-seeking, reduce incentives for all the players

involved in the large SOE reforms to deviate from the current state-ownership structure of large SOEs. The recent rapid expansion of large SOEs abroad, and the One-Belt One-Road (OBOR) national development programme, driven mainly by large SOEs and led by the central state, have provided very important stylized facts showing the greater plausibility of the story of this school.

More importantly, we also outline the respective contribution made by this thesis compared with each of the other five streams of literature. In terms of the ownership school literature which focuses on China's large SOE reforms, we contribute by pointing out the importance of the partial privatization of large SOEs in relation to the organizational structure adopted by large SOEs, the policy burden borne by large SOEs, and the shares owned by foreign firms operating in local markets. In terms of the policy burden literature, we argue that the existence of policy burdens borne by large SOEs is endogenous to both the internal and external governance structures of Chinese state sectors. This provides a new angle in terms of revealing the causes of policy burdens in the literature. Moreover, regarding the partial reform equilibrium and power-sharing school in the literature, we distinguish our arguments in this thesis from other literature by providing two new channels through which the adoption of a constrained-delegation governance structure by large SOEs, and the co-existence between economic decentralization and political centralization, could lead to the partial reform equilibrium of large SOE reforms in China. This thesis also proposes that given the current political-economy context and institutional constraints faced by China's large SOEs in reference to their corporate governance system, introducing party committee control in large SOEs is sometimes a sub-optimal institutional arrangement; this is because the partial re-centralization of large SOE decision-making authorities done through party committees, could increase the degree of monitoring large SOEs managers by ruling out their ex-post moral hazard behaviours, without undermining their initiative-taking in local investments.

Finally, this thesis also makes an important contribution by linking the reforms of large SOEs in China to both the broader late industrialization theory, and political economic literature with reference to the nature of the Chinese state; we argue that the operation of large SOEs is a reflection of the state's nature, combining all three features of a developmental, predatory, and welfare state.

Chapter 2

Towards an Internal Governance Theory of Large SOEs in China

2.1 The Debate Over The Role of State Guidance Over Large SOEs

A recent article by Barry Naughton (2017) raises urgent issues regarding the ongoing reform of large SOEs in China. He argues that what he calls the dilemma of the “impossibility trinity” confronts large SOEs in China. This refers to the three core goals, which are inherently inconsistent and have been pushed by the state to reform large SOEs under the supervision of both central and local level governments: increase firm autonomy, improve oversight from the state, and assign new developmental missions to state firms.²⁹ In some studies, the last two goals have been persistently labelled as factors which account for the low efficiency of the operations of large

²⁹ The assignment of state missions to state firms is compatible with the terminology pointed out by Lin et al. (1998) of so-called policy burdens. Policy burdens are of two types: social and strategic policy burdens. The former involve the compulsory employment of excessive numbers of unskilled workers, as well as their corresponding welfare entitlement such as social pensions. Strategic policy burdens involve the state's promotion in terms of forcing SOEs to invest in excessively capital-intensive industries, which is inconsistent with the comparative advantage of the labour-intensive factor endowment structure of China. These strategic policy burdens are imposed by the state to accumulate the necessary capital for the rapid industrialization and catching-up policies required for the nation's industrial development. For a detailed discussion of these two types of policy burden, please consult [Liu et al. \(2016\)](#). ‘A rational path towards a Pareto optimum for reforms of large state-owned enterprise in China, past, present and future.’ *Economic History Working Papers*, 244/2016. Department of Economic History, London School of Economics and Political Science, 2016.

SOEs: Shen et al. (2017), Lin et al. (1996; 2003), Qian (1996), Xu et al. (2005), and Chang and Wong (2004).³⁰

Thus, this cohort of scholars would contend that it is impossible to increase autonomy for large SOE managers whilst at the same time relaxing the state's political control over firms. Three main reasons summarize why political control over firms reduces the efficiency of large SOEs: (1) incentives for managers to improve the productivity of SOEs would inevitably be undermined by a lack of initiative; (2) state control over firms might induce non-productive rent-seeking activities to crowd out productive profit-maximization activities; (3) the allocation of formal authority over large SOEs to government officials would make them unable to adapt to local demand on the product market for which a certain amount of local information is required. As Lipton and Sachs (1993) comment:

The bureaucracy provides an extraordinarily important practical argument for radical free market policies, even in circumstances where "market failures" exist and pure theory might suggest more nuanced policies. It is important to think of the existing bureaucracy as equipped, professionally and temperamentally, to implement sophisticated policies based on Western-style theories of the "second best". The bureaucracy cannot be relied on for efficiency in regulating monopoly prices, promoting infant industries or implementing industrial policy'.

Nonetheless, another stream of literature holds contrasting views regarding the role of state control over large SOEs. This stream argues that the central state must guide the policy through which operations of large SOEs are controlled, especially during a period of economic transition (Nolan and Wang (1999); Brodsgaard (2012); Koppell (2007); Nolan and Yeung (2001)). These papers, particularly those by the ones by Nolan and Wang (1999) and Yeung (2011), demonstrate

³⁰ Several empirical and case study findings in the management literature corroborate these views: Tan (2007), and Conner et al. (2005).

that state intervention into large SOEs endogenously derives from external forces by globalization. On the one hand, increasing numbers of foreign multinationals with much more advanced technology are entering the Chinese market, which in the long term may crowd out the less competitive domestic firms. On the other hand, the party-state may directly allocate the large SOE bureaucrats the task of forming joint ventures with these foreign multinationals to facilitate the transfer of capabilities and technology. As a result, Chinese bureaucrats have indeed played an active role in the institutional reconstruction and technological upgrading of large SOEs under the opening-up policies.³¹ Nolan and Yeung (2001) use a case study of two giant SOEs: Shougang (steel) and Sanjiu (pharmaceutical), to further pinpoint the underlying factors driving the technological advancement of large SOEs, which may be ascribed to the legacy of motivational and organizational skills possessed by the Chinese Communist Party (CCP), which directly controls the large SOEs.

Brodsgaard (2012) even held the idea that control over large SOEs in China by political state personnel played an essential role in mobilizing the resources required for the rapid growth of these firms. Through a particular recruitment system for government officials stemming from the Soviet Union's nomenklatura system, the state can exert insider control over SOE managers by rotating and transferring them to other bureaucratic positions, whilst at the same time ensuring that the SOE managers can easily access required resources, such as bank loans and subsidies, thus guaranteeing the rapid expansion and high efficiency of these large SOEs.³² Similar views are

³¹ The view that the large SOEs have shown continuous technological improvement over the past few decades is endorsed in several empirical studies: Jefferson et al. (2008), and Zhou et al. (2007). For further detail, please consult Jefferson et al. (2008), and Zhou et al. (2007).

³² Koppell (2007) discussed the possibility of Chinese reforms liberating large SOEs from bureaucratic state control whilst maintaining some political guidance from the state. He contended that the key issue is not whether the state ought or ought not to eliminate its control over large SOEs, but it is instead important to investigate how political guidance over SOEs and the economic

found in Lo and Zhang (2011) who make the point that some long-term-oriented institutions in Chinese SOEs, such as the state's mandatory responsibility to fulfil its own policy commitments, may be conducive to productive efficiency, although not necessarily good for improving allocative efficiency. The message of this argument is clear: the state as a bulwark for large SOEs may efficiently enhance their productivity even though such state guidance may result in their monopolistic status, in turn reducing welfare (allocative efficiency).

It may be argued that the dichotomy in the literature regarding whether the state ought to play an active role in guiding the daily operations of large SOEs essentially reflects that the power division structure between the Leninist state and Chinese SOE managers may have a very mixed and debatable effect on the performance of large SOEs. A recent paper by Shen et al. (2017) constructed a sequential game model showing that an economy dominated by large SOEs with a rent-seeking state, such as China, is not necessarily worse off than a monopolistic free market economy in terms of welfare level. From the point of view of organizational structure, it is indeed an issue concerning the respective merits and drawbacks of decentralized and centralized ways of organizing production. When SOE decision-making is heavily under state control, the centralized structure of the organization emerges. The converse is true for decentralized structures if managers of large SOEs are given a certain level of decision-making autonomy, and the authority to allocate resources or plan investments. This chapter is most closely linked with a recent paper by Huang et al. (2017) which explains the heterogeneity of SOE firm-level performance and in doing so reveals

independence of SOEs could be compatibility with each other. Drawing on the American experiences with state-led hybrid organizations, he argued that there are three essential conditions which have to be satisfied to ensure this compatibility: (1) replacing the welfare functions of large SOEs with policy objectives reconciled with their commercial purposes; (2) reducing financial dependence on SOEs, to remove barriers to rational control; and (3) developing a robust and concrete regulatory framework to replace the administrative linkages between SOEs and state control over the SOEs is weakened. For details on this paper, please refer to Koppel (2007, pp. 255–278).

the trade-off between centralized and decentralized governance structures. However, this chapter differs from the above paper in two ways: (1) the chapter focuses on the centralization vs. decentralization trade-off in the SOE internal environment, whereas the paper treats distance from the central government as the key to interpreting the trade-off; (2) the paper does not acknowledge the role of the centralized organizational structure of large SOEs in overcoming the high ex-post agency costs caused by the empire-building inclination of managers, whereas this chapter does acknowledge it.

2.2 The Internal Governance Structure of Large SOEs in China in Relation to the Modern Organizational Economics Literature

It has been widely discussed in modern organizational economics literatures that a distinct internal organizational structure would have great impact on performance differentials across firms (Gibbons, 2010; Gibbons et al., 2012). Three lines of research have been developed to detect the channels through which organizational structure may affect firm performance: (1) the delegation of contracts replicating efficient centralized contracting (the revelation principle) (Baron and Besanko (1992); Melumad et al. (1995)³³); (2) the approach may use information processing and communication costs (Sah and Stiglitz (1986); Genakoplos and Milgrom (1991); Radner (1993); Radner and Van Zandt (1992); Bolton and Dewatripont (1994); Garicano (2000)); and (3) the trade-off between information and loss of control might feature in the approach of the adoption of distinct organizational structures in determining the subsequent firm performance (Aghion and

³³ The weakness of this approach is that it only works under a complete contract environment approach (Mookherjee, 2006). This is obviously inconsistent with the principal (SASAC officials) and agent (SOE managers) framework in studies about organizational structures in Chinese large SOEs.

Tirole (1997); Rajan and Zingales (2001); Dessein (2002); Hart and Moore (2005); Alonso, Dessein et al. (2008)).

The trade-off between decentralization and centralization has persistently been one of the most hotly debated topics in the organizational economics literature. The drawbacks of decentralization are seen when agents are biased towards their own investment decisions which are inconsistent with the interests of the organization as a whole, perhaps leading to conflict between principals and agents. Nevertheless, advantages also exist when authority is delegated to agents because they have better access to local product market information. Organizations may adapt to the negative aspects of decentralization in one of two ways: (1) by centralizing decisions when agent bias severely damages an organization's performance and (2) limiting the discretion of the agent by eliminating "conflicting choices". It is widely known that the party-state, represented by officials from SASAC acting as principals in large SOEs, is responsible for the asset appreciation of large SOEs (Leutert, 2016). Subsequently, government officials from SASAC care about the overall profitability of large SOEs due to their commitment to maintain SOE asset values, and by re-centralizing internal bureaucratic control over large SOEs the state could potentially resolve such negative factors, including high agent costs and the moral hazard problem arising from the decentralized governance structure of large SOEs.

Nevertheless, the point should be made that firms with centralized organizational structures have drawbacks. SASAC officials are not well attuned to local information regarding product demand. If they are not well informed and impose bureaucratic control over large SOEs in a way which prevents a well-informed SOE manager from making investment decisions on his own, then the large SOEs will incur losses.

Hence, in describing the trade-off between centralized and decentralized organizational large SOE structures, this section may be regarded as a first attempt to unify the two-sided argument regarding internal bureaucratic control over large SOEs: does it have a good or bad effect on improving the efficiency of large SOEs? Moreover, at the end of this chapter, we also argue that given the absence of the institutionalization of supervisory boards within large SOEs, the establishment of party committees within them could be deemed a so-called constrained-delegation mechanism through which the trade-off between loss of control and initiative-taking in terms of internal bureaucratic control, could be resolved. Such a constrained-delegation mechanism is in line with the spirit of Grimaud et al. (1998); Dessein (2002) and, Alonso and Matouschek (2007; 2008), who all pioneered relevant work in their literature.

2.3. A Theoretical Model

2.3.1 A Benchmark Model with Linearity of the Payoff Function

The following benchmark model is provided to illustrate the basic trade-off between the decentralized and centralized power division structures of Chinese large SOEs. Assume that there is a large SOE facing the following inverse demand function: $P=I-Q$, where P is the price charged on the market and Q is output. There is a state official from SASAC who acts as a principal of a large SOE whilst there is a large SOE manager acting as an agent. The marginal cost for this large SOE is a constant, c and $c<I$. Hence, the profit function for this large SOE could be written as follows: $\pi = (1 - Q)Q - cQ$. The profit level of this large SOE also depends on the realization of local demand on the local market for investment projects. There are three possible cases for the level of local demand, which could be characterized by the following set $Q=\{Q_L, Q_M, Q_H\}$ where $Q_L < Q_M < Q_H$, with the elements standing for low, medium, and high levels of demand,

respectively. When an SASAC official's recognition of local market demand is low, a large SOE will suffer losses, indicating that its profit $\pi_L < 0$. When his recognition of market demand is medium, its profit level is $\pi_M < 0$, meaning that the large SOE continues suffering losses, but the losses are smaller than those on the low local market demand case. When the politician's recognition of local market demand is high, the SOE's profit level is π_H . Here, $\pi_H > 0$.

The SASAC government official cares only about his personal payoff, stemming from the maximization of the overall profitability of the large SOE for the sake of asset appreciation. According to the *Company Law of People's Republic of China (Revised in 2018)*, the main duty of the SASAC officials who act on the behalf of state investors of large SOEs in China, is to ensure the maximization of their profits for the sake of their asset appreciation. In order to achieve the aims of profit maximization, they are legally allowed to take charge of the monitoring of the auditing system, selection and promotion mechanism of large SOE managers both internally and externally, managerial personnel system, some of the investment decision-making authority, and some others in the large SOEs. Hence, it is reasonable to assume that the objective function of SASAC officials in China is to maximize the profits of large SOEs.³⁴

Hence, the personal payoff could thus be derived as follows: $R_i = m\pi_i$, where $i = L, M$, and H $0 < m < 1$, which measures how much importance the state official attaches to asset appreciation. The higher the value of m (that is, m approaches 1), the more likely it is that SASAC officials will be committed to maintaining asset appreciation of large SOEs. It is worth mentioning here that the main reason for linking the payoff of government officials from SASAC to the profitability of

³⁴ It should be noted here that China's SASAC model for governing large SOEs highly resembles some SOE corporate governance features of Singapore's Temasek model whereby the Singaporean Temasek state investment company or fund, is also responsible for the asset appreciation and maximization of the return of asset of state-owned firms in Singapore. For further details of the Temasek model, please refer to Heaney et al. (2011) and Chen (2016).

large SOEs is that, according to Shen et al. (2019) and Fang (2017), the main function of the SASAC is to supervise the large SOEs in their charge to ensure that these SOEs are aligned with the objectives of profit maximization. Hence, the pay performance as well as the political promotion of government officials from SASAC, are dependent largely on the extent to which they can maintain the appreciation of large SOE assets.³⁵

Bearing these points in mind, the principal's (SASAC officials) payoff function for investment projects at various levels of realized demand is distributed as follows:

Table 2.1: SASAC Official's Linear Payoff as a Function of the Decision and the Recognition of Product Demand

	Low (L)	Medium (M)	High (H)
Invest	$m\pi_L$	$m\pi_M$	$m\pi_H$
Not Invest	0	0	0

Notes: $\pi_L < \pi_M < 0, \pi_H > 0$

Suppose that a large SOE is about to invest in the development of a new product. The return on this development depends on local demand for the product. The above Table 2.1 makes it clear that a state official from the SASAC who cares about the overall payoff stemming from the profitability of this investment project, will decide to invest only if demand is high. Nevertheless,

³⁵ In particular, SASAC's introduction of EVA (2010) further strengthened the incentives of officials to pursue the objectives of large SOE profit maximization.

the large SOE manager knows the actual demand for the product. It is assumed that the large SOE manager's payoff function is given by $\lambda\pi_i + dInvest$, whereby $i=L, M \text{ and } H$. "d" is the "bias" of the large SOE manager and is obtained only if officials from the state Asset Committee choose to invest. "d" captures the empire-building effect of large SOEs. According to some scholars, SOE managers in China without legal claim to the residual rights of their firms, tend to expand their firms with the objective of maximizing sales instead of profit (Bai et al., 2006; Shen et al., 2017; Zhang, 2004). On the one hand, these managers must manage the overall profitability of their firms, whilst on the other hand they are inclined towards self-interest and choose empire-building to maximize the private benefits derived from controlling firms. If $d>0$, managers will opt for the empire-building investment; they will do the opposite if $d<0$. If $d=0$, then managers are neutral in their investment plans.

Parameter λ determines how much weight large SOE managers place on the overall profits of the firms. Obviously, λ is not necessarily equal to 1. This is because, as noted above, large SOE managers are not always oriented towards maximizing profits. They may instead maximize sales or the total amount of labour employed, both of which are direct measures of firm size. Therefore λ measures the degree of alignment between a firm's overall interests, and the self-interests of individual SOE managers. If $\lambda > 1$ or $\lambda < 1$, the problem of misalignment occurs.

Suppose that large SOE managers decide how much to invest, contingent on the level of demand on the market, namely, I_j where $j=L, M \text{ and } H$. It is noted that when local market demand is low, a large SOE manager has no incentive to invest as he could not derive additional private benefits by undertaking investment at a low level. Hence, $I_L = 0$. $I_M < I_D$. However, one thing we need to bear in mind is that when local demand is medium or high, the corresponding investment level made by a large SOE manager, as well as her empire-building inclination (d), must be

sufficiently large that she would not derive the negative payoff from the investment. That is, $\lambda\pi_M + dI_M > 0$ and $\lambda\pi_H + dI_H > 0$.

The table of payoff functions for large SOE managers may be shown as follows:

Table 2.2: A Large-SOE Manager's Payoff as a Function of the Decision and the Recognition of Demand for a Product

	Low (L)	Medium (M)	High (H)
Invest	$\lambda\pi_L + dI_L$	$\lambda\pi_M + dI_M$	$\lambda\pi_H + dI_H$
Not Invest	0	0	0

Note: $\pi_L < 0, I_L = 0, 0 < I_M < I_H$

Table 2.2 indicates that since it is known that $\lambda\pi_L + dI_L < 0, \lambda\pi_M + dI_M > 0$ and $\lambda\pi_H + dI_H > 0$, large SOE managers will invest if demand is either medium or high. This contrasts with the preference of the State Asset Committee, which invests in projects only if demand is high. It may be seen that the bias in decision-making in this case reflects the fact that large SOE managers are misaligned if local demand is medium, but aligned if local demand is either high or low. To resolve this misalignment caused by their superior knowledge of local information about a product, two possible ways may be adopted:

Delegate the investment decision to the large SOE managers³⁶

³⁶ The delegation approach to decentralizing decision-making within the internal organization is tantamount to giving greater autonomy to large-SOE managers. This approach was first proposed by Sun (1956), a Chinese Marxist economist.

or

Centralize the investment decision in officials from the State Asset Committee (bias=0)³⁷

The following must be borne in mind: one benefit of assigning authority to officials from the state Asset Committee (centralizing decision-making), is that these officials will make decisions which prevent a state asset from depreciating; in other words, they will opt for projects that are compatible with profit maximization. The downside is that SASAC officials lack local information, and thus are uncertain about demand on the market.

Assume that the SASAC official assigns probability p_L to a low-demand situation, p_M to medium demand, and p_H to high demand. Given that $p_L + p_M + p_H = 1$. For simplicity, suppose that $p_L = p_M = p$ and $p_H = 1 - 2p$.³⁸ Note that the highest profit that this large SOE can make (this occurs when the decision is made by a profit driven decision-maker, and who perfectly observes product demand) is by investing if, and only if, demand is H, in which the profits are:

$$\pi_{max}^p = 0p_L + 0p_M + m\pi_H p_H = m(1 - 2p)\{[1 - Q_H]Q_H - cQ_H\}$$

(1)

Whether or not the decision-making process ought to be centralized or delegated depends on the results of comparing the firm's expected profits under every possible organizational structure (i.e. centralization or decentralization).

2.3.1.1 Centralization

³⁷ Recent tendencies in the power division structure are more consistent with the centralization of the decision-making process in which President JinPing Xi persistently emphasized the value of stronger party guidance and monitoring over large SOEs.

³⁸ If $p = \frac{1}{3}$, all demand realizations seem equally likely. If $p = 0$, the SASAC officials know for sure that demand is H. If $p = \frac{1}{2}$, the SASAC officials know for sure that demand cannot be H.

This occurs when all decisions regarding the investment are made by officials from the State Asset Council. Officials make decisions without knowing the level of demand, but seek to maximize profits for the sake of increasing assets. The expected profit if the State Asset Council officials decide to invest is:

$$\pi_I = m\pi_L p + m\pi_M p + m\pi_H(1 - 2p) = m\{[(1 - Q_L)Q_L - cQ_L] + [(1 - Q_M)Q_M - cQ_M]\}p + m\{[(1 - Q_H)Q_H - cQ_H]\}(1 - 2p)$$

(2)

Insofar as the expected profit for officials who do not is 0, officials from the State Asset Council therefore decide to invest if and only if $\pi_I > 0$:

$$m\{[(1 - Q_L)Q_L - cQ_L]p + m[(1 - Q_M)Q_M - cQ_M]\}p + m[(1 - Q_H)Q_H - cQ_H](1 - 2p) > 0$$

(3)

Equation (3) boils down to the following:

$$mp\{[(1 - Q_L)Q_L - cQ_L] + m[(1 - Q_M)Q_M - cQ_M]\} + m[(1 - Q_H)Q_H - cQ_H](1 - 2p) > 0$$

(4)

Equation (4) implies that:

$$p < - \frac{[(1 - Q_H)Q_H - cQ_H]}{[(1 - Q_L)Q_L - cQ_L] + [(1 - Q_M)Q_M - cQ_M] - 2[(1 - Q_H)Q_H - cQ_H]}$$

(5)

From equation (5), we can derive the first lemma in this chapter:

Lemma 2.1: *Government officials from the State Asset Council always make the investment regardless of actual product demand if and only if,*

$$p < - \frac{[(1-Q_H)Q_H - cQ_H]}{[(1-Q_L)Q_L - cQ_L] + [(1-Q_M)Q_M - cQ_M] - 2[(1-Q_H)Q_H - cQ_H]}$$

Lemma 2.1 implies that the loss owing to centralization lies in the fact that government officials from the State Asset Council always make the same decision regardless of actual product demand, given their lack of local knowledge about demand. That is to say, if State Asset Council government officials believe the probability that local product demand is low or medium and sufficiently low, then those officials will always decide to invest. There is a loss in profits from (1) as a result of their lack of local knowledge of actual demand. Loss arises when actual demand is L or M , because government officials should not invest in those cases. Losses from over-investment may be computed as follows:

$$\begin{aligned} Loss_1^m &= \pi_{max}^p - \pi_I = m(1 - 2p)\{[1 - Q_H]Q_H - cQ_H\} - m\{[(1 - Q_L)Q_L - cQ_L] - \\ & [(1 - Q_M)Q_M - cQ_M]\}p - m\{[(1 - Q_H)Q_H - cQ_H]\}(1 - 2p) = -pm\{[(1 - Q_L)Q_L - cQ_L] + \\ & [(1 - Q_M)Q_M - cQ_M]\} > 0 \end{aligned}$$

(6)

If $p > - \frac{[(1-Q_H)Q_H - cQ_H]}{[(1-Q_L)Q_L - cQ_L] + [(1-Q_M)Q_M - cQ_M] - 2[(1-Q_H)Q_H - cQ_H]}$, SASAC officials from the State

Asset Council decide not to invest; a loss from not investing also leads to reduced profits owing to their lack of local knowledge of product demand. Loss arises when actual demand is H , so the losses may be computed as:

$$Loss_2 = \pi_{max}^p - 0 = m(1 - 2p)\{[1 - Q_H]Q_H - cQ_H\}$$

(7)

From equations (6) and (7), it may be seen that, when the decision-making process is centralized to officials from the State Asset Council, there is zero loss if SASAC officials feel no uncertainty about the ‘right’ decision. If $p = \frac{1}{2}$ (that is $\pi_I = \frac{1}{2}m\pi_L + \frac{1}{2}m\pi_M < 0$), then demand is either L or M , so government officials ought not to invest. If $p = 0$ (that is $\pi_I = m\pi_H > 0$), demand is H , and government officials should invest.

Secondly, losses are maximal when there is greater uncertainty about what to do (roughly when all levels of demand are equally likely), and maximal losses increase with respect to the payoff of government officials from high local product demand. This is because, once this payoff rises, p approaches $\frac{1}{2}$, implying that true demand is more likely to be L or M . Indeed, once $\pi_H \rightarrow \infty$, $u, p \rightarrow \frac{1}{2}$ based on the use of L hospital’s rule.

Hence, a trade-off emerges which may be summarized as the following proposition:

Proposition 2.1: *Once SASAC officials’ potential payoff from high demand rises, it becomes more likely that L or M demand will be the case, implying higher risks would arise from the government officials lacking local demand knowledge, thus leading to higher maximal losses. If SASAC government officials still choose to invest under these conditions, maximal losses will unquestionably increase.*

The macro-level policy implication of the loss of centralization is that once government officials expect the performance of the local economy to be boosted (i.e. once the potential payoff of high demand for government officials rises), the absence of local demand knowledge makes it more likely; in fact the true state of the local economy will not be as good as the government officials expect. If they still choose to invest when the local economy is in a downturn, the large SOEs will incur consequent losses.

2.3.1.2 Decentralization

Under decentralization, large SOE managers with greater knowledge about local product demand, have decision-making authority. Nevertheless, their self-interest, such as empire-building to gain more private control of benefits, may lead to biased decisions. Suppose an SOE manager is pro-investment, having succumbed to the empire-building effect ($d > 0$) his/her preferences is in line with the illustration of Table 2.2.

It is known that decisions made by SOE managers depend on the ‘true’ bias $\frac{dI_{i \in \{L, M, H\}}}{\lambda}$, which is the ratio of the empire-building effect to the degree of alignment between the interests of large SOE managers and those of government officials. True bias will rise through two channels: the stronger the empire-building effect, the higher will be the true bias, but the lower the degree of alignment, the higher will be the true bias.

Suppose that, under the case of decentralization, $dI_{i \in \{L, M, H\}} > 0$, indicating the presence of the empire-building effect on large SOEs. There are then three cases to consider.

Case I: If $\lambda\pi_L + dI_L > 0$ (in other words, $d > -\frac{\lambda\pi_L}{I_L}$)

In Case I, the large SOE manager always invests, regardless of demand.

Case II: If $\lambda\pi_M + dI_M > 0$ and $\lambda\pi_L + dI_L < 0$ (in other words, $-\frac{\lambda\pi_M}{I_M} < d < -\frac{\pi_L}{I_L}$)

In Case II the large SOE manager invests only if demand is high or medium.

Case III: $\lambda\pi_M + dI_M < 0$ (in other words, $d < -\frac{\lambda\pi_M}{I_M}$)

In Case III, the large-SOE manager invests only if demand is high.

Based on these three cases, one may argue that once the true bias becomes small enough, the large SOE manager is aligned with the interests of officials from the State Asset Council who care about the overall interest of the SOEs.

We may then further compute the SASAC government officials' payoff losses under decentralization for each of the above cases as a function of p . We compute the losses in two stages. Firstly, we need to analyse which decision the large SOE manager will choose (invest or not invest) as a function of demand. In this chapter, we have simplified the situation under which the large SOE manager knows demand, so he would choose to invest whenever the payoff for investing is higher than 0. On this basis, we may compute the payoffs of SASAC government officials according to each possible value of demand.

Case I: $d > -\frac{\lambda\pi_L}{I_L}$

Decision: the large SOE manager always invests.

$$Loss_{case\ 1} = -pm\{[(1 - Q_L)Q_L - cQ_L] + [(1 - Q_M)Q_M - cQ_M]\}$$

Case II: $\frac{\lambda\pi_M}{I_M} < d < -\frac{\pi_L}{I_L}$

Decision: the large-SOE manager invests only if demand is H or M .

$$Loss_{case\ 2} = -pm\{[(1 - Q_M)Q_M - cQ_M]\}$$

Case III: $d < -\frac{\lambda\pi_M}{I_M}$

Decision: the large SOE manager invests only if demand is H .

$$Loss_{case\ 3} = m(1 - 2p)\{[1 - Q_H]Q_H - cQ_H\} - m(1 - 2p)\{[1 - Q_H]Q_H - cQ_H\} = 0$$

2.3.1.3 Comparison: Centralization vs Decentralization

Case I: High Misalignment

Large SOE managers know about local demand. However, they are very biased due to a strong commitment to empire building and the maximization of private control of benefits, such as reputation improvement, social network expansion, and so on (the case where $d > -\frac{\lambda\pi_L}{I_L}$). As a result, the information from the large SOE managers is not used and decentralization is not allowed to outperform centralization.

This has far-reaching implications in the debate over whether removing bureaucratic controls over large SOEs, would necessarily improve their efficiency, especially the monopolistic ones. Our analysis indicates that once there are inconsistent interests between large SOE managers and the government officials in charge of the State Asset Council, in order to avoid biased decisions by SOE managers, there arises the rationale for a certain level of centralized control by the state, thus avoiding the transfer of too much autonomy to SOE managers. Given the severity of the problems of insider control and principal-agent conflict during the reform of large SOEs, centralizing decisions to State Asset Council officials may prevent the loss of control and reduce agency costs in large SOEs.

Case II: Medium Misalignment

If the level of bias is medium, ($\frac{\lambda\pi_M}{I_M} < d < -\frac{\pi_L}{I_L}$), then firms sometimes choose to centralize or decentralize at another time, depending on the local uncertainty about product demand. One thing to bear in mind is that conflict between State Asset Council officials and SOE managers will emerge if, and only if local demand is medium rather than high or low. This is because officials

from the State Asset Council will make the same decision as that of an informed SOE manager if demand was L or H . An important observation for Case II is that the benefit of decentralization is highest when there is uncertainty amongst SOE managers making the right decisions.

Case III: Complete Alignment

This is the case under which the bias in interests between SOE managers and officials from the State Asset Council is so small, ($d < -\frac{\lambda\pi_M}{I_M}$), that SOE managers would make the same investment decisions as government officials. As a result, there is no loss from decentralization because the loss of control is zero. From the above three cases, we may derive the following proposition:

Proposition 2.2: *Losses from decentralization of the decision-making authority to government officials rise as the empire-building effect associated with large-SOE managers intensifies, namely:*

$$0 < -pm\{[(1 - Q_M)Q_M - cQ_M]\} < -pm\{[(1 - Q_L)Q_L - cQ_L] + [(1 - Q_M)Q_M - cQ_M]\}$$

From Proposition 2.2, it may be known that Case III (complete alignment) will emerge if, and only if the empire-building tendency of large SOE managers is sufficiently weak. This is very unlikely in the current context of large SOE reforms in China. Firstly, according to Shen et al. (2018), Jzhang et al. (2017) and Shen et al. (2017), ownership reforms applied to large SOEs in China have already trapped them in what they call the partial reform equilibrium. The central theme of these three papers is that the empire-building effect of large SOEs may not be eliminated because the current state-owned ownership structure of the large SOEs may deliver a win-win situation for SOE managers and SASAC officials. Hence, neither side has a unilateral incentive to deviate from this equilibrium. Secondly, as Jefferson (2016) argues, even though the ownership

structure of large SOEs becomes more dispersed, this effect is ascribed to the weakness of the external regulatory mechanism, which may enable shareholders with minority shares to act as independent directors. Consequently, the empire-building effect which arises largely because of the insider control over large SOEs may not be resolved unless a complete management buyout (MBO) type of privatization is implemented.

Given the stagnation of ownership reforms of large SOEs, the prevailing empire-building effect of large SOE managers would inevitably lead to major losses were they to be delegated decision-making authority. Thus, it may become a state rationale to recentralize the decision-making authority to SASAC officials.

2.3.1.4 Investment Decision Under Constrained Delegation

In the previous section, we evaluated the performance of centralized vs. decentralized governance structures as an all-or-nothing choice: either the SOE manager or the SASAC official makes the investment decision. With only two choices (invest or not invest), there is not much more that firms can do when investment decisions are decentralized. However, when there are more possible choices, SASAC officials may impose constraints on the available choices. Considering the example of large SOE managers, they may make their own decisions in terms of investment, but they cannot appoint other members to their managerial boards. Moreover, the authority of the SOE manager selection mechanism is constrained by party committees in large SOEs which are under the direct control of the SASAC. In addition, SASAC officials may also impose quantity constraints on the investments made by large SOE managers. Alternatively, SASAC officials may also impose thresholds above which large-SOE managers may not borrow from banks. In all these examples the SASAC officials allow lower-level SOE managers some degree of decision-making, but at the same time imposing limits by ruling out certain choices.

We now address the following question: if the firm decentralizes its decision-making authority, when will it be best to rule out certain decisions and limit the discretion of large SOE managers? Consider the same set-up as before, with uninformed officials from the SASAC officials, and a large SOE manager who knows demand for a product. Now, the firm may invest X , Y , or Z million, where $0 \leq X < Y < Z$. Table 2.3 demonstrates the payoffs for uninformed officials from the SASAC officials as a function of demand.

Table 2.3: SASAC Officials' Payoff with Three Possible Investment Choices

	Low (L)	Medium (M)	High (H)
Invest Z Million	$m\pi_L^Z$	$m\pi_L^M$	$m\pi_H^Y$
Invest Y Million	$m\pi_L^Y$	0	$m\pi_H^Y$
Invest X Million	0	0	0

Notes: $\pi_L^Z < \pi_L^Y < \pi_M^Z < 0 < \pi_H^Y < \pi_H^Z$

Assume that SASAC officials assign probability p_L to L, p_M to M, and P_H to H. For simplicity, we suppose that $p_L = p_M = p$ and $P_H = 1 - 2p$. As a result of the empire-building effect, the large SOE manager is pro-investment and reaps a private payoff, as shown in Table 2.4.

Table 2.4: Large-SOE Manager's Private Payoff with Three Possible Investment Choices

	Low (L)	Medium (M)	High (H)
Invest Z Million	$\pi_L^Z _{manager} = d\pi_L^Z +$ hI_L	$\pi_M^Z _{manager} =$ $\pi_M^Z + hI_M$	$\pi_H^Z _{manager} = d\pi_H^Z +$ hI_H
Invest Y Million	$\pi_L^Y _{manager} = d\pi_L^Y +$ hI_L^Y	$\pi_M^Y _{manager} =$ $d\pi_M^Y + hI_M^Y$	$\pi_H^Y _{manager} = d\pi_H^Y +$ hI_H^Y
Invest X Million	0	0	0

Notes: $\pi_L^Y|_{manager} < 0 < \pi_L^Z|_{manager} < \pi_H^Y|_{manager} < \pi_M^Z|_{manager} < \pi_H^Z|_{manager}$

It may be seen that if the large SOE manager decides on an amount to invest, he will always invest Z million. Note that delegation without restrictions may not outperform centralization, because the large SOE manager always makes the same investment decision due to the empire-building effect, irrespective of local demand. What if SASAC officials then impose limits on the degree of discretion with which large SOE managers make investment decisions? This is the case of “constrained delegation”: the large SOE manager may decide how much to invest but is not allowed to choose to invest in a Z-million project. Under constrained delegation, the large SOE manager will, in this case, invest Y million if demand is medium or high, but will not invest if demand is low. We may therefore compare the scenarios of constrained delegation with the case of centralization in which the decision-making authority is wielded by officials from the top, and from this we can derive the conditions under which constrained delegation is preferred to centralization. It is also noted that $\pi_H^Z|_{manager}$ is assumed to be sufficiently large owing to the

degree of private control over the benefits that a large SOE manager could derive from undertaking empire-building activities.

When investment decisions are centralized to officials at the top, these officials have no knowledge of local product demand, but seek to maximize their personal payoffs based on overall profits. Again, we compute optimal payoffs of SASAC officials in two stages. The first stage is to analyse which decision the officials will make (invest or not invest) as a function of their uncertainty regarding local demand for a product (as a function of p). We then compute the expected profits given that SASAC officials will choose the optimal decision.

Firstly, the expected profits under each investment option are:

$$\begin{aligned} \pi(Z \text{ million}) &= pm\pi_L^Z + pm\pi_M^Z + (1 - 2p)m\pi_H^Z \\ \pi(Y \text{ million}) &= pm\pi_L^Y + m\pi_H^Y(1 - 2p) \\ \pi(X \text{ million}) &= 0 \end{aligned}$$

(8)

From equation (8), it may be demonstrated that investing Z million is better than investing Y million if and only if:

$$pm\pi_L^Z + pm\pi_M^Z + (1 - 2p)m\pi_H^Z > pm\pi_L^Y + m\pi_H^Y(1 - 2p)$$

(9)

From equation (9), it could be derived that:

$$p > \frac{\pi_H^Y - \pi_H^Z}{\pi_L^Z + \pi_M^Z - 2\pi_H^Z - \pi_L^Y + 2\pi_H^Y}$$

(10)

Investing Z million is better than not investing if and only if $pm\pi_L^Z + pm\pi_M^Z + (1 - 2p)m\pi_H^Z > 0$, which gives:

$$p < -\frac{\pi_H^Z}{\pi_L^Z + \pi_M^Z - 2\pi_H^Z}$$

(11)

Likewise, investing Y million is better than not investing if, and only if $pm\pi_L^Y + m\pi_H^Y(1 - 2p) > 0$, which gives:

$$p > -\frac{\pi_H^Y}{\pi_L^Y - 2\pi_H^Y}$$

(12)

Taking everything into account, we know that investing Z million is best if and only if, $p \leq -\frac{\pi_H^Z}{\pi_L^Z + \pi_M^Z - 2\pi_H^Z}$, investing in Y million is best if $-\frac{\pi_H^Y}{\pi_L^Y - 2\pi_H^Y} \leq p \leq -\frac{\pi_H^Z}{\pi_L^Z + \pi_M^Z - 2\pi_H^Z}$, and not investing is the best choice for officials if and only if, $p \geq -\frac{\pi_H^Z}{\pi_L^Z + \pi_M^Z - 2\pi_H^Z}$. It may be argued that SASAC officials would prefer to invest in a big project (Z million etc.) if and only if they are uncertain about having low or medium local demand. If SASAC officials become more certain about having low or medium local demand, they will choose to invest in smaller projects or not invest at all if they are certain that local demand will be low or medium.

The payoffs which SASAC officials would obtain if they knew local demand for a product may be computed as follows:

$$\pi_{know} = (1 - 2p)m\pi_H$$

(13)

Thus, the losses from centralization under each investment decision may be represented as follows:

$$\begin{aligned} \{\pi_{Loss} = p(-m\pi_L^Z - m\pi_M^Z) \text{ if invest in } Z \text{ million } \pi_{Loss} = (3m\pi_H^Y - 2m\pi_H^Z)p + m\pi_H^Z - \\ m\pi_H^Y \text{ if invest in } Y \text{ million } \pi_{Loss} = (1 - 2p)m\pi_H^Z \text{ if not invest} \end{aligned}$$

(14)

Under constrained delegation, the decision to invest in the Z-million project is ruled out by SASAC officials through monitoring large SOE managers. In this case, the large SOE manager chooses to invest in the Y-million project as long as local demand is medium or high. Therefore, the payoffs obtained by SASAC officials when a large SOE manager invests in the Y-million project may be computed as:

$$\pi_{constrained}(p) = m\pi_H^Y (1-2p)$$

This implies that losses from constrained delegation with respect to the uncertainty of local demand may be derived as follows:

$$\pi'_{loss} = m\pi_H^Z (1-2p) - m\pi_H^Y (1-2p) = m(\pi_H^Z - \pi_H^Y)(1-2p)$$

(15)

From equation (15), we may compare the performance of centralization and constrained delegation by considering the losses incurred under these two organizational structures. It is known that total losses from the centralized governance structure could be computed as follows:

$$\pi_{Loss}^c = p(-m\pi_L^Z - m\pi_M^Z) + (3m\pi_H^Y - 2m\pi_H^Z)p + m\pi_H^Z - m\pi_H^Y + c(1-2p)m\pi_H^Z$$

(16)

We may do some simple algebra to derive the condition under which the organizational structure of constrained delegation would strictly dominate the centralized organizational structure of large SOEs. To derive this condition, the following inequality must be satisfied:

$$\pi_{Loss}^c - \pi'_{loss} > 0$$

(17)

Equation (17) could be rewritten as follows:

$$p(-m\pi_L^Z - m\pi_M^Z) + (3m\pi_H^Y - 2m\pi_H^Z)p + m\pi_H^Z - m\pi_H^Y + c(1-2p)m\pi_H^Z > m(\pi_H^Z - \pi_H^Y)(1-2p)$$

(18)

Equation (18) leads to the following two conditions:

$$\{\pi_H^Z < -\left(\frac{\pi_H^Y p + \pi_L^Z p + \pi_M^Z p}{c(1-2p)}\right) \text{ if } p < \frac{1}{2} \quad \pi_H^Z > -\left(\frac{\pi_H^Y p + \pi_L^Z p + \pi_M^Z p}{c(1-2p)}\right) \text{ if } p > \frac{1}{2}$$

(19)

We know that π_H^Z is assumed to be sufficiently large given the degree of private control over the benefits large-SOE managers could derive from undertaking empire-building activities.

We also know that, when $\pi_H^Z \rightarrow \infty$, $p \rightarrow \frac{1}{2}$. Hence, we can conclude that the second condition implied by (19) is impossible. From equation (19), we could have the following Proposition 2.3:

Proposition 2.3: *The organizational structure of constrained delegation will be preferred to that of centralization if and only if the profits of investing in an empire-building project (the Z-million investment choice) with high local demand received by large SOEs, are sufficiently small.*

Mathematically, $\pi_H^Z < \left(\frac{-\pi_H^Y p + \pi_L^Z p + \pi_M^Z p}{c(1-2p)}\right)$

Proposition 2.3 conveys a very important message: if SASAC officials could not derive a sufficiently high level of payoff from investing in high-level local demand empire-building investment choices (the z-million investment choice in our case), then the constrained-delegation organizational structure always dominates the centralized governance structure. This makes sense because it is normally the case that large SOE managers receive very high payoffs by investing in empire-building, and this deviates from the organizational interests such as profit maximization pursued by SASAC officials. Therefore, it could be demonstrated that unless there is convergence in terms of interest alignment between large SOE managers and SASAC officials, the constrained-delegated mechanism is superior to the centralized organizational structure of large SOEs as it reduces losses to the firms.

2.3.2 A Multi-Project Product Model with a General Functional Form of Payoff

In this section, we extend our previous one-project-based model to a multiple-project case. Suppose that, as in the previous benchmark model, a large SOE faces inverse demand function $P=I-Q$, where P is the price it charges the market, and Q is output. A state official from SASAC acts as the principal of the large SOE and meanwhile there is a large SOE manager acting as an agent. The marginal cost for this large SOE is a constant, c and $c < I$. There are n available projects from which large SOE managers can choose to invest at varying levels of local demand. It is assumed here that the probability for which a project I is selected at each level of demand is p_i . Hence, the expected payoffs for SASAC officials from investing when local demand is low, medium, or high and could be expressed as follows respectively:

$$\{\Pi_L = m[p_1\pi_1^L + p_2\pi_2^L + \dots p_n\pi_n^L] = m \sum_{i=1}^{n_L} p_i \pi_i^L \quad \Pi_M = m[p_1\pi_1^M + p_2\pi_2^M + \dots p_n\pi_n^M] = m \sum_{i=1}^{n_M} p_i \pi_i^M \quad \Pi_H = m[p_1\pi_1^H + p_2\pi_2^H + \dots p_n\pi_n^H] = m \sum_{i=1}^{n_H} p_i \pi_i^H\}$$

(20)

From equation (20), we inform the following table:

Table 2.5: SASAC Official's Payoff as a Function of the Decision and the Recognition of Demand for the Multi-project Product

	Low (L)	Medium (M)	High (H)
Invest	$\Pi_L = m \sum_{i=1}^{n_L} p_i \pi_i^L$	$\Pi_M = m \sum_{i=1}^{n_M} p_i \pi_i^M$	$\Pi_H = m \sum_{i=1}^{n_H} p_i \pi_i^H$
Not Invest	0	0	0

Notes: $\Pi_L < \Pi_M < 0, \Pi_H > 0$

Suppose a large-SOE manager is about to invest in the development of a new product. The above Table 2.5 indicates that even for the multi-project case, the state official from SASAC who cares about the overall payoff stemming from the profitability of this investment project, will only invest if demand is high. Under a multi-project case, as was true for the single-project case, large SOE managers decide how much to invest depending on the level of demand on the market, namely, I_i , where $i=L, M$, and H . It is noted that when local market demand is low, the large SOE manager has no incentive to invest because he could not derive any additional private benefits by undertaking the low-level investment. Hence, $I_L = 0$. $I_M < I_D$. However, differing from the single-project case, consider that now the amount of investment which large SOE managers will make at each level of local demand I_i^{MP} where $i = L, M$, and H is now a monotonically increasing function of the number of projects selected by large SOE managers at each level of local demand, which can be written as:

$$I_i^{MP} = n_i^2 \text{ where } n_i \geq 1 \text{ and } i=L, M, \text{ and } H.$$

As with the benchmark model, where local demand is either medium or high, the corresponding investment level made by the large SOE manager, as well as her empire-building inclination (d), must be sufficiently large such that she would not obtain a negative payoff from the investment. That is:

$$\lambda\Pi_M + dI_M^{MP} > 0 \text{ and } \lambda\Pi_H + dI_H^{MP} > 0.$$

Table 2.6 below is for the payoff functions of large SOE managers.

Table 2.6: Large SOE Manager’s Payoff as a Function of the Decision and the Recognition of Demand for the Multi-project Product

	Low (L)	Medium (M)	High (H)
Invest	$\lambda\Pi_L + dI_L^{MP}$	$\lambda\Pi_M + dI_M^{MP}$	$\lambda\Pi_H + dI_H^{MP}$
Not Invest	0	0	0

Note: $\Pi_L < 0, I_L^{MP} = 0, 0 < I_M^{MP} < I_H^{MP}$

Table 2.6 indicates that $\lambda\Pi_L + dI_L^{MP} < 0, \lambda\Pi_M + dI_M^{MP} > 0$ and $\lambda\Pi_H + dI_H^{MP} > 0$, as was the case with the benchmark model, thus demonstrating that large SOE managers will invest if demand is either medium or high. This differs from the preference of the State Asset Committee, which invests in projects only if demand is high. It could be argued that in the multi-project product case, the decision-making bias also reflects the fact that large SOE managers are misaligned if local demand is medium, but aligned if local demand is either high or low. To resolve this misalignment caused by the superior knowledge of local product information by large SOE managers, one can adopt either of the two following ways:

a) Delegate the investment decision to the large SOE managers

or

b) Centralize the investment decision in officials from the State Asset Committee
(bias=0)

The benefit of assigning authority to State Asset Committee officials (centralizing the decision-making) is that they will make decisions which prevent a state asset from depreciating; in other words, they will opt for projects compatible with profit maximization. The downside is that officials from SASAC lack local information, and thus are uncertain about market demand.

Assume that the official from SASAC assigns probability p_L to a low-demand situation, p_M to medium demand, and p_H to high demand. Given that $p_L + p_M + p_H = 1$, for simplicity, suppose that $p_L = p_M = p$ and $p_H = 1 - 2p$.³⁹ Note that the highest profit which this large SOE may make (this occurs when the decision-maker cares only about profits and perfectly observes product demand), is to invest if and only if demand is H , in which case the profits are:

$$\pi_{max}^{mp} = 0p_L + 0p_M + \Pi_H p_H = m(1 - 2p) \sum_{i=1}^{n_H} p_i \pi_i^H$$

(21)

Suppose that the probability for which each project at varying levels of demand is selected is uniformly distributed, and thus (17) can be rewritten as follows:

$$\pi_{max}^{mp} = \frac{m(1-2p) \sum_{i=1}^{n_H} \pi_i^H}{n_H}$$

³⁹ As with the single-project product case, if $p = \frac{1}{3}$, all demand recognitions seem equally likely. If $p = 0$, the SASAC officials know for sure that demand is H . If $p = \frac{1}{2}$, the SASAC officials know for sure that demand cannot be H .

(22)

Now it becomes clear that under a multi-project product case, whether the decision-making process ought to be centralized or delegated, depends on the results of comparing the firm's expected profits under each possible organizational structure, such as centralization or decentralization.

2.3.2.1 Centralization in a Multi-project Product Case

When the decision-making authority is centralized, all decisions regarding the investment are made by officials from the State Asset Council. Officials make decisions without knowing the level of demand, but seek to maximize the personal payoff based on profits for the sake of increasing state assets. The expected payoff if State Asset Council officials decide to invest is:

$$\begin{aligned} \pi_I^m &= \Pi_L p + \Pi_M p + \Pi_H (1 - 2p) = pm \sum_{i=1}^{n_L} p_i \pi_i^L + pm \sum_{i=1}^{n_M} p_i \pi_i^M + (1 - \\ &2p)m \sum_{i=1}^{n_H} p_i \pi_i^H = \frac{mp \sum_{i=1}^{n_L} \pi_i^L}{n_L} + \frac{mp \sum_{i=1}^{n_M} \pi_i^M}{n_M} + \frac{m(1-2p) \sum_{i=1}^{n_H} \pi_i^H}{n_H} \end{aligned}$$

(23)

Since the expected profit when SASAC officials do not invest is 0, officials from the State Asset Council decide to invest if and only if $\pi_I^m > 0$:

$$\frac{mp \sum_{i=1}^{n_L} \pi_i^L}{n_L} + \frac{mp \sum_{i=1}^{n_M} \pi_i^M}{n_M} + \frac{m(1-2p) \sum_{i=1}^{n_H} \pi_i^H}{n_H} > 0$$

(24)

Therefore (24) boils down to the following:

$$n_M n_H m p \sum_{i=1}^{n_L} \pi_i^L + n_L n_H m p \sum_{i=1}^{n_M} \pi_i^M + n_L n_M m (1 - 2p) \sum_{i=1}^{n_H} \pi_i^H > 0$$

(25)

(25) implies that:

$$p < \frac{n_L n_M \sum_{i=1}^{n_H} \pi_i^H}{n_M n_H \sum_{i=1}^{n_L} \pi_i^L + n_L n_H \sum_{i=1}^{n_M} \pi_i^M - 2n_L n_M \sum_{i=1}^{n_H} \pi_i^H}$$

(26)

From equation (26), we can derive our next lemma:

Lemma 2.2: *In a multi-project product case, government officials from the State Asset Council always make the investment regardless of actual product demand if and only if $p <$*

$$\frac{n_L n_M \sum_{i=1}^{n_H} \pi_i^H}{n_M n_H \sum_{i=1}^{n_L} \pi_i^L + n_L n_H \sum_{i=1}^{n_M} \pi_i^M - 2n_L n_M \sum_{i=1}^{n_H} \pi_i^H}$$

Lemma 2.2 implies that in a multi-project product case, the loss stems from State Asset Council government officials always making the same decision regardless of actual product demand due to their lack of local demand knowledge. Therefore, in the multi-project product case, if the government officials believe that the probability is sufficiently low that local product demand is low or medium, namely, $p < \frac{n_L n_M \sum_{i=1}^{n_H} \pi_i^H}{n_M n_H \sum_{i=1}^{n_L} \pi_i^L + n_L n_H \sum_{i=1}^{n_M} \pi_i^M - 2n_L n_M \sum_{i=1}^{n_H} \pi_i^H}$, then those government

officials will always decide to invest. Also, from Lemma 2.2, it can be seen that in a multi-project case, the above inequality is more likely to hold if the profits ($\sum_{i=1}^{n_H} \pi_i^H$) which SASAC government officials expect to receive from selecting high local demand projects, are sufficiently high. Secondly, once the number of projects with low or medium local demand increases, the inequality is also more likely to hold. The first condition implies that, if SASAC politicians can derive high levels of benefits from investing in high-demand local projects, then they are more likely to always invest. Moreover, the increase in the number of projects with low or medium levels of local

demand will lead to a higher level of uncertainty of the occurrence of low or medium local demand, implying a lower probability of the occurrence of low or medium demand.

The loss takes the form of reduced personal payoffs for government officials from (21) owing to their lack of local knowledge of actual demand. The loss arises when actual demand is L or M , because government officials should not invest in either of those cases. Losses from over-investment may be computed as follows:

$$Loss_1^m = \pi_{max}^{mp} - \pi_l^m = \frac{m(1-2p) \sum_{i=1}^{n_H} \pi_i^H}{n_H} - \frac{mp \sum_{i=1}^{n_L} \pi_i^L}{n_L} - \frac{mp \sum_{i=1}^{n_M} \pi_i^M}{n_M} - \frac{m(1-2p) \sum_{i=1}^{n_H} \pi_i^H}{n_H} > 0 \quad (27)$$

If $p > \frac{n_L n_M \sum_{i=1}^{n_H} \pi_i^H}{n_M n_H \sum_{i=1}^{n_L} \pi_i^L + n_L n_H \sum_{i=1}^{n_M} \pi_i^M - 2 n_L n_M \sum_{i=1}^{n_H} \pi_i^H}$, government officials from the State Asset

Council will not invest; the loss from not investing also arises from the reduced profits owing to their lack of local product demand knowledge. Losses will occur when actual demand is H , so they may be computed as follows:

$$Loss_2^m = \pi_{max}^{mp} - 0 = \frac{m(1-2p) \sum_{i=1}^{n_H} \pi_i^H}{n_H} \quad (28)$$

From equations (27) and (28) it may be seen that, when the decision-making process is centralized to officials from the State Asset Council, there is zero loss when they feel no uncertainty about the ‘right’ decision. If $p = \frac{1}{2}$ (that is $\pi_l = \frac{1}{2} \Pi_L + \frac{1}{2} \Pi_M < 0$), then demand is either L or M , so government officials from SASAC ought not to invest. If $p = 0$ (that is $\pi_l^m = \frac{m(1-2p) \sum_{i=1}^{n_H} \pi_i^H}{n_H} > 0$) demand is H and they should invest.

Secondly, as was true in the single-project product case, the losses are maximal when there is greater uncertainty about what to do (roughly when all levels of demand are equally likely), and maximal losses increase with respect to the payoffs of SASAC government officials from high local product demand. This is because, once this payoff rises, p would approach $\frac{1}{2}$, implying that the true demand recognition is more likely to be L or M . Indeed, once $\sum_{i=1}^{n_H} \pi_i^H \rightarrow \infty$, $p \rightarrow \frac{1}{2}$ based on the L hospital rule.

Thus, we can derive the following proposition:

Proposition 2.3: *In a multi-project case, once the potential payoff of government officials from high demand rises, it becomes more likely that L or M demand will occur, implying the higher risks which would arise from the lack of knowledge of local demand by government officials, leading to higher maximal losses. If government officials still choose to invest in these conditions, the maximal losses will unquestionably increase.*

2.3.2.2 Decentralization in a Multi-project Product Case

Under decentralization in the multi-project product case, large SOE managers with better knowledge about local product demand have decision-making authority to select the number of projects, as well as the size of investment to make at each level of local demand. Nevertheless, their self-interest inclines them towards empire-building to obtain greater private control over benefits, leading to biased decisions. It is assumed that a large SOE manager is pro-investment, undertaking empire-building activities; his or her preference is illustrated in Table 2.6.

As was true in the single-project product case, it is noted that decisions made by large SOE managers depend on the true bias $\frac{dI_{i \in \{L, M, H\}}(n_i)}{\lambda}$, which is the ratio of the empire-building inclination

to the degree of alignment between the interests of large SOE managers, and those of SASAC officials. The bias will be larger through two channels: the stronger the empire-building effect, the higher will be the true bias; the lower the degree of alignment, the higher will be the bias.

Suppose that in the multi-project product case of decentralization, $dI_{i \in \{L, M, H\}} > 0$, indicating the presence of the empire-building effect of large SOEs, then consider three cases:

Case I: If $\lambda \Pi_L + dI_L^{MP}(n_L) > 0$ (in other words, $d > -\frac{\frac{m \sum_{i=1}^{n_L} \pi_i^L \lambda}{n_L}}{n_L^2} = -\frac{m \sum_{i=1}^{n_L} \pi_i^L \lambda}{n_L^3}$)

In Case I, the large SOE manager always invests, regardless of demand. Furthermore, it could be seen as well that the rise in the number of local low-demand projects selectable by large SOE managers would also make the above inequality more likely. This makes sense because by overseeing more investment projects, large SOE managers are better able to maximize their control over benefits through empire-building activities.

Case II:

If $\lambda \Pi_M + dI_M^{MP}(n_M) > 0$ and $\lambda \Pi_L + dI_L^{MP}(n_L) < 0$ (in other words, $-\frac{m \sum_{i=1}^{n_M} \pi_i^M \lambda}{n_M^3} < d < -\frac{m \sum_{i=1}^{n_L} \pi_i^L \lambda}{n_L^3}$)

In Case II, the large SOE manager invests only if demand is medium or high. Secondly, the above inequality is more likely to hold if the number of local medium-demand projects is higher. Likewise, if the number of local low-demand projects is lower, the above inequality is less likely to hold. This indicates that the large SOE manager will no longer be willing to invest in local low-demand products if the number is low as that would not deliver a high enough level of private control over possible benefits.

Case III:

$$\lambda \Pi_M + dI_M^{MP}(n_M) < 0 \text{ (in other words, } d < -\frac{m \sum_{i=1}^{n_M} \pi_i^M \lambda}{n_M^3} \text{)}$$

In Case III, the large SOE manager invests only if demand is high. Also, the lower the number of local medium-demand projects available for selection by the large SOE managers, the more likely the above inequality. This makes sense because large SOE managers are less able to maximize control over their benefits through empire-building activities if they oversee fewer projects in which they could invest.

One may argue based on these three cases, that once the true bias, a multi-project product case is small enough, stemming from a low number of projects selectable at the medium level of local demand, the large SOE manager is aligned with the interests of State Asset Council officials who care about the overall interests of the SOEs.

In the next step, we compute the payoff losses of SASAC officials in the multi-project case as a function of “ p ” in two stages. Firstly, we need to analyse which decision the large-SOE manager will make (invest or not invest) as a function of demand. As in the single-project product case, the large SOE manager will decide to invest when his or her personal payoff for investing is higher than “0”. We then compute the function of the payoff loss of SASAC officials based on each possible level of local demand:

Case I: $d > -\frac{m \sum_{i=1}^{n_L} \lambda \pi_i^L}{n_L^3}$

Decision: the large SOE manager always invests.

$$Loss_{case\ 1} = -pm \left\{ \left[\frac{\sum_{i=1}^{n_L} \pi_i^L}{n_L} \right] + \left[\frac{\sum_{i=1}^{n_M} \pi_i^M}{n_M} \right] \right\}$$

(29)

From the above equality (29) we know that:

$$\text{Case II: } -\frac{m \sum_{i=1}^{n_M} \lambda \pi_i^M}{n_M^3} < d < -\frac{m \sum_{i=1}^{n_L} \lambda \pi_i^L}{n_L^3}$$

Decision: the large SOE manager invests only if demand is H or M.

$$Loss_{case\ 2} = -pm \left\{ \left[\frac{\sum_{i=1}^{n_M} \pi_i^M}{n_M} \right] \right\}$$

(30)

$$\text{Case III: } d < -\frac{\sum_{i=1}^{n_M} \lambda \pi_i^M}{n_M}$$

Decision: the large SOE manager only invests if demand is H.

$$Loss_{case\ 3} = m(1 - 2p) \left\{ \frac{\sum_{i=1}^{n_H} \pi_i^H}{n_H} \right\} - m(1 - 2p) \left\{ \frac{\sum_{i=1}^{n_H} \pi_i^H}{n_H} \right\} = 0$$

(31)

From (29) and (30), the following three relationships can be derived:

$$\frac{\partial Loss_{case\ 1}}{\partial n_L} > 0 \quad \frac{\partial Loss_{case\ 1}}{\partial n_M} > 0 \quad \frac{\partial Loss_{case\ 2}}{\partial n_M} > 0$$

(32)

From (32), we could derive the following Proposition 2.4:

Proposition 2.4: *In a multi-project product case, an increase in the number of local medium-demand projects will increase the losses incurred when the interests of large-SOE managers and SASAC officials are aligned at the high or medium levels.*

Proposition 2.4 implies that losses arising from conflicts of interest between SASAC officials and large SOE managers depend largely on the number of local medium-demand projects which are selected. This is because conflicts between State Asset Council politicians and SOE managers will only emerge if local demand is medium rather than high or low. State Asset Council officials would make the same decision as that of an informed SOE manager if local demand is L or H.

2.3.2.3 Comparison: Centralization vs Decentralization in a Multi-project Product Case

Case I: High Misalignment

For Case I ($d > -\frac{m \sum_{i=1}^{n_L} \pi_i^L \lambda}{n_L^3}$), as in the single-project product case, large SOE managers know more about local demand, but they are biased by the high level of the empire-building effect. Consequently, many losses arise from decentralization, preventing it from outperforming a centralized governance structure.

Case II: Medium Misalignment

If bias is medium ($-\frac{m \sum_{i=1}^{n_M} \pi_i^M \lambda}{n_M^3} < d < -\frac{m \sum_{i=1}^{n_L} \pi_i^L \lambda}{n_L^3}$), then large SOEs sometimes choose to centralize or to decentralize at some other time, contingent on local uncertainty about product demand. It should be noted that the conflict of interest between SASAC officials and large SOE managers will stem from medium level local market product demand rather than high or low levels. That is to say that State Asset Council officials will make the same decision as that which would be made by an informed large SOE manager if local product market demand is low or high.

Case III: Complete Alignment

Case III represents a situation in which the misalignment between the interests of large SOE managers and those of SASAC officials is sufficiently small ($d < -\frac{m \sum_{i=1}^{n_M} \lambda \pi_i^M}{n_M^3}$). The investment decision made by large SOE managers in Case III is same as the one made by SASAC officials. Based on the above three cases, we present the following proposition:

Proposition 2.5: *In a multi-project product case, losses from decentralizing the decision-making authority to government officials rise as bias (the empire-building effect) rises, causing intensified misalignment between the interests of large SOE managers and those of SASAC officials, namely:*

$$0 < -pm \left[\frac{\sum_{i=1}^{n_M} \pi_i^M}{n_M} \right] < -pm \left\{ \left[\frac{\sum_{i=1}^{n_L} \pi_i^L}{n_L} \right] + \left[\frac{\sum_{i=1}^{n_M} \pi_i^M}{n_M} \right] \right\}$$

Based on Proposition 2.5, as in the single-project product case, we can see that Case III (complete alignment) will emerge if and only if the empire-building tendency amongst large SOE managers is sufficiently small. The main difference between the single-project product case and the multi-project product case under the decentralized governance structure, is that in the presence of multiple projects, the empire-building tendency of large SOE managers is also determined by the number of projects at various levels of local demand which they could possibly select.

2.3.2.4 Multi-project Product Investment Decision under Constrained Delegation

In the previous section, we evaluated the performance of centralized and decentralized governance structures under a binary choice. That is, either the large SOE manager or the SASAC officials choose whether or not to invest. With only two choices (invest or not invest), there is not much more that firms can do when investment decisions are decentralized to large SOE managers. As is true of the single-project product case, SASAC officials may impose limits on the investment choices available to large SOE managers.

Suppose again that there is an uninformed SASAC official and a large SOE manager who have knowledge of local product demand. Now the uninformed SASAC officials may invest X million, Y million, or Z million, where $0 \leq X < Y < Z$. The payoffs for the uninformed SASAC officials as a function of varying levels of local demand are given in Table 2.7.

Table 2.7 SASAC Official ’s Payoff in the Multi-Project Product Case with Three Possible Investment Choices

	Low (L)	Medium (M)	High (H)
Invest Z Million	$m\Pi_L^Z$	$m\Pi_M^Z$	$m\Pi_H^Z$
Invest Y Million	$m\Pi_L^Y$	0	$m\Pi_H^Y$
Invest X Million	0	0	0

Notes: $\Pi_L^Z < \Pi_L^Y < \Pi_M^Z < 0 < \Pi_H^Y < \Pi_H^Z$

Assume that SASAC officials assign probability p_L to L, p_M to M, and P_H to H. For simplicity, we suppose that $p_L = p_M = p$ and $P_H = 1 - 2p$. The presence of the empire-building effect will make the large SOE manager in a multi-project product case pro-investment and provide the manager with a private payoff, as shown in Table 2.8.

Table 2.8 Large-SOE Manager’s Private Payoff in a Multi-Project Product Case with Three Possible Investment Choices

	Low (L)	Medium (M)	High (H)

Invest Z Million	$\pi_{ML}^Z _{manager = d}$ $\Pi_L^Z + hI_L^{MP}$	$\pi_{MM}^Z _{manager = d}$ $\Pi_M^Z + hI_M^{MP}$	$\pi_{MH}^Z _{manager = d}$ $\Pi_H^Z + hI_H^{MP}$
Invest Y Million	$\pi_{ML}^Y _{manager = d}$ $\Pi_L^Y + hI_L^{YMP}$	$\pi_{MM}^Y _{manager =}$ $d\Pi_M^Y + hI_M^{YMP}$	$\pi_{MH}^Y _{manager =}$ $d\Pi_H^Y + hI_H^{YMP}$
Invest X Million	0	0	0

Notes: $\pi_{ML}^Y |_{manager} < 0 < \pi_{ML}^Z |_{manager} < \pi_{MH}^Y |_{manager} < \pi_{MM}^Z |_{manager} < \pi_{MH}^Z |_{manager}$

As in the single-project product case, we could also compare the scenario of constrained delegation with the case of centralization for the multi-project case, in which the decision-making authority is wielded by officials from the top, and from this we can derive the conditions in which constrained delegation dominates centralization. It is also noted that $\pi_{MH}^Z |_{manager}$ is assumed to be sufficiently large given the degree of private control over benefits which the large SOE manager could maximize by undertaking empire-building activities.

We derive the optimal payoffs of SASAC officials in two stages. The first stage is to analyse which decision SASAC officials will make (invest or not invest) as a function of their uncertainty about local demand for the product (as a function of p). We then calculate the expected payoffs given that SASAC officials will choose an optimal decision.

Firstly, the expected payoffs for SASAC officials under each investment option are:

$$\begin{aligned} \{\pi(Z \text{ million}) &= p m\Pi_L^Z + p m\Pi_M^Z + (1 - 2p) m\Pi_H^Z \} \\ \pi(Y \text{ million}) &= pm\Pi_L^Y + m\Pi_H^Y(1 - 2p) \\ \pi(X \text{ million}) &= 0 \end{aligned}$$

(33)

From (33), it may be demonstrated that investing Z million is better than investing Y million if and only if,

$$p m \Pi_L^Z + p m \Pi_M^Z + (1 - 2p) m \Pi_H^Z > p m \Pi_L^Y + m \Pi_H^Y (1 - 2p)$$

(34)

From (34), it could be derived that:

$$p > \frac{\pi_H^Y - \pi_H^Z}{\pi_L^Z + \pi_M^Z - 2\pi_L^Y - \pi_L^Y + 2\pi_H^Y}$$

(35)

Investing Z million is better than not investing if and only if $p m \Pi_L^Z + p m \Pi_M^Z + (1 - 2p) m \Pi_H^Z > 0$, which gives:

$$p < -\frac{\pi_H^Z}{\pi_L^Z + \pi_M^Z - 2\pi_H^Z}$$

(36)

Likewise, investing Y million is better than not investing if and only if $p m \Pi_L^Y + m \Pi_H^Y (1 - 2p) > 0$, which gives:

$$p > -\frac{\pi_H^Y}{\pi_L^Y - 2\pi_H^Y}$$

(37)

Taking everything into account, we know that investing Z million is best if and only if $p \leq -\frac{\pi_H^Z}{\pi_L^Z + \pi_M^Z - 2\pi_H^Z}$. Investing in Y million is best if $-\frac{\pi_H^Y}{\pi_L^Y - 2\pi_H^Y} \leq p \leq -\frac{\pi_H^Z}{\pi_L^Z + \pi_M^Z - 2\pi_H^Z}$ and not investing

is the best choice for officials if and only if $p \geq -\frac{\pi_H^Z}{\pi_L^Z + \pi_M^Z - 2\pi_H^Z}$. As in the single-project product

case, it can be seen that SASAC officials would prefer to choose a big investment (Z million etc.)

if and only if they are uncertain about having low or medium local demand. In addition, inequality

$p \leq -\frac{\pi_H^Z}{\pi_L^Z + \pi_M^Z - 2\pi_H^Z}$ also implies that:

$$p \leq -\frac{\frac{\sum_{i=1}^{n_H} \pi_i}{n_H}}{\frac{\sum_{i=1}^{n_L} \pi_i}{n_L} + \frac{\sum_{i=1}^{n_M} \pi_i}{n_M} - 2\frac{\sum_{i=1}^{n_H} \pi_i}{n_H}} = -\frac{\frac{\sum_{i=1}^{n_H} \pi_i}{n_H}}{\frac{n_M^Z n_H^Z \sum_{i=1}^{n_L} \pi_i + n_L^Z n_H^Z \sum_{i=1}^{n_M} \pi_i - 2n_L^Z n_M^Z \sum_{i=1}^{n_H} \pi_i}{n_L^Z n_M^Z n_H^Z}} = -\frac{\sum_{i=1}^{n_H} \pi_i}{[\frac{n_H^Z}{n_L^Z} \sum_{i=1}^{n_L} \pi_i + \frac{n_H^Z}{n_M^Z} \sum_{i=1}^{n_M} \pi_i - 2 \sum_{i=1}^{n_H} \pi_i]}$$

(38)

From (38), it can be demonstrated that once $n_L^Z \rightarrow \infty, n_M^Z \rightarrow \infty, p$ approaches $\frac{1}{2}$.

Thus, we can derive the following proposition:

Proposition 2.6 *In a multi-project product case, once the number of local low- and medium-demand projects following a big investment choice (Z million, etc.) approaches infinity, the level of uncertainty about there being low or medium local demand reaches the maximum, indicating that SASAC officials would certainly make a big investment choice.*

Proposition 2.6 indicates that SASAC officials would prefer to make a big investment choice (Z million etc.) if and only if they are uncertain about whether local demand is low or medium. If SASAC officials become more certain about the level of local demand, they will choose to invest in smaller projects, or even not to invest at all if they feel very certain that local demand will be low or medium.

The payoffs that SASAC officials would obtain if they knew local demand for the product may be computed as follows:

$$\pi_{know}^m = (1 - 2p)m\Pi_H^Z$$

(39)

Hence, losses from centralization following each investment decision may be represented as follows:

$$\begin{aligned} \pi_{Loss} &= p(-m\Pi_L^Z - m\Pi_H^Z) \text{ if invest in Z million } \pi_{Loss} = (3m\Pi_H^Y - 2m\Pi_H^Z)p + m\Pi_H^Z - \\ & m\Pi_H^Y \text{ if invest in Y million } \pi_{Loss} = (1 - 2p)m\Pi_H^Z \text{ if not invest} \end{aligned}$$

(40)

Under constrained delegation, in the presence of a multi-project product case, the decision to invest in the Z-million project is ruled out by SASAC officials through the monitoring of large SOE managers. In this case, the large-SOE manager chooses to invest in the Y-million project as long as local demand is medium or high. Therefore, the payoffs obtained by SASAC officials when the large SOE manager invests in Y-million project is $\pi_{constrained}^{MP}(p) = m\Pi_H^Y (1-2p)$.

This implies that losses from constrained delegation with respect to the uncertainty of local demand may be derived as follows:

$$\pi_{loss}^{MP'} = m\Pi_H^Z (1-2p) - m\Pi_H^Y (1 - 2p) = m(\Pi_H^Z - \Pi_H^Y)(1 - 2p)$$

(42)

Based on equation (42), we can compare the performance of centralization and constrained delegation by considering losses to SASAC officials under these two organizational structures. It is known that total losses from the centralized governance structure in the multi-project product case can be computed as follows:

$$\pi_{Loss}^{MPc} = p(-m\Pi_L^Z - m\Pi_H^Z) + (3m\Pi_H^Y - 2m\Pi_H^Z)p + m\Pi_H^Z - m\Pi_H^Y + (1 - 2p)m\Pi_H^Z$$

(43)

We then implement some simple algebra to derive the condition under which the organizational structure of constrained delegation would strictly dominate that of the centralized organizational structure in large SOEs. To derive such a condition, the following inequality must be satisfied:

$$\pi_{Loss}^{MPc} - \pi_{loss}^{MP'} > 0$$

(44)

Equation (44) could be rewritten as follows:

$$p(-m\Pi_L^Z - m\Pi_H^Z) + (3m\Pi_H^Y - 2m\Pi_H^Z)p + m\Pi_H^Z - m\Pi_H^Y + (1 - 2p)m\Pi_H^Z$$

$$> m(\Pi_H^Z - \Pi_H^Y)(1 - 2p)$$

(45)

Equation (45) leads to the following two conditions:

$$\Pi_H^Z < -\frac{\Pi_H^Y p + \Pi_L^Z p + \Pi_M^Z p}{(1-2p)} \text{ if } p < \frac{1}{2} \quad \Pi_H^Z > -\frac{\Pi_H^Y p + \Pi_L^Z p + \Pi_M^Z p}{(1-2p)} \text{ if } p > \frac{1}{2}$$

(46)

We know that once $\Pi_H^Z \rightarrow \infty, p \rightarrow \frac{1}{2}$. This makes the second condition of (46) impossible.

From the first condition of (46), we know that:

$$\frac{\sum_{i=1}^{n_H^Z} \pi_i}{n_H^Z} < -\frac{\left(\frac{\sum_{i=1}^{n_H^Y} \pi_i}{n_H^Y} + \frac{\sum_{i=1}^{n_L^Z} \pi_i}{n_L^Z} + \frac{\sum_{i=1}^{n_M^Z} \pi_i}{n_M^Z} \right) p}{(1-2p)}$$

(47)

Rearranging (47), it can be rewritten as follows:

$$n_H^Z < \frac{(1-2p) \sum_{i=1}^{n_H^Z} \pi_i}{\left(\frac{\sum_{i=1}^{n_H^Y} \pi_i}{n_H^Y} + \frac{\sum_{i=1}^{n_L^Z} \pi_i}{n_L^Z} + \frac{\sum_{i=1}^{n_M^Z} \pi_i}{n_M^Z} \right) p}$$

(48)

From equation (48), we derive Proposition 2.7:

Proposition 2.7: *In the multi-project product case, the organizational structure of constrained delegation will be preferred to that of centralization if and only if the number of possible projects which could be selected by making the Z-million big investment choice with high local demand is*

sufficiently small. Mathematically, $n_H^Z < \frac{(1-2p) \sum_{i=1}^{n_H^Z} \pi_i}{\left(\frac{\sum_{i=1}^{n_H^Y} \pi_i}{n_H^Y} + \frac{\sum_{i=1}^{n_L^Z} \pi_i}{n_L^Z} + \frac{\sum_{i=1}^{n_M^Z} \pi_i}{n_M^Z} \right) p}$

Proposition 2.7 indicates that when the number of projects available with the local high-demand investment choice is sufficiently small, the constrained delegation organizational structure always dominates the centralized governance structure. The main difference between the single-project product case and the multiple one is that, to make constrained delegation superior to centralization, the single-project case requires only that SASAC officials be unable to derive sufficiently high levels of benefits from investing in the empire-building investment choice. Nonetheless, in the multiple-project product case, not only are SASAC officials unable to obtain high levels of benefits from empire-building activities, but also the number of projects that he or she could select has to be limited; otherwise he or she could see more opportunities to benefit from these empire-building investment choices.

2.3.3 Extension Model for the Internal Governance Structure of Large SOEs under a Mixed-Ownership Structure

The next interesting question pertains to the implications for the organizational structure of large SOEs if these SOEs are partially privately owned by large-SOE managers. If some private shares are transferred to large-SOE managers, then what are the effects of ownership diversification on the organizational structure of large SOEs compared with when the large SOEs are purely state-owned?

The following extension model is provided to explain how the optimal organizational structure of large SOEs would interplay with ownership diversification in firms. A partially privatized large SOE faces the following inverse demand function: $P = 1 - Q$, where P is the price charges on the market and Q is the output yielded. In the purely state-owned large-SOE case, a state official from the SASAC who acts as a principal in large SOEs still exists. Similarly, a large-SOE manager acts on behalf of an agent for this large SOE. The difference between the partial privatization case and the previously discussed purely state-owned one is that the large-SOE manager now owns certain proportions of this large SOE, which we denote as θ , where $0 \leq \theta \leq 0.5$. The marginal cost for this large SOE, $c(\theta)$, now becomes a function of θ considering that if the large-SOE manager owns several private shares, then the marginal cost is low. This case is because once large-SOE managers have acquired additional private shares, they have strong incentives to exert the effort needed to engage in cost-reducing activities, such as technological upgrading. Thus, the explicit functional form for $c(\theta)$ can be written as follows: $c(\theta) = c_0 - \theta$, where c_0 is the constant marginal cost when no private shares are transferred to large-SOE managers. Moreover, $c(\theta) < 1$. Hence, the profit function for this large SOE could be written as follows: $\pi_i^{ppo} = (1 - Q_i^{ppo})Q_i^{ppo} - c(\theta) Q_i^{ppo}$, where $i = L, M, H$. The profit level for this large SOE is also determined by the recognition of

local demand for investment projects in the local market. Considering these settings, the benefits to the large-SOE manager can be expressed as the following weighted objective function: $W_i = \theta \pi_i^{ppo} + (1 - \theta)[\lambda \pi_i^{ppo} + dI_i^{ppo}]$, where $i = L, M$, and H . As in the previous cases, d is the “bias” of the large SOE and reflects the empire-building effects of large SOEs.

The government officials from the SASAC only consider personal gains from maximizing the overall profitability of the large SOE for asset appreciation. Thus, the personal payoff could be derived as follows: $R_i^{ppo} = m\pi_i^{ppo}$, where $i = L, M$, and H .

From these results, Table 2.9 presents the principal’s (SASAC official’s) payoff function for investment projects at varying levels of recognized demand.

Table 2.9 SASAC Official’s Payoff Function under a Mixed-Ownership Structure

	Low (L)	Medium (M)	High (H)
Invest	$m\pi_L^{ppo}$	$m\pi_M^{ppo}$	$m\pi_H^{ppo}$
Not to invest	0	0	0

Note: $\pi_L^{ppo} < \pi_M^{ppo} < 0, \pi_H^{ppo} > 0$.

Similar to the benchmark model, when the local market demand is low, the large-SOE manager has no incentive to invest as she/he cannot obtain additional personal benefits by undertaking a low level of investment. Hence, $I_L^{ppo} = 0$. $I_M^{ppo} < I_D^{ppo}$. In addition, $\lambda \pi_M^{ppo} + dI_M^{ppo} > 0$ and $\lambda \pi_H^{ppo} + dI_H^{ppo} > 0$.

Table 2.10 shows the payoff functions for large-SOE managers.

Table 2.10 Large-SOE Manager’s Payoffs under a Mixed-Ownership Structure

	Low (L)	Medium (M)	High (H)
Invest	$\theta\pi_L^{ppo} + (1 - \theta)[[\lambda\pi_L^{ppo} + dI_L^{ppo}]]$	$\theta\pi_M^{ppo} + (1 - \theta)[[\lambda\pi_M^{ppo} + dI_M^{ppo}]]$	$\theta\pi_H^{ppo} + (1 - \theta)[[\lambda\pi_H^{ppo} + dI_H^{ppo}]]$
Not to invest	0	0	0

Note: $\pi_L^{ppo} < 0, I_L^{ppo} = 0, I_M^{ppo} < I_H^{ppo}$.

Table 2.10 shows that large-SOE managers of partially privatized large SOEs will invest if the demand is either medium or high because $\theta\pi_L^{ppo} + (1 - \theta)[[\lambda\pi_L^{ppo} + dI_L^{ppo}]] < 0$, $\theta\pi_M^{ppo} + (1 - \theta)[[\lambda\pi_M^{ppo} + dI_M^{ppo}]] > 0$, and $\theta\pi_H^{ppo} + (1 - \theta)[[\lambda\pi_H^{ppo} + dI_H^{ppo}]] > 0$. This notion contrasts with the preference of officials from the State Asset Council, who invests in projects only if the local market demand is high. As in the previous cases, two possible ways are adopted to resolve this misalignment caused by local large-SOE managers' superior knowledge of local information about a product:

(1) Delegate the investment decision to large-SOE managers

(2) Centralize the investment in officials from the State Asset Council (bias = 0)

In the case of mixed-ownership structure, the SASAC official assigns probability p_L to a low-demand situation, p_M to medium demand, and p_H to high demand. Given that $p_L + p_M + p_H = 1$, we suppose that $p_L = p_M = p$ and $p_H = 1 - 2p$ for simplicity.⁴⁰ Notably, the highest profit that this large SOE could obtain (when the decision is made by a decision-maker who cares only about

⁴⁰In the previous cases, if $p = \frac{1}{3}$, then all demand realizations seem equally likely. If $p = 0$, then the SASAC officials are certain that demand is H. If $p = \frac{1}{2}$, then the SASAC officials are certain that demand cannot be H.

profits and perfectly observes product demand) is to invest only if demand is H, in which the payoffs are

$$\pi_{max}^{ppo} = 0p_L + 0p_M + p_H m\pi_H^{ppo} = m(1 - 2p)\{(1 - Q_H^{ppo})Q_H^{ppo} - (c_0 - \theta) Q_H^{ppo}\}. \quad (49)$$

2.3.3.1 Centralization under the Mixed-Ownership Structure

Once the decision-making authority focuses on officials from the SASAC, they make decisions without knowing the level of demand but seek to maximize profits to increase the state's assets.

The expected payoff if SASAC officials decide to invest is as follows:

$$\begin{aligned} \pi_I^{ppo} &= m\pi_L p + m\pi_M p + m\pi_H(1 - 2p) = m\{[(1 - Q_L^{ppo})Q_L^{ppo} - (c_0 - \theta) Q_L^{ppo}] + [(1 - \\ &Q_M^{ppo})Q_M^{ppo} - (c_0 - \theta) Q_M^{ppo}]\}p + m\{[(1 - Q_H^{ppo})Q_H^{ppo} - (c_0 - \theta) Q_H^{ppo}]\}(1 - 2p). \end{aligned} \quad (50)$$

Considering that the expected payoff for officials not to invest is 0, officials from the State Asset Council, therefore, decide to invest only if $\pi_I^{ppo} > 0$:

$$\begin{aligned} mp\{[(1 - Q_L^{ppo})Q_L^{ppo} - (c_0 - \theta) Q_L^{ppo}] + [(1 - Q_M^{ppo})Q_M^{ppo} - (c_0 - \theta) Q_M^{ppo}]\} + m\{[(1 - \\ &Q_H^{ppo})Q_H^{ppo} - (c_0 - \theta) Q_H^{ppo}]\}(1 - 2p) > 0. \end{aligned} \quad (51)$$

Equation (51) leads to the following inequality:

$$p < - \frac{(1 - Q_L^{ppo})Q_L^{ppo} - (c_0 - \theta) Q_L^{ppo}}{(1 - Q_L^{ppo})Q_L^{ppo} - (c_0 - \theta) Q_L^{ppo} + [(1 - Q_M^{ppo})Q_M^{ppo} - (c_0 - \theta) Q_M^{ppo}] - 2[(1 - Q_H^{ppo})Q_H^{ppo} - (c_0 - \theta) Q_H^{ppo}]}. \quad (52)$$

Equation (52) also implies the following condition for the degree of partial privatization θ :

$$\theta > \frac{-Q_L^{ppo} p - Q_M^{ppo} p - 2(Q_H^{ppo})^2 - 2c_0 p Q_H^{ppo} + (Q_L^{ppo})^2 p + c_0 Q_M^{ppo} p + 2Q_H^{ppo} p - Q_H^{ppo} + (Q_H^{ppo})^2 + c_0 Q_H^{ppo}}{Q_H^{ppo} + Q_L^{ppo} p + Q_M^{ppo} p - 2Q_H^{ppo} p}$$

(53)

Lemma 2.3 *Government officials from the State Asset Council always invest regardless of the actual product demand only if the degree of partial privatization is sufficiently large. Mathematically,*

$$\theta > \frac{-Q_L^{ppo} p - Q_M^{ppo} p - 2(Q_H^{ppo})^2 - 2c_0 p Q_H^{ppo} + (Q_L^{ppo})^2 p + c_0 Q_M^{ppo} p + 2Q_H^{ppo} p - Q_H^{ppo} + (Q_H^{ppo})^2 + c_0 Q_H^{ppo}}{Q_H^{ppo} + Q_L^{ppo} p + Q_M^{ppo} p - 2Q_H^{ppo} p}$$

Lemma 2.3 implies that government officials from the State Asset Council always make the same decision regardless of actual product demand only if the degree of partial privatization exceeds a certain threshold. This notion makes sense because once large-SOE managers are given additional private shares, government officials would expect managers to be favorably aligned with the asset-appreciation objectives of SOEs, that is, profit maximization. Thus, when the decision-making authority is centralized, government officials still tend to invest regardless of the actual demand although they have no complete knowledge about the local demand for the product. Arguably, managers may reveal information about the local market demand that is consistent with SASAC officials' expectations by transferring certain private shares to large-SOE managers.

SASAC officials' payoffs have a reduction based on Eq. (49) due to their lack of knowledge of the actual local demand. Such a loss occurs when the actual local demand is L or M because government officials should not invest in this case. The payoff losses from over-investment may be derived as follows:

$$\begin{aligned}
Loss_1^{ppo} &= \pi_{max}^{ppo} - \pi_I^{ppo} = m(1 - 2p)\{(1 - Q_H^{ppo})Q_H^{ppo} - (c_0 - \theta)Q_H^{ppo}\} - m\{[(1 - Q_L^{ppo})Q_L^{ppo} - \\
&(c_0 - \theta)Q_L^{ppo}] - [(1 - Q_M^{ppo})Q_M^{ppo} - (c_0 - \theta)Q_M^{ppo}]\}p - m\{[(1 - Q_H^{ppo})Q_H^{ppo} - (c_0 - \\
&\theta)Q_H^{ppo}]\}(1 - 2p) \\
&= -pm\{[(1 - Q_L^{ppo})Q_L^{ppo} - (c_0 - \theta)Q_L^{ppo}] + [(1 - Q_M^{ppo})Q_M^{ppo} - (c_0 - \theta)Q_M^{ppo}]\} > 0.
\end{aligned}$$

(54)

If the conditions implied by Eqs. (52) and (53) are not satisfied, then government officials from the State Asset Council will unlikely invest. However, the loss from not investing also stems from the reduction in payoffs due to their lack of knowledge of the local product demand. Loss arises when the actual demand is H, so the losses may be computed as:

$$Loss_2^{ppo} = \pi_{max}^{ppo} - 0 = m(1 - 2p)\{(1 - Q_H^{ppo})Q_H^{ppo} - (c_0 - \theta)Q_H^{ppo}\}.$$

(55)

From Eqs. (54) and (55), as in the case when the large SOE is purely state-owned, if the decision-making authority is centralized to officials from the State Asset Council, then a loss is avoided when government officials feel no uncertainty about what constitutes the “right” decision. If $p = \frac{1}{2}$, then the demand is either L or M, so government officials ought not to invest. If $p = 0$, then the demand is H, and government officials from the SASAC should invest.

Second, when the large SOE is partially privatized, the losses are also maximal when uncertainty about what to do is great (when all levels of demand are equally likely). Moreover, the maximal level of losses increases concerning SASAC government officials’ payoffs from high local product demand. This case is because once π_H^{ppo} rises, p would also converge on $\frac{1}{2}$, indicating that the true

demand recognition is likely to be L or M. Once $\pi_H^{ppo} \rightarrow \infty$, $u, p \rightarrow \frac{1}{2}$ based on the use of L hospital's rule. Moreover, once the probability p converges on $\frac{1}{2}$, condition (53) can be written as follows:

$$\theta > -1 + c_0 + (Q_L^{ppo} + Q_M^{ppo}) - \frac{2Q_L^{ppo}Q_M^{ppo}}{Q_L^{ppo} + Q_M^{ppo}}.$$

(56)

Equation (56) shows that the low bound that the degree of partial privatization θ must satisfy is larger than that indicated by Eq. (53). This notion means that if SASAC government officials will still have incentives to invest, then they must transfer additional private shares to large-SOE managers when the true demand recognition is likely to be L or M. Their losses from investing in projects that are in reality most likely to involve low or medium local demand could be reduced. This finding makes sense because, as mentioned previously, partial privatization of large SOEs could create convergence in terms of alignment between the personal interests of managers and SASAC officials. Therefore, the losses incurred by SASAC officials when they wrongly make medium or low local demand investment choices could be offset by granting additional private shares to large-SOE managers.

Hence, we derive the next proposition:

Proposition 2.8: *Under the centralized organizational structure case of partial privatization of large SOEs, once SASAC officials' perceived payoff from rising high demand, L or M demand will likely be the case. This notion implies the high risks that would arise from SASAC officials' lack of knowledge of local demand, which leads to high maximal losses. If SASAC officials still choose*

to invest under these conditions, then the maximal losses will unquestionably increase. Such an increase in losses could be compensated by transferring certain private shares to large-SOE managers.

2.3.3.2 Decentralization under the Mixed-Ownership Structure

Under the decentralization of a mixed-ownership structure, the large-SOE managers with great knowledge about local product demand will have the decision-making authority. Nevertheless, differing from the case in which large SOEs are purely state-owned, their self-interests, including empire-building to gain additional private control over benefits, thereby leading to biased decisions, could be mitigated by obtaining some private shares. A large-SOE manager in the mixed-ownership structure may remain pro-investment, having succumbed to the empire-building effect ($d > 0$). In this case, the manager's preferences are in line with the illustration of Table 2.10.

Decisions made by large-SOE managers will depend on the “true” bias, which can be written as follows: $\frac{(1-\theta)dI_{i \in \{L,M,H\}}}{\lambda}$. This idea is the ratio of the empire-building effect to the degree of alignment between the interests of large-SOE managers and those of government officials. However, such decisions are affected by the number of shares that are not transferred to large-SOE managers, which is $(1 - \theta)$. In the case of the mixed-ownership structure, the true bias will rise through two channels. If the empire-building effect is high and the degree of partial privatization is low, then the true bias will be high. The true bias increases as the degree of alignment decreases.

In the case of decentralization, $(1 - \theta)dI_{i \in \{L,M,H\}} > 0$, indicating the presence of the empire-building effect in large SOEs under the mixed-ownership structure. The following three cases should be considered:

Case I: If $\theta\pi_L^{PP} + (1 - \theta)[\lambda\pi_L^{PP} + dI_L^{PP}] > 0$ (in other words, $d > -\frac{\lambda\pi_L^{ppo}}{I_L^{ppo}} - \frac{\theta\pi_L^{ppo}}{I_L^{ppo}(1-\theta)}$)

In case 1, the large-SOE manager under the mixed-ownership structure always invests, regardless of demand.

Case II: If $\theta\pi_M^{ppo} + (1 - \theta)[\lambda\pi_M^{ppo} + dI_M^{ppo}] > 0$ and $\pi_L^{ppo} + (1 - \theta)[\lambda\pi_L^{ppo} + dI_L^{ppo}] < 0$ (in other words, $-\frac{\lambda\pi_M^{ppo}}{I_M^{ppo}} - \frac{\theta\pi_M^{ppo}}{I_M^{ppo}(1-\theta)} < d < -\frac{\lambda\pi_L^{ppo}}{I_L^{ppo}} - \frac{\theta\pi_L^{ppo}}{I_L^{ppo}(1-\theta)}$)

In case 2, the large-SOE manager invests only if the demand is high or medium.

Case III: If $\theta\pi_M^{ppo} + (1 - \theta)[\lambda\pi_M^{ppo} + dI_M^{ppo}] < 0$ (in other words, $d < -\frac{\lambda\pi_M^{ppo}}{I_M^{ppo}} - \frac{\theta\pi_M^{ppo}}{I_M^{ppo}(1-\theta)}$)

In case 3, the large-SOE manager invests only if the demand is high.

Based on these three cases, as in the purely state-owned large-SOE case, once the true bias becomes small enough, the interests of the large-SOE manager are aligned with the interests of officials from the State Asset Council considering the overall interests of SOEs. Nevertheless, the additional insights that could be drawn from these three cases are that, if the degree of partial privatization is higher than θ , then the bias is likely to be small enough given that I_M^{ppo} and π_M^{ppo} remain unchanged. This notion is reasonable because, in the decentralization case, if large-SOE managers are given additional private shares, then they will be less inclined to undertake empire-building activities and will focus on profitability maximization, which is consistent with the objectives of SASAC officials.

We can further compute the large-SOE managers' payoffs under decentralization in the presence of the mixed-ownership structure for each of the above three cases as a function of p . As with the benchmark model, we calculate the large-SOE managers' payoffs in two stages. First, we

analyze which decision the large-SOE manager will choose (invest or not to invest) as a function of local market demand. In this chapter, large-SOE managers have complete knowledge of local demand, so the manager would choose to invest whenever the payoff for investing is higher than 0. On this basis, we may compute the large-SOE managers' payoff function according to each possible value of demand.

$$\text{Case I: } d > -\frac{\lambda\pi_L^{ppo}}{I_L^{ppo}} - \frac{\theta\pi_L^{ppo}}{I_L^{ppo}(1-\theta)}$$

Decision: the large-SOE manager always invests.

$$Loss_{case\ 1} = -pm\{\pi_L^{ppo} + \pi_M^{ppo}\}$$

$$\text{Case II: } -\frac{\lambda\pi_M^{ppo}}{I_M^{ppo}} - \frac{\theta\pi_M^{ppo}}{I_M^{ppo}(1-\theta)} < d < -\frac{\lambda\pi_L^{ppo}}{I_L^{ppo}} - \frac{\theta\pi_L^{ppo}}{I_L^{ppo}(1-\theta)}$$

Decision: the large-SOE manager invests only if demand is H or M.

$$Loss_{case\ 2} = -pm\{\pi_M^{ppo}\}$$

$$\text{Case III: } d < -\frac{\lambda\pi_M^{ppo}}{I_M^{ppo}} - \frac{\theta\pi_M^{ppo}}{I_M^{ppo}(1-\theta)}$$

Decision: the large-SOE manager invests only if demand is H.

$$Loss_{case\ 3} = m(1 - 2p)\{\pi_H^{ppo}\} - m(1 - 2p)\{\pi_H^{ppo}\} = 0$$

2.3.3.3 Comparison: Centralization vs Decentralization under the Mixed-Ownership Structure

Case I (High Misalignment)

Large-SOE managers have full knowledge of the local demand. However, they are very biased because of the empire-building effect and the intention to maximize private control over benefits, such as reputation improvement and social network expansion (the case where $d > -\frac{\lambda\pi_L^{ppo}}{j_L^{ppo}} - \frac{\theta\pi_L^{ppo}}{j_L^{ppo}(1-\theta)}$). Hence, information from large-SOE managers is not used, and decentralization under the mixed-ownership structure is not allowed to outperform centralization.

This case has profound implications for the policy debate regarding whether removing bureaucratic controls over large SOEs in China would necessarily improve their efficiency, particularly in monopolistic SOEs. Our analysis indicates that, in the absence of partial privatization, once large-SOE managers and the government officials who are in charge of the State Asset Council have conflicting interests, the rationale arises for a certain level of centralized control by the state and of limiting the transfer of autonomy to SOE managers to prevent biased decisions from SOE managers. In other words, the delegation of decision-making authority ought to be accompanied by the implementation of a certain degree of partial privatization to avoid the occurrence of bias favoring large-SOE managers' personal interests, which might cause losses. Indeed, the inequality condition implied by Case I is likely to hold only if the degree of partial privatization is small, which is consistent with our above argument. This result is because once θ is low, π_L^{ppo} and $\frac{\theta}{(1-\theta)}$ will also be low.

Given that the problems of insider control and principal-agent conflict have been very severe during the decentralization reforms in China, we could adopt two methods to resolve the negative aspects brought about by the decentralized structure of China's large SOEs. This problem could be resolved in two ways. First, decisions to State Asset Council officials should be centralized to prevent the loss of control over and high agency costs in large SOEs. Second, certain

private shares are to be transferred to large-SOE managers to align their incentives harmoniously with those of SASAC officials.

Case II (Medium Misalignment)

In the previous case of purely state-owned large-SOE, under the mixed-ownership structure, if bias is medium ($-\frac{\lambda\pi_M^{ppo}}{I_M^{ppo}} - \frac{\theta\pi_M^{ppo}}{I_M^{ppo}(1-\theta)} < d < -\frac{\lambda\pi_L^{ppo}}{I_L^{ppo}} - \frac{\theta\pi_L^{ppo}}{I_L^{ppo}(1-\theta)}$), then large SOEs will sometimes choose to centralize or decentralize at some other time, contingent on local uncertainty about product demand. Notably, conflicts of interest between State Asset Council officials and large-SOE managers will emerge only if the local demand is medium rather than high or low. This case is because officials from the State Asset Council will make the same decision that an informed SOE manager would make if local demand appears to be low or high.

Case III (Complete Alignment)

In this case, the bias favoring the interests of either large-SOE managers or officials from the State Asset Council is so small ($d < -\frac{\lambda\pi_M^{ppo}}{I_M^{ppo}} - \frac{\theta\pi_M^{ppo}}{I_M^{ppo}(1-\theta)}$), in which the large-SOE managers would make the same investment decisions as to the officials of SASAC. Thus, no loss is caused by decentralization because the loss of control is zero. Second, the inequality condition implied by Case III is likely to hold only if the degree of partial privatization is sufficiently large. This finding implies that complete alignment between the interests of large-SOE managers and SASAC officials is likely to occur if large-SOE managers are given additional private shares. That is, they could be highly motivated to pursue profit maximization. Numerically, once θ is high, π_L^{ppo} and $\frac{\theta}{(1-\theta)}$ will be also be high.

Based on the above three cases, we derive the following proposition:

Proposition 2.9: *In the presence of a mixed-ownership structure for large SOEs, losses stemming from the decentralization of decision-making authority to government officials rise as the empire-building effect of large-SOE managers intensifies. Such an effect will be strengthened if the degree of partial privatization is not sufficiently large.*

$$0 < -pm\{\pi_M^{ppo}\} < -pm\{\pi_L^{ppo}\} + \pi_M^{ppo}.$$

Based on proposition 2.9, case 3 (complete alignment) will emerge only if the empire-building tendency on the part of large-SOE managers is sufficiently small. In the mixed-ownership structure case, in which large SOEs are partially privatized, the empire-building effect could be mitigated if some private shares were transferred to managers such that their personal interests could be closely aligned with the officials of SASAC. This notion could explain why the central state recently enacted a series of reforms to advance joint-ownership reforms for large SOEs in China.

2.3.3.4 Investment decisions under constrained delegation in the presence of a mixed-ownership structure

In this section, we explore how constrained delegation as an internal governance mechanism in large SOEs could be affected by the diversification of the ownership structure in firms. As in the previous constrained-delegation case in the absence of ownership diversification, SASAC officials will also impose, from the top, constraints on available investment choices. Such constraints could be possibly chosen by large-SOE managers when they are given private shares. The following numerical example aims to address the following issue: if a partially privatized large SOE decentralizes its decision-making authority to managers, when will eliminating certain investment choices and limiting the empire-building tendencies of large-SOE managers become optimal? For instance, an uninformed SASAC official and a large-SOE manager partially own certain private

shares but know the demand for a product perfectly. Now, they have three available investment choices, namely, Z million, Y million, and Z million, where $0 \leq X < Y < Z$. The payoff function for this uninformed official from the SASAC as a function of local market demand can be given as follows:

Table 2.11 SASAC Official’s Payoff under a Mixed-Ownership Structure with 3 Possible Investment Choices

	Low (L)	Medium (M)	High (H)
Invest Z Million	$m\pi_L^{ppoZ}$	$m\pi_M^{ppoZ}$	$m\pi_H^{ppoZ}$
Invest Y Million	$m\pi_L^{ppoY}$	0	$m\pi_H^{ppoY}$
Invest X Million	0	0	0

Note: $\pi_L^{ppoZ} < \pi_L^{ppoY} < \pi_M^{ppoZ} < 0 < \pi_H^{ppoY} < \pi_H^{ppoZ}$.

SASAC officials assign a probability p_L to L, p_M to M, and P_H to H. For the sake of model tractability, we suppose that $p_L = p_M = p$ and $P_H = 1 - 2p$. Reflecting on the existence of the empire-building effect, the large-SOE manager is still pro-investment and receives a private payoff, as shown in Table 2.12.

Table 2.12 Large-SOE Manager’s Private Payoff under a Mixed-Ownership Structure with Three Possible Investment Choices

	Low (L)	Medium (M)	High (H)

Invest Z Million	$W_L^{ppoZ} _{manager} =$ $\theta\pi_L^{ppoZ} + (1 -$ $\theta)[[\lambda\pi_L^{ppoZ} +$ $dI_L^{ppoZ}]$	$W_M^{ppoZ} _{manager} =$ $\theta\pi_M^{ppoZ} + (1 -$ $\theta)[[\lambda\pi_M^{ppoZ} +$ $dI_M^{ppoZ}]$	$W_H^{ppoZ} _{manager} =$ $\theta\pi_H^{ppoZ} + (1 -$ $\theta)[[\lambda\pi_H^{ppoZ} +$ $dI_H^{ppoZ}]$
Invest Y Million	$W_L^{ppoY} _{manager} =$ $\theta\pi_L^{ppoY} + (1 -$ $\theta)[[\lambda\pi_L^{ppoY} + dI_L^{ppoY}]$	$W_M^{ppoY} _{manager} =$ $\theta\pi_M^{ppoY} + (1 -$ $\theta)[[\lambda\pi_M^{ppoY} + dI_M^{ppoY}]$	$W_H^{ppoY} _{manager} =$ $\theta\pi_H^{ppoY} + (1 -$ $\theta)[[\lambda\pi_H^{ppoY} + dI_H^{ppoY}]$
Invest X Million	0	0	0

Note: $W_L^{ppoY} |_{manager} < 0 < W_L^{ppoZ} |_{manager} < W_H^{ppoY} |_{manager} < W_M^{ppoZ} |_{manager} < W_H^{ppoZ} |_{manager}$.

Although under the mixed-ownership structure, if the large-SOE manager can decide the amount to invest, then she/he will always invest Z million. Notably, the delegation without restrictions does not outperform centralization because the large-SOE manager always makes the same investment decision based on the empire-building effect, regardless of the local market demand. Under constrained delegation, the large-SOE manager will be allowed to invest only Y million if the demand is medium or high and will not invest if the demand is low. We could again compare scenarios under constrained delegation with the case of centralization, in which decision-making authority is wielded by officials from the SASAC. Then, we can in turn derive the conditions in which constrained delegation is preferred to centralization. Notably, as in the previous case, $\pi_H^{ppoZ} |_{manager}$ is assumed to be sufficiently large given the degree of private control over benefits that the large-SOE manager could derive from undertaking empire-building activities.

When investment decisions are centralized to officials from the SASAC, these officials have no knowledge of the local product demand but seek to maximize their payoffs based on the profits for asset appreciation. We compute optimal SASAC officials' payoffs in two stages. The first stage is to analyses which decision the officials will make (invest or not to invest) as a function of their uncertainty about local product demand (as a function of p). Then, we compute their expected payoffs given that SASAC officials will choose an optimal decision.

First, the expected payoffs for SASAC officials in the presence of a mixed-ownership structure of large SOEs for each investment option are as follows:

$$\begin{aligned} \{\pi(Z \text{ million}) = pm\pi_L^{ppoZ} + pm\pi_M^{ppoZ} + (1 - 2p)m\pi_H^{ppoZ} \quad \pi(Y \text{ million}) = pm\pi_L^{ppoY} + \\ m\pi_H^{ppoY} (1 - 2p) \quad \pi(X \text{ million}) = 0 . \end{aligned}$$

(57)

Equation (57) shows that from the perspective of SASAC officials, investing Z million is better than investing Y million only if

$$pm\pi_L^{ppoZ} + pm\pi_M^{ppoZ} + (1 - 2p)m\pi_H^{ppoZ} > pm\pi_L^{ppoY} + m\pi_H^{ppoY} (1 - 2p).$$

(58)

Equation (58) also shows that

$$p > \frac{\pi_H^{ppoY} - \pi_H^{ppoZ}}{\pi_L^{ppoZ} + \pi_M^{ppoZ} - 2\pi_H^{ppoZ} - \pi_L^{ppoY} + 2\pi_H^{ppoY}}.$$

(59)

By analogy, investing Z million is better than not investing only if $pm\pi_L^{ppoZ} + pm\pi_M^{ppoZ} + (1 - 2p)m\pi_H^{ppoZ} > 0$, which gives us

$$p < -\frac{\pi_H^{ppoZ}}{\pi_L^{ppoZ} + \pi_M^{ppoZ} - 2\pi_H^{ppoZ}}.$$

(60)

Similarly, investing Y million is better than not investing only if $pm\pi_L^{ppoY} + m\pi_H^{ppoY}(1 - 2p) > 0$, which gives

$$p > -\frac{\pi_H^{ppoY}}{\pi_L^{ppoY} - 2\pi_H^{ppoY}}.$$

(61)

To sum up, investing Z million is best only if $p < -\frac{\pi_H^{ppoZ}}{\pi_L^{ppoZ} + \pi_M^{ppoZ} - 2\pi_H^{ppoZ}}$. Investing Y million is

best if $-\frac{\pi_H^{ppoY}}{\pi_L^{ppoY} - 2\pi_H^{ppoY}} \leq p \leq -\frac{\pi_H^{ppoZ}}{\pi_L^{ppoZ} + \pi_M^{ppoZ} - 2\pi_H^{ppoZ}}$, and not investing is the best choice for

officials only if $p \geq -\frac{\pi_H^{ppoZ}}{\pi_L^{ppoZ} + \pi_M^{ppoZ} - 2\pi_H^{ppoZ}}$. Thus, in the presence of a mixed-ownership structure,

SASAC officials prefer making a big investment choice (Z million, etc.) only if they are uncertain whether the local product demand is low or medium. If SASAC officials become highly certain as to whether local demand is low or medium, then they will choose to invest in smaller projects or even not to invest.

Second, as the degree of partial privatization increases, having low or medium local demand may likely not occur. This case is because the probability that SASAC officials are indifferent between not investing and investing Z million is

$$p^* = -\frac{\pi_H^{ppoZ}(\theta)}{\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)}.$$

(62)

Equation (62) implies a comparative statics analysis to verify how the uncertainty of facing medium or low local demand could be affected by the degree of partial privatization:

$$\frac{\partial p^*}{\partial \theta} = -\frac{[\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)][\pi_H^{ppoZ}(\theta)]' - \pi_H^{ppoZ}(\theta)[\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)]'}{[\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)]^2}.$$

(63)

Equation (63) could be written as follows:

$$\frac{\partial p^*}{\partial \theta} = -\frac{[\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)][\pi_H^{ppoZ}(\theta)]'}{[\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)]^2} + \frac{\pi_H^{ppoZ}(\theta)[\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)]'}{[\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)]^2}.$$

(64)

$$\text{As } -\frac{[\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)][\pi_H^{ppoZ}(\theta)]'}{[\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)]^2} > 0, [\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)]^2 > 0$$

and $\pi_H^{ppoZ}(\theta) > 0$. Then, the sign of the derivative is determined purely by the term

$$[\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)]'.$$

Judging the sign of this term is difficult as the first two terms could either dominate the third term or the other way around. Once $\pi_H^{ppoZ}(\theta)$ is sufficiently large, the derivative of $\pi_H^{ppoZ}(\theta)$ will be also sufficiently large. Hence, the overall term $[\pi_L^{ppoZ}(\theta) + \pi_M^{ppoZ}(\theta) - 2\pi_H^{ppoZ}(\theta)]'$ could be negative. This case in turn might result in an overall negative sign on Eq. (64) and vice versa for the smaller value of $\pi_H^{ppoZ}(\theta)$.

This notion implies the following lemma:

Lemma 2.4 *An increase in the degree of partial privatization will result in a high level of uncertainty regarding whether the local market demand is low or medium only if the payoff derived by SASAC officials from investing in high (empire-building) investment choices (Z million) with high local market demand is not sufficiently high.*

Losses from making empire-building investment choices could be compensated by large-SOE managers' inclination to be closely aligned with the objectives of profit maximization because of additional private shares being transferred to them. Hence, transferring additional private shares to large-SOE managers will make SASAC officials likely to adopt high investment projects in the centralization case. Lemma 2.4 provides us, however, with additional insights that such a compensation mechanism might fail to function, or partial privatization might become unnecessary if SASAC officials could also receive large benefits from investing in empire-building projects. If SASAC officials were to collude with large-SOE managers in terms of investing in empire-building projects, then the incentive mechanism through which partial privatization might be adopted to reduce agency conflicts between large-SOE managers and SASAC officials might become unnecessary.

The payoffs that SASAC officials would obtain if they knew the local product demand can be computed as follows:

$$\pi_{know}^{ppo} = (1 - 2p)m\pi_H^{ppoZ}.$$

(65)

Hence, with the mixed ownership structure, the losses incurred by SASAC officials from centralization under each investment decision may be represented as follows:

$$\{\pi_{Loss} = p(-m\pi_L^{ppoZ} - m\pi_M^{ppoZ}) \text{ if invest in Z million } \pi_{Loss} = (3m\pi_H^{ppoY} - 2m\pi_H^{ppoZ})p + m\pi_H^{ppoZ} - m\pi_H^{ppoY} \text{ if invest in Y million } \pi_{Loss} = (1 - 2p)m\pi_H^{ppoZ} \text{ if not invest.}$$

(66)

Under constrained delegation, SASAC officials rule out the decision to invest in the Z-million project by monitoring the managers of large SOEs. In this case, the large-SOE manager chooses to invest in the Y-million project when the local demand is medium or high. Therefore, the personal payoff obtained by SASAC officials when the large-SOE manager invests in the Y-million project is $\pi_{constrained}^{ppo}(p) = m\pi_H^{ppoY} (1-2p)$.

This result implies that the losses from constrained delegation concerning the uncertainty of local demand may be derived as follows:

$$\pi_{loss}^{ppo} = m\pi_H^{ppoZ} (1-2p) - m\pi_H^{ppoY} (1-2p) = m(\pi_H^{ppoZ} - \pi_H^{ppoY})(1-2p).$$

(67)

From Eq. (67), we can compare the performance of centralization and constrained delegation under the mixed-ownership structure in large SOEs by considering the losses under these two organizational structures. The total losses from the centralized governance structure could be derived as follows:

$$\pi_{Loss}^{cppo} = p(-m\pi_L^{ppoZ} - m\pi_M^{ppoZ}) + (3m\pi_H^{ppoY} - 2m\pi_H^{ppoZ})p + m\pi_H^{ppoZ} - mm\pi_H^{ppoY} + (1 - 2p)m\pi_H^{ppoZ}.$$

(68)

We can carry out algebraic calculations to verify whether the organizational structure of constrained delegation would strictly dominate that of the centralized organizational structure in large SOEs in the presence of a mixed-ownership structure. Thus, the following inequality must be satisfied:

$$\pi_{Loss}^{cppo} - \pi_{loss}^{ppo} > 0.$$

(69)

Equation (69) can be rewritten as follows:

$$p(-m\pi_L^{ppoZ} - m\pi_M^{ppoZ}) + (3m\pi_H^{ppoY} - 2m\pi_H^{ppoZ})p + m\pi_H^{ppoZ} - mm\pi_H^{ppoY} + (1 - 2p)m\pi_H^{ppoZ} > m(\pi_H^{ppoZ} - \pi_H^{ppoY})(1 - 2p).$$

(70)

Equation (70) leads to the following two conditions:

$$\{\pi_H^{ppoZ} < -\left(\frac{\pi_H^{ppoY} p + \pi_L^{ppoZ} p + \pi_M^{ppoZ} p}{(1-2p)}\right) \text{ if } p < \frac{1}{2} \text{ or } \pi_H^{ppoZ} > -\left(\frac{\pi_H^{ppoY} p + \pi_L^{ppoZ} p + \pi_M^{ppoZ} p}{(1-2p)}\right) \text{ if } p > \frac{1}{2}.$$

(71)

When $\pi_H^{ppoZ} \rightarrow \infty$, $p \rightarrow \frac{1}{2}$. This notion makes the second condition of Eq. (71) impossible.

From Eq. (71), we derive the following proposition:

Proposition 2.10 *In the presence of a mixed-ownership structure in large SOEs, the organizational structure of constrained delegation will be preferred to that of centralization only if the profits from investing in empire-building projects (the Z-million investment choice) with high local*

demand received by SASAC officials are sufficiently small. Mathematically, $\pi_H^{ppoz} < \left(\frac{-\pi_H^{ppoY} p + \pi_L^{ppoZ} p + \pi_M^{ppoZ} p}{(1-2p)} \right)$.

In the case of purely state-owned large-SOE, proposition 2.10 indicates that if officials from the SASAC cannot derive a sufficiently high payoff from investing in local high-demand empire-building investment choices (z-million investment choice in our case), then the constrained delegation organizational structure always dominates the centralized governance structure. The logic behind this is as same as that which applies to the previous case: large-SOE managers receive very high payoffs by making empire-building investment choices, which deviates from organizational interests, such as profit maximization pursued by SASAC officials. Therefore, the constrained-delegated mechanism is superior to the centralized organizational structure in large SOEs as it would reduce losses to firms from the perspective of SASAC officials unless compatibility exists between the interest large-SOE managers and SASAC officials.

Moreover, we can determine the channel through which partial privatization can affect decisions made by SASAC officials regarding whether large SOEs should adopt the constrained-delegation governance mechanism. To verify this effect, we suppose that the benefits received by SASAC officials such that they are indifferent between adopting the constrained-delegation governance structure and the centralized governance structure can be expressed as follows:

$$\pi_H^{*ppoZ}(\theta) = - \left(\frac{\pi_H^{ppoY} p + \pi_L^{ppoZ} p + \pi_M^{ppoZ} p}{(1-2p)} \right).$$

(72)

From Eq. (72), we can carry out a comparative static analysis to verify how π_H^{*ppoZ} varies with the degree of partial privatization:

$$\frac{\partial \pi_H^{*ppoZ}}{\partial \theta} = \frac{-p}{(1-2p)} [\pi_H^{ppoY'} + \pi_L^{ppoZ'} + \pi_M^{ppoZ'}] < 0 \text{ given that } p < \frac{1}{2}.$$

(73)

From Eq. (73), the following lemma can be derived:

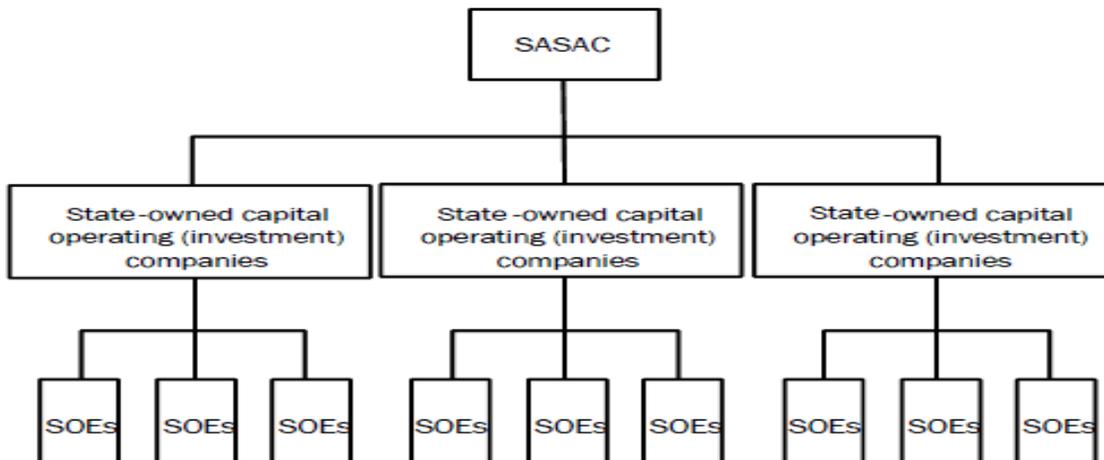
Lemma 2.5 *An increase in the degree of partial privatization will make the SASAC officials likely to adopt the constrained delegation governance mechanism than the centralized governance mechanism for large SOEs.*

Lemma 2.4 shows that losses from investing in empire-building choices could be compensated by large-SOE managers' inclination to be closely aligned with the objectives of profit maximization because they are receiving additional private shares. Hence, granting additional private shares to large-SOE managers will make SASAC officials likely to adopt high investment projects under the centralization case. Lemma 2.4 also shows that partial privatization might fail to motivate the large-SOE managers to pursue organizational interests if an incentive mechanism exists. SASAC officials might collude with large-SOE managers in terms of jointly sharing the large benefits from investing in empire-building projects (the Z million choice). From this point of view, lemma 2.5 illustrates the relevance of calculating why partial privatization is sometimes necessary to induce SASAC officials to choose the constrained-delegation mechanism. This case is because SASAC officials will not implement constrained delegation if they cannot derive sufficiently large benefits from investing in empire-building choices (the Z million choice). The low level of benefits stemming from the Z million choice can be achieved only if the number of private shares being transferred to large-SOE managers increases. Otherwise, the managers would be unable to greatly invest in empire-building activities. Hence, the mechanism through which SASAC officials collude with large-SOE managers fails because of the managers choose the Z million for a low

level of investment. The failure of the collusion mechanism determines that the losses incurred by SASAC officials by delegating decision-making authority to large-SOE managers could not be compensated. Therefore, they must implement the constrained-delegation mechanism instead. SASAC officials can easily delegate constrained decision-making authority to managers by transferring them some private shares.

2.4 Policy Implications Concerning the Rationale of Recentralizing Political Authority over Large SOEs in China

The internal structure of China’s large SOEs, distributing power among several parties, reflects the various ways in which allocating formal authority across large SOEs is possible (Zhang and Wang, 1998). Allocating formal authority over large SOES has two methods, namely, introducing party committee control over large SOEs and introducing middle-layer entities, so-called state-owned capital investing companies. The allocation of formal authority within and outside large SOEs involves two constrained-delegated governance mechanisms. The objective is to sustain local investment initiative on the part of large-SOE managers while preventing them from engaging in moral hazard behaviors including empire-building activities. Figure 2.1 shows the three-tiered structure of the supervision and administration of state-owned assets in China.



Source: Compiled by Chi Hung Kwan, "Post Third Plenum Reform of state-owned Enterprises: Can corporate governance be improved? Research Institute of the Economy, Trade and Industry."

Figure 2.1 Governance structure of the supervision and administration of state-owned assets in
China

Figure 2.1 depicts that, in China, the SASAC has been directly administering and monitoring human resources, management, marketing, and finances in large SOEs. Then, the decision-making authority in SOEs has been centralized in the SASAC. Moreover, state-owned capital-operating (investment) companies exist within the middle layer of the governance hierarchy between SASAC and large SOEs. Our argument is based on Shen and Zhang (2019). They contended that the formal authority of party committee control or middle-layered state-owned investment companies over large SOEs might resolve the trade-off between the loss of control (if large-SOE managers control the SOEs) and initiative (if government officials from SASAC control them directly). This case is because the presence of middle-layer state-owned investment companies or party committees increases the degree of monitoring over large-SOE managers' ex-post moral hazard behaviors. Managers in this case will find deriving personal payoffs from empire-building investment projects less profitable.

In the context of this chapter, introducing party committees within large SOEs and state-owned investment companies into the governance hierarchy in large SOEs as two constrained-delegation governance mechanisms might dominate the governance structure of large SOEs, whether centralized or decentralized.

Without constrained-delegation governance structures of the formal authority of party committees and middle-layer state-owned investment companies, several negative consequences would ensue. Yang and Zhou (1998) noted that three problems might arise given the traditional corporate governance structure of large SOEs. First, in the absence of a real owner, SOE managers

would be interested only in maximizing their own benefits. This misalignment of interests between SOE managers and shareholders arising from the decentralized governance structure of large SOEs might make SOE managers easily infringe on the rights of shareholders. Second, although theoretical, this scenario suggests that CEOs or managers of SOEs as agents should manage state assets on behalf of shareholders. If formal authority is decentralized to SOE managers, then collective decision-making will decline, although it is often needed to overcome the free-riding problem with SOE managers. Third, if the internal governance structure is centralized to government officials from the SASAC, then the associated problem will be the ignorance on the part of other stakeholders who are involved in the daily operations of large SOEs, including that of the incentives motivating SOE managers or even workers. Hence, the constrained delegation of formal authority by party committees in large SOEs and middle-layered state-owned investment companies may greatly mitigate the ex-post high agency cost incurred under either the decentralized or centralized governance structure in large SOEs.⁴¹

However, imposing full party-committee or middle-layered state-owned investment companies' control over large SOEs is not always efficient, as this process inevitably will undermine the incentives that drive large-SOE managers to work hard. Nonetheless, if large-SOE managers are given full autonomy, then ex-post agency inefficiencies would arise, such as empire-building activities and perk consumption, which would conflict with the overall interests of a firm. In advanced economies, firm shareholders normally monitor managers of large firms through independent boards of directors composed of representatives of employees, shareholders, and other levels of managers. This event is politically infeasible in China, as China's large SOEs are under

⁴¹Such views can also be found in other works, such as Ma et al. (2012).

direct party control. Therefore, the role of party committees or middle-layer state-owned investment companies might replace the role of an independent board of directors, which could sufficiently monitor large-SOE agents (CEOs and managers). The disadvantage of indefinitely imposing the control of party committee or middle-layered state-owned investment company over large SOEs is that such a fully centralized governance structure in large SOEs could undermine incentives driving large-SOE managers to exert full effort.

2.5 Conclusions

This chapter aims to develop a unified framework which integrates the two sides of the argument regarding the role of the party state's guidance over large SOEs in China. The policy suggestions offered by this section are rich. We argue that the reform of the internal governance system in the country's large SOEs, mainly through delegation of greater autonomy to SOE managers, that was initiated early in the 2000s, is not omnipotent concerning the large SOEs' enhancement of welfare or improvement of efficiency. We conclude that although the decentralized structure of large SOEs may encourage these firms to take great initiative in investment, the disadvantage is that SOE managers may then take empire-building decisions to adopt investment projects that lack significant local demand or high returns but seem to deliver personal benefits of control to the SOE managers. The recent tendency among Chinese SOEs' to diversify and expand into new industries is one of the most graphic examples of the empire-building effect (Shen, Fang and Deng, 2017).

Privatization of the MBO type may substantially remove incentives for SOE managers to undertake empire-building investment projects, by making them more profitability-driven than total-revenue driven. Hence, given the political constraint and the partial reform equilibrium

puzzle faced by large SOEs in China, privatization of the MBO type is not feasible in practice. In this situation, adopting a highly centralized organizational structure for large SOEs may be a second-best choice. Nevertheless, as argued above, the shortcomings of centralization are also apparent when officials from the top know little about local product demand or impose strict bureaucratic control over SOEs that their managers have no initiative to make investments.

Considering this trade-off in organizational structure, we propose an organizational economics model to illustrate how a constrained-delegation mechanism could resolve the trade-off between loss of control by officials from the SASAC and initiative-taking by the large-SOE managers. We demonstrate in our model that SASAC officials might be able to curb the ex-post moral hazard behaviors of large SOEs' managers while not undermining their incentives to exert effort to make local investments by ruling out some empire-building investment projects that large-SOE managers might choose. Our model considers two cases where large SOEs could be either purely state-owned or partially privatized. Our model shows that whichever case is chosen, the superiority of the constrained-delegation governance structure for large SOEs over either fully decentralized or fully centralized governance structures always holds as long as officials from the SASAC cannot derive sufficiently large benefits from empire-building investment choices preferred by managers.

The policy implications of our model are very rich. An externally independent supervisory board that could regulate the behaviors of large-SOE managers is not politically feasible in China. Hence, the Chinese government establishes party committees in large SOEs to enable SOEs' party secretaries as agents to stand proxy for officials from the SASAC, which could be deemed a constrained-delegated governance mechanism. Second, the middle-layer entities, the so-called state-owned capital investment companies, are introduced into the governance hierarchy of large

SOEs in China. This event may also play an important role in constraining the empire-building tendencies of SOEs' managers while avoiding negative consequences, such as discouraging managers' initiatives by excessive direct supervision and monitoring by the SASAC. In organizational economics, this case is the advantage that stems from the institutional arrangement of constrained delegation, as illustrated in the theoretical section above.

Based on our theoretical model, installing party committees in large SOEs and introducing middle-layer investment companies within the governance hierarchy of SOEs are two ways of reducing the value of λ , that is, the degree of misalignment in interests between SOE managers and officials from the SASAC. Imposing moderate but not total political control over large SOEs is a means of resolving the trade-off between the centralized and decentralized power division structures in Chinese large SOEs.

Chapter 3.

A Theory of External Governance Structures of State Sectors in China

3.1 Conventional Wisdom on the Decentralized Authoritarian System and Its Relationship to the State Sector in China

Facilitating the economic growth of China over the past few decades has greatly relied on the nature of the state system at regional and central levels. For instance, Xu's (2011) frequently cited work praises what he calls the "regionally decentralized authoritarian system" as one of the fundamental causes of the spectacular growth of the Chinese economy. Other studies, such as Qian and Weingast (1996), deem China's governance structure a market-preserving form of federalism. These terms reveal the intricacy of the central-local state relationship in China's economy. In this chapter, we propose a micro-level theoretical framework to illustrate why this economy benefits from the co-existence of political centralization and fiscal decentralization. This chapter links two streams of literature. One consists of studies on fiscal decentralization in the Chinese economy. The focus is on how the tax-sharing system has promoted the rapid growth of the Chinese economy. That is, local governments are provided with powerful incentives to collect tax revenue from local regions. They carried out the mandated task of submitting a certain proportion of revenues to the central state, mainly in the form of central-local shared tax revenues, including value-added, income, and resource taxes (Lin and Liu, 2000; Zhang, 2006; Tsui and Wang, 2004; Jin, Qian and Weingast, 2005; Treisman, 2006; Jia, Guo and Zhang, 2014; Knight and Li, 1999; Jin and Zou, 2005; Shen, Jin and Zou, 2012). The other stream of the literature consists of studies of the

decentralized governance structure of the Chinese economy (Li and Lian, 1999; Xu, 2011; Birney, 2014; Cai and Treisman, 2004, 2005, 2006; Lee and Zhang, 2013; Wu and Wang, 2013; Landry, 2008; Cao, 2011). The difference between these two streams is that the first over-emphasizes the advantages of the fiscal decentralization of the local state while largely neglecting the political constraints imposed by the central state. On the contrary, the second ignores the role of the local state in facilitating economic growth and focuses too narrowly on bargaining between the local and central states. In other words, the first focuses narrowly on the functioning of the incentive structure in the Chinese economy, whereas the second pays attention solely to the governance structure of the Chinese economy.

The long-standing paradox is unsolved in either stream because the Chinese economy has grown rapidly between economic decentralization and political centralization. The seemingly inherently contradictory objectives the local and central states in China constitute a major puzzle for anyone seeking to understand this economy's governance structure. Zhang and Zou (1998) even demonstrated that large allocations of tax revenue to local governments in China would impede local economic growth because of the inconsistent economic development objectives of the central and local states.

In addition, studies investigating how local large SOEs function under these dynamic and complex central-local state relations are limited. To address this gap, the present chapter aims to associate the incentive structure with the governance system of the Chinese economy. This structure demonstrates in a principal-agent model that extends the incentive-contract framework developed by Aghion and Tirole (1997). Despite some loss of local fiscal control from the central state, the growth of local large SOEs plays an important role in terms of generating an incentive compatibility mechanism between the local and central states. That is, the trade-off between the

local state's initiative-taking concerning fiscal autonomy and the central state's loss of fiscal control could be resolved. In detail, Aghion and Tirole (1997) revealed only the trade-off between principals and agents regarding the loss of control and initiative-taking. In contrast to their modeling framework, we demonstrate in an incentive contract model in this chapter that after the 1994 tax-sharing reforms in China, an incentive compatibility mechanism emerged. In this case, the local state must remit most central-local shared tax revenues mainly in the categories of value-added, income, and resource taxes collected from local resource-intensive and high value-added large SOEs to the central state. The objective is to compensate for the central state's loss of fiscal control by the local state's growing fiscal autonomy. The central state still centralizes political authority because its loss of fiscal control could be largely compensated by the central-local shared tax revenues that are remitted by the local state. Thus, the central state would no longer resist economic decentralization by granting fiscal autonomy to local states. How economic decentralization and political centralization co-exist within the governance structure of the Chinese economy could be verified through the analytical framework provided by this chapter.

3.2 Some Institutional Background and Stylized Facts

The decentralized fiscal reform was initiated in the 1980s. By contrast, the national fiscal system in China, particularly regarding the distribution of fiscal surplus between the central and local states before the 1990s, was mainly based on the so-called fiscal contracting system. According to Lin and Liu (2000), the main theme of the fiscal contracting system is that fiscal revenues are classified by sources and divided into three categories: (1) central fixed revenues (including customs duties and revenues remitted by centrally owned SOEs), (2) local fixed revenues (including salt taxes, agricultural taxes, revenues remitted by local SOEs, and other local nature taxes), and (3) central-local shared revenues (mainly in the form of value-added taxes (VAT),

including profits of large-scale SOEs under dual leadership by the central and local government and other forms of VAT as well as the other tax categories, such as industrial and commercial taxes and turnover taxes). As argued by Wong (2000) and Oksenberg and Tong (1991), the old fiscal contracting system broke down because the central state could no longer monitor tax efforts at the local level as there were no clear allocations of fiscal responsibility between the local and the central state under the old fiscal system. This resulted in a situation wherein the central state was forced to negotiate with increasingly recalcitrant local governments over revenue shares.

Given the nature of unequal distribution of fiscal surplus between the local and central states within the Chinese fiscal system, it can be argued that the central state encountered massive fiscal deficits at the beginning of the 1990s. The central state found it extremely difficult to finance some national-scale investment projects in defense industries and other infrastructure-related industries. To reverse the fiscal deficit status of the central state, the Chinese government enacted the so called tax-sharing reforms in 1994. Under this tax-sharing reform scheme, the assignment of fiscal responsibility was clearly stated in the sense that the local state must remit most of the VAT revenue (a fixed proportion equal to 75% of total VAT revenues) stemming mainly from local large SOEs to the central state. In addition to the VAT revenues, in the presence of central-local shared tax revenues under the tax-sharing reform scheme, the local state must also remit certain proportions of business taxes, resource taxes, and other SOE-based taxes to the central state.

The direct consequence of undertaking the tax-sharing reform in 1994 was that the local state must mandatorily remit most central-local shared tax revenues to the central state, including those in the value-added, resource and business income tax categories from the local high value-added and resource-intensive large SOEs. To a large degree, this re-shaped fiscal relationships between

the central and local states in China. Table 3.1 shows the industry distribution of large SOEs in China in 2006.

Table 3.1 Large SOEs in 18 selected industries in China in 2006

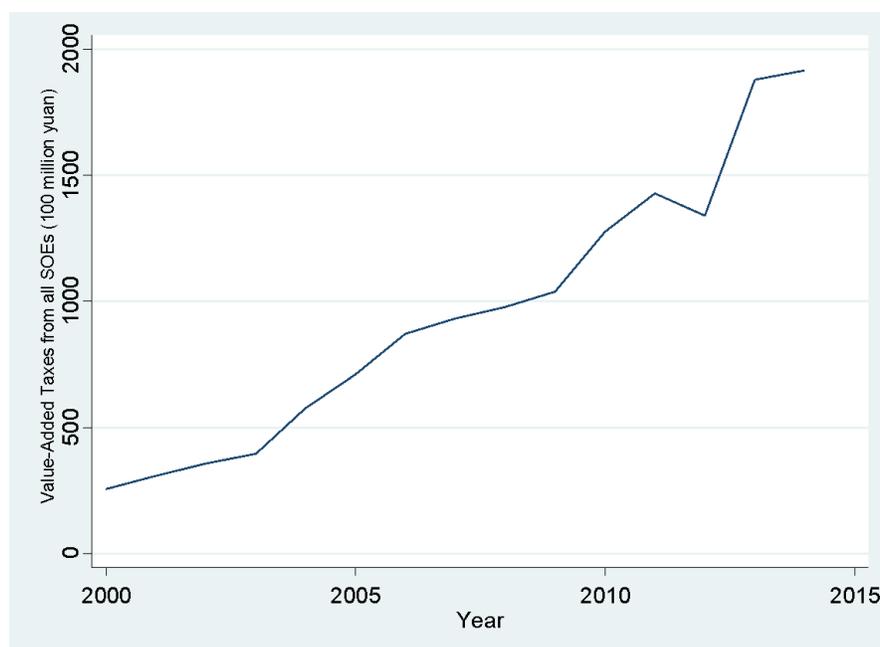
Full names of the industries	Number of large SOEs
Agriculture, forestry, and fishing	83
Mining and quarrying	203
Electricity, gas, and water supply	439
Manufacturing	3049
Construction	126
Transportation and storage	538
Information, communication, compuserve, and software	312
Wholesale and retail trade	25
Accommodation and food service activities	147
Financial and insurance activities	96
Real estate activities	429
Tenancy and commercial services	85
Professional, scientific, and technical activities	16
Water, environment, and public facilities management	55
Education	4
Human health, social security, and social welfare	8
Arts, entertainment and recreation	85
Public administration and social organization	108

Source: China Statistical Yearbook in 2006.

Notes: The large SOEs in this table are those with operating income above 500 million RMB.

Table 3.1 indicates that most large SOEs in China in 2006 were concentrated in upstream, high value-added, capital-intensive, and resource-intensive sectors, such as manufacturing, extraction

of petroleum and natural gas, production and supply of electric power and heat power, real estate services, information communications, transportation and storage, production and supply of water, gas, and so on. It can be hypothesized that, insofar as most large SOEs in China following the massive privatization campaign of downstream small-medium SOEs in the late 1990s are endowed with high value-added and natural resources, the local state in China since the late 1990s has been able to collect large amounts of central-local shared tax revenues under the tax-sharing scheme from local large SOEs and remit most of these proportions to the central state. Figure 3.1 shows how the VAT paid by SOEs to the central government in China have increased consistently over the last two decades.

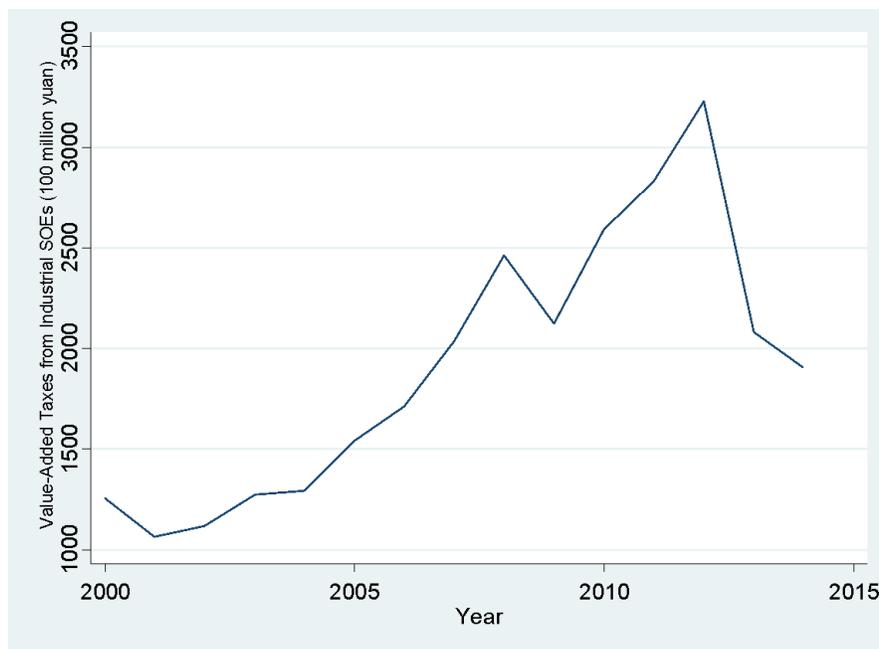


Source: China Statistical Yearbook 1998 to 2014 (units: 100 million yuan)

Figure 3.1 The level of VAT paid by all Chinese SOEs to the central state from 1998 to 2014

Figure 3.1 indicates that the amount of VAT paid by all SOEs in China from 1998 through 2014 has been consistently increasing regardless of industry. Hence, it is fair to say that SOEs have

contributed substantially to the fiscal revenue of the central government since the late 1990s. Furthermore, if we look only at the VAT paid by industrial SOEs in China, a similar empirical pattern can be detected. We plot the following graph showing the evolutionary change in the VAT paid by Chinese industrial SOEs to the central government during the period running from 1998 through 2014.

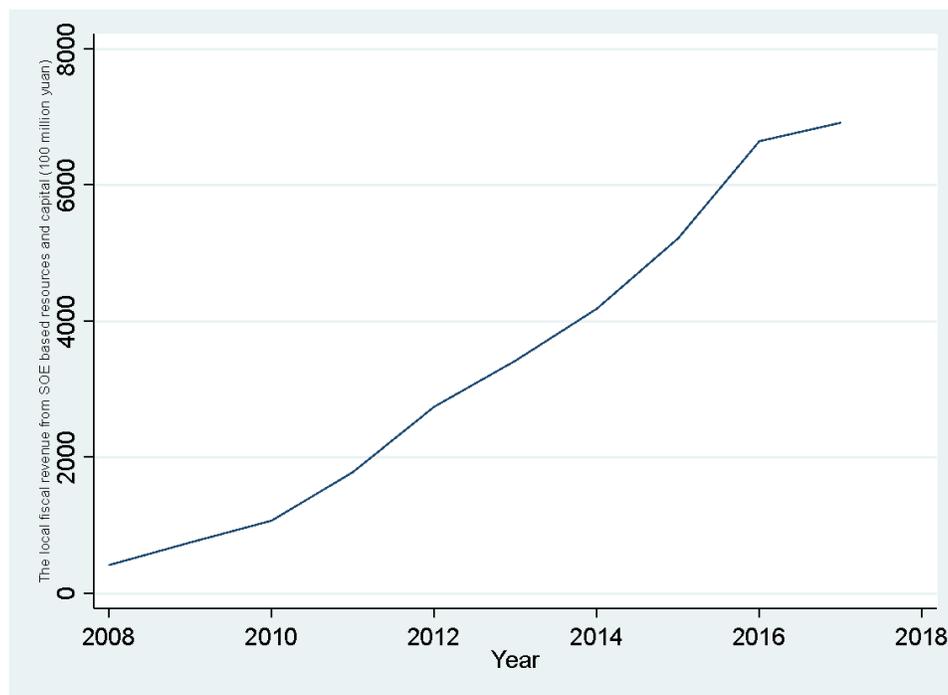


Source: *China Statistical Yearbook 1998 to 2014*, (units: 100 million yuan)

Figure 3.2 The level of VAT paid by Chinese industrial SOEs to the central government from 1998 through 2014

Figure 3.2 shows that, since the late 1990s, the VAT paid by Chinese industrial SOEs to the central government has increased substantially despite the drastic fall around 2013 following the tax reform regime known as “replace the business tax with a value-added tax.”⁴²

The increasing VAT paid by Chinese SOEs in the late 1990s has far-reaching implications for revitalizing the fiscal positions of both local and central governments in China. Figure 3.3 shows how the local fiscal revenue stemming from SOE-based resources and capital has increased dramatically over the course of the past 10 years.⁴³



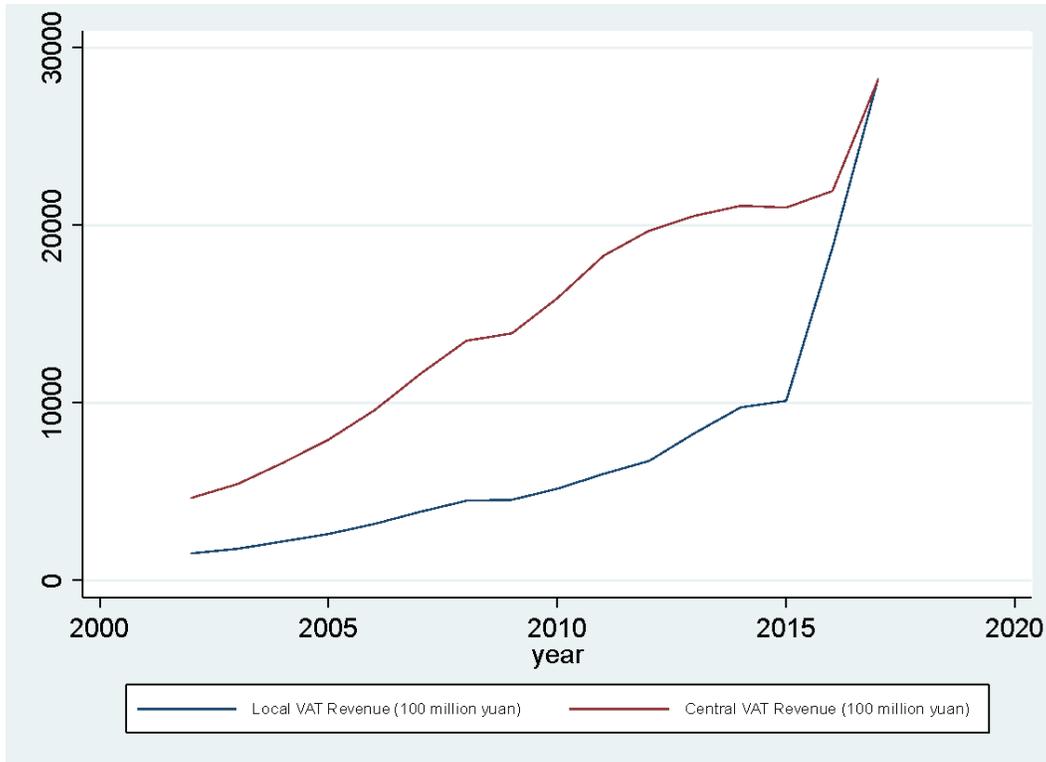
Source: *China Statistical Yearbook 2008 to 2017*

⁴² The main idea of the tax reform regime known as “replace the business tax with a value-added tax,” introduced in 2013, is that of a massive tax-reduction campaign concentrated mainly on the value-added tax on industrial firms and firms from service industries. A detailed discussion of this reform can be found in several papers, including Zhang et al. (2018) and Ma (2019).

⁴³ There are no data available on the local fiscal revenue contributed by SOE-based resources and capital before 2008.

Figure 3.3 Local fiscal revenue from SOE-based resources and capital from 2008 through 2017

Notably, the respective fiscal positions of the local and central governments in China after the introduction of the tax-sharing reform scheme have both improved significantly. Figure 3.4 illustrates this situation.



Source: China Statistical Yearbook 2002 to 2017

Figure 3.4 The local and central VAT revenues from 2002 to 2017

Figure 3.4 indicates that, since the early 2000s, both local and central VAT revenues have risen dramatically. In particular, central VAT revenues soared to a much greater degree than its local counterpart, indicating that the fiscal position of the central government in China has benefitted even more than the local government in terms of VAT revenue collection. These facts are consistent with our theoretical hypothesis that, in the presence of the tax-sharing reform scheme,

wherein the local state must remit most its VAT collected mainly from local large SOEs to the central state, the loss of the central state's fiscal control has largely been offset by increasing central-local sharing tax revenues, mainly in the form of VAT, which it obtains from local states. Hence, fiscal decentralization and a politically centralized governance structure coexist within the Chinese economy.

3.3 A Literature Review of the Governance Structure of the Chinese Economy in Relation to SOE Sectors

In intellectual circles, one of the most plausible reasons for the extraordinary growth of the Chinese economy over the last few decades is the economically decentralized governance structure of the Chinese economy. To quote Lieberthal and Lampton (1992), the governance system of China can be characterized as “fragmented authoritarianism.” Obviously, decentralization, for any type of organization from a firm to a country, has merits. At the country level, a higher degree of decentralized governance, such as the tax-sharing system in China, may enhance incentives for local bureaucrats to put more effort into promoting local economic growth. Second, given that local government officials are more adapted to the conditions of the local economy, a decentralized governance system allows them to be more autonomous in handling emergencies and contingencies at their own level. For instance, Lin and Liu (1998) argue that fiscal decentralization has made a significant contribution to local economic growth by improving the efficiency of resource allocation. Nonetheless, as the authors of that paper admit in the end, their paper is not intended to unlock the full intricacy of the relations between the local and the central states. Therefore, the purely empirical investigation of the effects of fiscal decentralization on local

economic growth in their paper may be treated as tentative rather than conclusive, reflected in full the way by which fiscal decentralization affects economic growth. Based on their work, this chapter argues that the mechanism through which fiscal decentralization affects local economic growth, in fact, depends on the expansion of local large SOEs. Following the 1994 tax-sharing reform, the local state would be able to collect central-local shared tax revenues mainly in the categories of value-added, resource, and income taxes from local large SOEs and subsequently remit most of the tax revenues to the central state. In the presence of the central-local shared tax revenue scheme, the loss of fiscal control for the central state could be compensated for, thus making the central state less resistant to granting local fiscal autonomy to the local state.

The second paper worth mentioning here is that of Zhang (2006). Taking a different perspective, he argued that the initial economic conditions across provinces have affected the degree to which fiscal decentralization can influence local economic growth. In particular, he found that the high cost of collecting agricultural taxes, along with the excessive numbers of government employees, can very often prevent local governments in largely agricultural regions from providing the necessary public goods and services. From this observation, he demonstrated that, if the central government in China granted more autonomy to local states, they would be more likely to have an inflated bureaucracy than a democratic regime would. Such growth in local government would distort the allocation of resources at the local level. This chapter partially agrees with Zhang's views, but differs in the following respect: it is not necessarily the case that the size of the agricultural bureaucracy is the only structural factor shaping the expenditure structure of the local state. Zhang's paper tends to ignore the function of the industrial sector, especially the role of local large SOEs in affecting the fiscal behaviors of the local government. Therefore, discussions of the initial conditions in various provinces should not be confined to their agricultural production alone.

For instance, a province with more local large SOEs might have another rate of economic growth and a different degree of fiscal decentralization than a region with fewer large local SOEs.

Tsui and Wang (2004) argue that China's local governments are less autonomous under their vertical bureaucratic control system. Although they accurately identified some elements of the relationship between the local and central states, the paper fails to further investigate the incentive structure of the dynamics of local-central relations. The argument proposed in this chapter goes one step further and argues that the key factor in understanding the centralized/decentralized governance structure of the Chinese economy is a comprehensive interpretation of the trade-off between the loss of control and the taking of initiatives. This chapter illustrates the fact that the central state faces a loss of fiscal control over local regions when it delegates more autonomy to the local state. However, local states become more highly motivated to promote local economic growth when the central state gives them more autonomy. Additionally, this chapter further derives the conditions under which such trade-offs may be resolved. Using principal-agent model, this chapter demonstrates that, even though it might lose some of its fiscal control over local governments, the central state is compensated for its loss of fiscal control by delegating more autonomy to the former. This is guaranteed as long as two conditions are met: (1) the large local SOEs must generate sufficiently high income, value-added, and resource tax revenues for the local states, and (2) the local states must submit most of these central-local shared tax revenues to the central state. This creates an incentive compatibility mechanism between the local and the central state.

Using a panel dataset from China, Jin, Qian, and Weingast (2005) document the fact that stronger ex-ante fiscal incentives, as measured by the contractual marginal retention rate of the provincial government in its budgetary revenue, are associated with the faster development of the non-state

sector and further reforms in the state sector of the provincial economy. On the one hand, this point is in line with the spirit of this chapter in the sense that, if the central state does not collect enough central-local shared tax revenues from the local states (the high rate of marginal retention of provincial governments' budgetary revenue), then this is generally because the local non-state sector has grown dramatically and progress in restructuring large SOEs in local regions has accelerated. On the other hand, as predicted by the theories of this chapter, if the central state can collect enough central-local shared tax revenues from the local state (a lower rate of marginal retention of the provincial governments' budgetary revenue), this is mainly attributable to the dramatic expansion of large local SOEs, thus enabling the central state to benefit substantially from the local economic growth as well.

Treisman (2006) contended that one may not account for the local state autonomy in China as a primary driving force in promoting economic growth without looking at the interests of the central state. Treisman realized that the net effects of the country's output were indeterminate when output shrinks, because the interests of the central state conflict with those of the local state in terms of sharing the fiscal budget revenue. The difference between the treatment in this chapter and that of Treisman is that we also derive the boundary conditions under which the central state, by maintaining its centralized political power, might also become an encouraging force by granting fiscal autonomy to the local state.

This chapter is also closely linked with the literature on the governance structure of the Chinese economy in general. For instance, the chapter is closely in line with the spirit of Xu (2011), who argued that the spectacular growth of the Chinese market economy is largely attributable to the sub-national government ownership of large local SOEs. This chapter argues that the growth of large local SOEs enables the local state to collect sufficiently large amounts of value-added,

resource, and income revenues and then share most of these central–local shared tax revenues with the central state, thus considerably benefiting the latter. Hence, large local SOEs play a crucial role in maintaining coexistence between the politically centralized and economically decentralized governance structure within the Chinese economy.

Our argument also closely follows ideas proposed by Li and Lian (1999), who coined the term “market-preserving authoritarianism” to illustrate the value of combining political control by the central state with the autonomy of the local state to protect the credibility of the market under an authoritarian regime such as China’s. However, Cai and Treisman (2004, 2005, 2006) strongly doubt whether political or economic decentralization are the main engines driving China’s rapid economic growth. Instead, they argue that bargaining between conservative officials from the central state and pro-market officials from the local state holds the key to understanding this phenomenon. In line with their paper, our argument concludes that such political and economic decentralization may be compatible if the central state can also benefit substantially from the local state’s collected central–local shared tax revenues from large SOEs as well as the local state’s sharing of most of these tax revenues with the central state.

A very important paper by Wu and Wang (2013) empirically demonstrates that the central state’s control over expenditures on remuneration in the public sector may enhance ministerial control while local bureaucrats boost their personal interests by exploiting better remuneration. Their argument exactly resembles the features of the theoretical model proposed in this chapter, because they illustrate its relevance and demonstrate the conditions in which political centralization and fiscal decentralization co-exist: the central state has to control public sector remuneration in certain local states to prevent local bureaucrats from extracting all the economic benefit that derives from

local economic growth. In other words, the bonus brought by the reforms must not be enjoyed by the local state alone; the central state must be involved in determining how the cake is shared.

Zhang (1998) and Li et al. (2000) argue that the decentralized governance-structure-result inevitably fosters a tendency in large local SOEs to privatize, thus reflecting inter-governmental competition for higher levels of economic growth in local regions. Nevertheless, the problem with their research is that they largely ignore the market structures and types of industries where SOEs of varying sizes operate. Most of the small-to-medium SOEs in China in the late 1990s operated in downstream labor-intensive industries, such as clothing, toys, shoe manufacturing, and so on, which are open to both domestic and foreign competition and are thus intensely competitive. The fact that these downstream sectors could not generate sufficient value-added, resource, or income tax revenues for the local states means that the central state is unable to share high levels of tax revenues with the local state through small-medium local SOEs. Therefore, the local states can only raise the tax revenue from these small-medium local SOEs by privatizing them. However, large local SOEs in China operate in the upstream resource and capital-intensive industries, where entry barriers are high and the market structure is normally monopolistic. They could generate huge value-added, resource, and income tax revenues for the local states, and these revenues could be shared with the central state. Hence, it is apparent that there are no incentives for local states to privatize the large local SOEs. It can be easily seen that one of the pre-conditions for the theories of Zhang (1998) and Li et al. (2000) is that the local market structure must be competitive enough to let the local governments protect the SOEs' profits from erosion through a higher level of competition. Obviously, one may argue that large local SOEs are in no danger of erosion, but this

means that the above papers have great limitations when it comes to assessing the relationship between a decentralized governance structure and local privatization policies.⁴⁴

3.4 A Baseline Model

3.4.1 Basic Set-up

The set-up of our baseline model is based on Aghion and Tirole (1997), but we apply the principal-agent problem within the firm hierarchy, which is the framework of Aghion and Tirole (1997), in the context of a state governance hierarchy. Suppose there is a political hierarchy composed of a principal (a central government) and agents (local governments). The basic idea is that, in this hierarchy, the central government may have two ways of organizing agents (in the local state) to implement the projects.⁴⁵ In the central state's formal authority case, in addition to collecting central taxes, the central state would force the local state under mandate to collect information and to implement projects. In the agent's formal authority case, the local states will decide which project to invest in and choose their preferred project. Such a decision cannot be overruled by the principal. In our model, the first way through which projects are implemented under the principal's formal authority is known as the politically centralized governance structure. In contrast, the second way of implementing projects under the agent's formal authority implies

⁴⁴ A similar study by Cao et al. (1999) compares two competing theories (efficiency oriented vs. income oriented) regarding why the local state is willing to privatize its state-owned enterprises. Using empirical data, they perceived that the local state is inclined to privatize, because the local government wants to increase its fiscal income to enable it to perform better in inter-governmental competition by cutting subsidies to SOEs rather than seeking to improve their efficiency. Their views are apparently in contrast with those by Zhang (1998) and Li et al. (2000). Nonetheless, whatever the motivation behind the state's wish to privatize, these studies all ignore the fact that privatization policies are deeply affected by the heterogeneity of SOEs and the market structure in which they operate.

⁴⁵ These projects may include the construction of infrastructure, social aid, credit loans, human capital investment, stabilizing markets, and so on.

the political decentralized governance structure of an economy. In both cases, the central state would provide the fixed fiscal transfer to the local states.

Projects- A local state screens some $n \geq 3$ potential and a priori identical projects on behalf of the central state. Each project $k \in \{1, 2, 3, \dots, n\}$ will generate a verified monetary gain or profit B_k for the central state and b_k for the local state. If no project is implemented, the benefit for both the central and local states is 0, which may be denoted as $B_0 = b_0 = 0$.

For each party, at least one ineffective project yields a “sufficiently negative” payoff. This indicates that an uninformed local state would recommend inaction (i.e., not to invest in such unprofitable projects) or a similarly uninformed central state would also not choose a project which delivers a negative payoff. Projects preferred by the central state and the local state yield known profits represented by B and b , respectively. This means that the projects recommended by the central state may generate different benefits if they are delegated to the local state. For instance, in selecting projects, the local state might invest in some projects in a way that gives greater priority to the interests of the local state rather than those of the central state.⁴⁶ The misalignment between the interests of the central state and that of the local state would imply that, if the central state’s preferred project is chosen, the local state receives its own expected benefit, βb ;⁴⁷ likewise, if the local state’s preferred project is chosen, the central state receives the expected benefit αB . The congruence parameters β and α measure the degree to which the preference of the central state is aligned with that of the local state. Here, both β and α belong to $(0, 1)$. The latter, α , measures the

⁴⁶ In some situations, the local state would rather invest in infrastructure than human capital projects, because local government officials have greater incentives than central officials to promote GDP growth in local regions. This is because GDP growth can be much more easily enhanced by investing in infrastructure projects, which give local government officials a better chance of promotion.

⁴⁷ In line with Aghion and Tirole (1997), “expected” here refers to the ex-ante uninformed situation in which all projects are alike.

extent to which the central state's preferred project is also preferred by the local state. Likewise, β measures the degree to which the local state's preferred project is also preferred by the central state. In addition, $b > 1$, $B > 1$ such that the interior solution can be ensured.

Preferences- Unlike the risk-neutrality assumption made by Aghion and Tirole (1997), it is assumed here that the central state is risk-averse and has utility $B_k - F + t(E)$, where F is a fiscal transfer payment made to a local state if project k is chosen, and $t(E)$ represents the central taxes collected directly by the central state. Notably, the higher the probability that the central state is informed (the higher the degree of fiscal control wielded by the central state), the higher the central taxes it can collect. The converse is true for a lower value of E (weaker fiscal control). Hence, the functional form for $t(E)$ is linear. This may be written as $t(E) = E + t_{min}$, and t_{min} is the minimum level of central taxes collected by the central state, that is, when the central state is fully uninformed (has no fiscal control) as to how much central taxes it can collect. The local state, as an agent, is protected by limited liability; thus, $F > 0$. Thus, the local state's utility is $u(F) + b_k$, where $u'(F) > 0$ and is concave, indicating that the local state is risk-averse. Notably, in the latter extension part of the model, both the local and central states will become risk-loving due to the existence of additional *central-local shared tax revenues under the tax-sharing reform scheme*. As a result, it will take greater initiative in terms of investing in risky projects to maintain its fiscal surplus. Moreover, in the absence of central-local shared tax revenues, the central state, apart from the purposes of promoting economic growth, is not always willing to take on risky projects. Bearing this in mind, we can reasonably assume that the central state will opt for the risk-averse preference under a politically centralized governance structure if there is no shared taxed between the central and local state.

Information- We assume that the nature of the projects' payoffs is initially unknown to both

the central state and the local state; this may reflect the non-routine nature of the decision over the authority that may be delegated to local states (Aghion and Tirole, 1997). The local state acquires information in a binary form. At private cost $g_A(e) = \frac{e^2}{2}$, it learns everything about payoffs on all the candidate projects at probability e . Here, probability e also measures the degree to which the local state would have the capacity to tax projects. This is because the more information it learns about the payoffs of all the candidate projects, the more likely it is for the local states to choose their own preferred projects. As a result, the local states have greater autonomy over the choices of projects in which to invest. Likewise, the central state chooses how much effort to devote to learning about payoffs. At probability E , it will become perfectly informed about the payoffs on all the projects. The probability E equivalently measures the degree to which the central state could control the fiscal autonomy, including the capacity to tax the local state over possible candidates as investment projects. This is because the more informed the local states are about the payoffs on all the candidate projects, the more likely it is that the central state will choose its own preferred projects. Therefore, the central state will have greater control over the fiscal autonomy (taxation capacity) of the local government.⁴⁸ The effort cost function for the central state is denoted as $g_p(E) = \frac{E^2}{2}$. At probability $(1-E)$, the central state will learn nothing. The disutilities for effort $g_A(\cdot)$ and $g_p(\cdot)$ are increasing. They are strictly convex and satisfy $g_i(0) = 0$, $g_i'(0) = 0$ and

⁴⁸ In this case, one could naturally treat the probabilities e and E as the two proxies for the degree of fiscal decentralization of an economy. In Aghion and Tirole's (1997) model, these two probability parameters measure the degree of real authority that the agent and principal respectively have. In the remainder of the chapter, I will use the term "fiscal control" to describe the taxation capacities of both the local and central states. According to Besley and Persson (2009), taxation capacity is the degree to which the state could create varying tax categories as well as the extent to which the state can collect taxes efficiently.

$$g_i'(1) = 1, i = A, P.^{49}$$

Authority. In terms of the allocation of political authority, when the central state has formal authority or centralized political decision-making authority, it can always overrule the local state. The central state will do so if it has been perfectly informed and if the local state's preferred projects are not congruent with those of the central state. In this case, the central state has formal and real authority over the choice of projects and fully exploits the local state's information and recommendations. Otherwise, given $\alpha > 0$, the local state will have the real authority to decide which projects to pick, and such an authority must be acknowledged by the central state. Likewise, under the local state's formal authority, if "the independent local state" is perfectly informed, it may then pick its own preferred projects and may not be overruled by central state.

Contracts. In line with the incomplete contract theory approach of Grossman and Hart (1986), we assume that projects cannot be described and contracted for ex-ante. The initial contracts specify only the allocation of formal authority to one of the parties.

The sequence of timing is as follows: (i) the central state offers a contract, which includes the formal authority granted to itself or to the local state over the future choice of projects; (ii) both parties privately collect information regarding n projects' payoffs; (iii) the party that does not have formal authority communicates the information about what it has learned about the subset of its preferred project choices; and (iv) the controlling party chooses a project (or none) based on its collected information and that communicated by the other non-controlling party.

3.4.2 The Basic Trade-off between Loss of Fiscal Control and Initiatives

⁴⁹ In accordance with the approach adopted by Aghion and Tirole (1997), it is assumed in this model that information communication between the local and central states is either hard or soft. Hard information about a project's payoffs can be costless and verified by the other party.

Suppose that, under the central state's formal authority (political centralization), where the central state decides which project to invest in, the utilities for the central state and the local state could be respectively written as follows:

$$u_p = EB + (1 - E)e\alpha B - F + t(E) - g_p(E), \quad (1)$$

$$u_A = E\beta b + (1 - E)eb + F - g_A(e). \quad (2)$$

The intuition behind (1) and (2) is that, at probability E , the principal is informed and chooses its preferred project. In other words, the first term of (1) measures the extent to which the central state could benefit from its preferred project if it exerts the fiscal control. With probability $(1-E)$, the principal is uninformed, and the second term of (1) thus implies the benefits that the central state could obtain when it does not have fiscal control. Meanwhile, at probability e , the local state is informed and chooses its preferred project. The first term of (2) indicates the benefit that it could obtain if it has fiscal control over the projects in which to invest. If the local state chooses its preferred project, the central state either learns from the local state's recommendation regarding the payoff attached to this chosen project (hard information) or remains uncertain about whether the local state proposes her its project (soft information).

Under local state authority (political decentralization), at probability e , the local state has fiscal control over which project to invest in (it is informed), and the agent simply chooses its preferred project. At probability $(1-e)$, the local state does not have fiscal control over which project to invest in, and the central state instead has the fiscal control, so the central state then suggests its preferred project, which is then implemented by the local state. Thus, with the superscript d for "political decentralization," the preferences for the central state and the local state could be respectively written as follows:

$$u_p^d = e\alpha B + (1 - e)EB - F + t(E) - g_p(E), \quad (3)$$

$$u_A^d = eb + (1 - e)E\beta b + F - g_A(e) \text{ }^{50}. \quad (4)$$

Now the next step is to consider the case in which the central state has formal authority, that is, the situation of political centralization. From (1) and (2), the two best response functions in information-gathering for the central state and the local state are defined by the following first-order conditions:

$$(1 - \alpha e)B = E - 1, \quad (5)$$

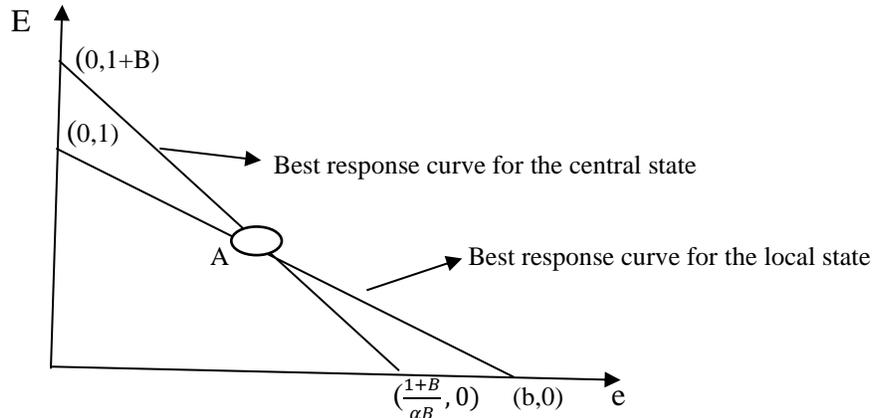
$$(1 - E)b = e. \quad (6)$$

From (5) and (6), it can be seen that these two best response functions are both downward sloping, indicating that, under political centralization, the central state and the local state have entered a *strategic substitutive* relationship in terms of fiscal control. Thus, we offer the following proposition 3.1:

Proposition 3.1: *Under political centralization, in the absence of central–local shared tax revenues under the tax-sharing reform scheme, when both the central state and the local state are risk-averse, both states have entered a strategic substitution relationship in terms of fiscal control.*

Proposition 3.1 implies that an increase in the central’s state effort in terms of centralizing fiscal control will unambiguously induce the reduction in effort or the local state’s fiscal control over possible investment projects. We illustrate these two best response functions through the following graph:

⁵⁰ Due to the fact that we still treat the local state as an institution rather than a sort of human element, such as a local state government official, monetary incentives (e.g., wage payments or political promotion) have not been incorporated into the payoff for the local state. In the extension model part, when we treat the local state as comprising local government officials, we will incorporate such monetary incentives into the analysis, and then the local government officials will respond to monetary incentives and may engage in ex-post renegotiation of the exercise of authority.



Note: Point A is the Nash equilibrium of these two best response function systems.

Figure 3.5 Best response functions for the central and local states

As shown in Figure 3.5, when the central state supervises to a greater extent (exerts more fiscal control), the higher its stake and the lower the level of the congruence parameter α and the local state's control over the taxation capacity. Conversely, when the local state takes greater fiscal control, the higher will be its private benefit and the lower will be the central state's fiscal control.

The purpose of this baseline model is to illustrate that, under certain circumstances, when the local state is risk-averse and the central state is risk-neutral under a politically centralized structure, there exists a trade-off between the loss of fiscal control for the central state and the initiative taken by the local state in terms of fiscal power. Hence, for most countries with a politically centralized governance structure, the norm is that the central state controls both political and fiscal power, and there is no fiscal autonomy granted to the local state. The typical case is the Russian economy after the collapse of the Soviet Union wherein political centralization and economic centralization co-exist (Alexeev and Weber, 2013). This is the typical combination of political centralization and fiscal centralization.

3.5 An Extension Model

The next interesting question we ask is, “In the Chinese case, how can political centralization and economic decentralization coexist given that the latter has been persistently regarded as the main engine driving economic growth in China in the past several decades?” In other words, “How can the trade-off between the loss of fiscal control and local initiative be resolved?” This chapter responds to such questions in a unique way. We argue that, following the tax-sharing reforms of 1994, the central state will be compensated for the loss of fiscal control, because the local state in China can extract large value-added, resource, and income tax revenues from the growth of large local SOEs in the presence of central-local shared tax revenues under the tax-sharing scheme, although they have to submit most of these central-local shared tax revenues to the central state.⁵¹ As a result, two additional channels will emerge, which would resolve the trade-off mentioned previously. First, owing to the additionally large proportions of central–local shared tax revenues that could be shared between the local and central states, both the local and central states become risk-loving in terms of promoting economic growth. This is because the local state must seek more tax revenues to offset the central-local shared tax revenues stemming from large local SOEs that it must pay to the central state. After the tax-sharing reform of 1994, local states in China became risk-lovers and took greater initiative in local investments to maintain fiscal revenue. Hence, in this case, the fiscal decentralization structure within the Chinese economy is expected to emerge.

⁵¹ Before the tax-sharing reforms of 1994, the central state was unable to limit the fiscal power of the local state and could not extract enough taxes from local administrative units. Thus, the central state’s preferred project would normally be misaligned with the local state’s preferred project. For instance, from the standpoint of the central state, the priority has always been to increase the level of fiscal income and thus accumulate the capital required for industrial development at the national level. However, from the standpoint of local states, the local state has a strong incentive to achieve popularity with the local population, which they control by investing in human capital and infrastructure projects as well as by giving greater autonomy to local organizations, such as SOEs and private enterprises, so as to encourage local investment. Local states tend not to be tolerant of the central state’s interference in their fiscal affairs.

Second, under the politically centralized structure, the central state is still willing to delegate fiscal power to the local state even though it faces a loss of fiscal control, because it can be compensated by the local state's remitted central-local shared tax revenues stemming from the growth of large local SOEs. We can illustrate this argument through the following extension model.

3.5.1 Basic Set-up

For the basic set-up of the extension model, suppose there exists a political hierarchy composed of a central state acting as a principal and a local state acting as the agent. As in the baseline model, there are two ways by which the central state could organize agents to implement projects: (1) to centralize the political decision-making authority regarding which projects to invest in to the central state, and (2) to delegate the decision-making authority to the local state. The main difference between the extension and the baseline model is that, regardless of the way by which decision-making authority is organized, the local state must submit most of the additional central–local shared tax revenues that it collects from large local SOEs to the central state. This is called the central–local shared tax revenues under the tax-sharing reform of 1994. The inclusion of the central–local shared tax revenues under the tax-sharing scheme makes our current modelling framework depart sharply from the framework developed by Aghion and Tirole (1997). This is because, as we will see later in this chapter, such an inclusion would change the preferences of both the local state and the central state from risk-averse to risk-loving choices. As a result of the change of the nature of their preferences, the results produced by the extension model will, in part, be fundamentally different from those posited by Aghion and Tirole (1997). Finally, the central state must still pay fixed amounts in fiscal transfers to the local state.

Preferences – The central state in the extension model has utility $B_k - F + [z(e,E)]t(E)+t(E)$ if project k is chosen, where $[z(e,E)]t$ are the amounts of central–local shared tax revenues remitted

by the local state to the central state, after the former collects those taxes from large local SOEs. This is called the *central–local shared tax revenues under the tax-sharing reform scheme* that the local state must share with the central state. In addition, $t(E)$ represents the central taxes collected by the central state, as stated previously, and z is the proportion of the taxes remitted by the local state to the central state through taxation from large local SOEs. Here, z is a function of the extent to which the central and local states respectively have fiscal control. The higher the level of fiscal control that the central state has, the lower proportion of taxes the local state can retain, and vice versa for the fiscal control possessed by the local state. Thus, we have the following functional form for z : $z = E^2 - e^2$. This functional form indicates that, when the local state has no fiscal control ($e=0$), the local state must submit certain proportions of the central–local shared tax revenues equal to E^2 . Conversely, when the local state has full fiscal control ($e=1$), the central state has to fully monitor the local state ($E=1$) so that it can avoid the negative proportions of the central–local shared tax revenues. In other words, it has to financially subsidize the local state.

Meanwhile, the central state is protected by the condition of limited liability, indicating that $t(E)$ may not be negative. The local state's utility is then expressed as $b_k + F + z(e, E)t(e)$, where $z(e, E)t(e)$ represents the central–local tax shared revenues retained by the local state from collecting taxes from large local SOEs. It is noted that, when the local state is more likely to be informed (has greater fiscal autonomy), then it is more likely to collect higher amounts of taxes from the local large SOEs. Here, it is assumed that the $t(e)$ could be written in the following functional form: $t = 2e + t_{min}^d$, where t_{min}^d is the minimum level of local tax revenues that the local state could collect when it has no fiscal control.

3.5.2 Resolving the Trade-off between the Loss of Fiscal Control and Initiative

Given the basic set-up of the extension model presented above, in the presence of central–local

shared tax revenues under the tax-sharing reform scheme, under the central state's formal authority (political centralization) wherein it decides which project to invest in, the utilities for the central state and the local state could be respectively written as follows:

$$u_p = EB + (1 - E)e\alpha B - F + [z(e, E)]t(e) + t(E) - g_p(E), \quad (5)$$

$$u_A = E\beta b + (1 - E)eb + F + [1 - z(e, E)]tI - g_A(e). \quad (6)$$

The intuition behind the functional forms of (5) and (6) is slightly different from the intuition underlying (1) and (2) in the baseline model. This is because the local state has an additional term $[(1 - z(e, E)]t(e)$ representing the central–local shared tax revenues that the local state can collect from local resources and capital-intensive large SOEs. This term delivers an additionally positive payoff for the local state compared with the case in the baseline model. Likewise, the central state also has an additional term $z(e, E)t(E)$, which represents the central–local shared tax revenues it can collect from the local state. This term also yields an additionally positive payoff for the central state. It can be also seen that the new utility functions for the central and local states imply that both the central state and the local state become risk lovers, as $u_p'' > 0$ and $u_A'' > 0$.

Given the functional forms (4) and (5), we can compute the best response functions for the central and local states under political decentralization in the presence of central–local shared tax revenues under the shared-taxing reform scheme:

$$E = \frac{e\alpha B - 1 - B}{4e + 2t_{min}^d - 1}, \quad (7)$$

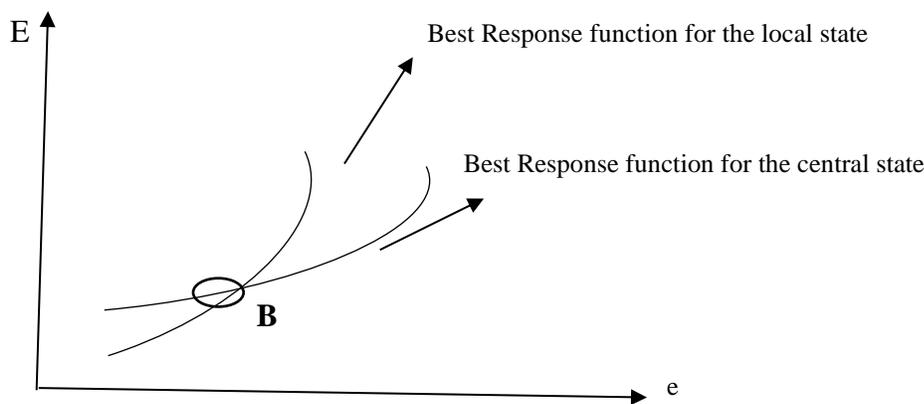
$$Eb + 2E^2 = 6e^2 + 2et_{min}^d - e + b + 2. \quad (8)$$

From (7) and (8), it can be seen that the two new best response functions are both upward-sloping, indicating that both the central and the local states now enter into a *strategic*

complementary relationship in terms of fiscal control under the political centralization governance structure. Thus, we derive the following proposition 3.2:

Proposition 3.2 *Under political centralization, in the presence of central–local shared tax revenues under the tax-sharing reform scheme between the local and central states, when both states are risk-loving, they enter a strategic complementary relationship in terms of fiscal control.*

Proposition 3.2 implies that an increase in the central’s state effort to monitor the local state will unambiguously induce a rise in effort or the latter's fiscal control over the projects in which it chooses to invest. We illustrate these two best response functions through the following graph:



Note: Point B is the Nash equilibrium of these two best response function systems.

Figure 3.6 Best response functions for the central and local states in the presence of the shared tax scheme

Figure 3.6 indicates that, when both the local and central states become risk-loving in the presence of central–local shared tax revenues under the tax-sharing reform scheme under which the local state collects taxes from large local SOEs, the trade-off between the loss of fiscal control and initiative-taking under a politically centralized governance structure can be resolved. In other words, when the central state supervises more closely, its stake will be lower and the congruence

parameter α and the local state's control over the taxation capacity will be higher. Conversely, when the local state has low fiscal control, its private benefits will be lower, and the central state's supervision level will be higher. In general, it could be argued that the *strategic complementary* relationship between the central and local states in terms of fiscal control could ensure the coexistence of political centralization and fiscal decentralization. This is because the increase in the monitoring effort exerted by the central state would lead to a rise in imitative taking by the local state in terms of fiscal autonomy. As a result, fiscal decentralization under a politically centralized governance structure could subsequently emerge. The key behind this story is that there is one more additional term, which is the central–local shared tax revenues under the tax-sharing reform scheme, that the local state collects from large local SOEs, in the payoff function for the central state. The local state must submit most of these central–local shared tax revenues to the central state. Such additional shared tax revenues could be treated as a form of compensation for the central state when it experiences a loss of fiscal control when it grants fiscal autonomy to the local state. In addition, given the aforementioned theoretical results, it is worth mentioning that, because of the risk-loving nature of the preferences of the central state (principals) and the local state (agents), the *strategic substitutive* relationship between the principal's loss of control and the agent's initiative-taking, which is the key trade-off in the incentive-contract models developed by Aghion and Tirole (1997), has been resolved.

3.5.3 The Determinants of the Optimal Level of Fiscal Decentralization

The next interesting question we explore is, “Under a politically centralized governance structure, what are the relevant determinants of the optimal level of fiscal decentralization?” In other words, we are interested in how the optimal level e varies with the three parameters B , b , and α , which

are the benefits that accrue when the central state decides on its preferred projects for investment, the counterpart for the local state when it decides on its preferred projects for investment as well as the interest-misalignment parameter α . To achieve this aim, we must first compute the analytical solution for the Nash equilibrium point B to obtain the optimal level of fiscal decentralization e^* . For the sake of the tractability of the model, we parameterize $t_{min}^d = 1$ and then solve Equations (7) and (8) to obtain the Nash equilibrium. Given that the analytical solution for the optimal level of fiscal decentralization cannot be obtained, we can compute the Nash equilibrium function trajectory only for e^* :

$$8e^*(-1 + e^*\alpha)B = 4e^* + 4e^*b + 4e^*\sqrt{b^2 - 18b - 31} + b + \sqrt{b^2 - 18b - 31} - 1. \quad (9)$$

We can conduct a comparative static analysis on Equation (8) using the implicit function technique. First, we compute the dynamics of how the optimal level of fiscal decentralization varies with the interest misalignment parameter α

$$-8\frac{\partial e^*}{\partial \alpha}B + 16(e^*)kB\frac{\partial e^*}{\partial \alpha} + 8(e^*)^2B = 4\frac{\partial e^*}{\partial \alpha} + 4\frac{\partial e^*}{\partial \alpha}b + 4\frac{\partial e^*}{\partial \alpha}\sqrt{b^2 - 18b - 31}. \quad (10)$$

From (10), we can derive the expression for $\frac{\partial e^*}{\partial \alpha}$:

$$\frac{\partial e^*}{\partial \alpha} = \frac{8e^2B}{4+4b+4\sqrt{b^2-18b-31}-16e^*\alpha B+8B}. \quad (11)$$

From (11), we know that the expression $\frac{\partial e^*}{\partial \alpha}$ is valid if and only if $\sqrt{b^2 - 18b - 31} \geq 0$.

This means $\frac{\partial e^*}{\partial \alpha} \geq 0$ if and only if $b \geq 9 + 4\sqrt{7}$.⁵² Hence, we derive the following lemma 3.1:

Lemma 3.1 *The rise in the extent to which the central state's preferred project is also preferred by the local state (signifying a higher level of preference alignment between the central and the local states) further increases fiscal decentralization if and only if the benefit extracted by the local*

⁵² There is another negative solution that satisfies the inequality. However, b cannot be negative and, therefore, we can exclude the negative value of b from consideration.

state when it picks up its preferred project is sufficiently large, namely, $\frac{\partial e^*}{\partial \alpha} =$

$$\frac{8(e^*)^2 B}{4+4b+4\sqrt{b^2-18b-31}-16(e^*)\alpha B+8B} > 0 \text{ if and only if } b > 9+4\sqrt{7}.$$

The above lemma 3.1 implies that when there is a rise in the alignment of the interests of the central and local states, the optimal degree of fiscal decentralization or the level of fiscal control that the local state could obtain will increase if and only if the benefits it can obtain from picking its preferred projects are sufficiently large. The logic behind this is simple: once the central state's preferred project is also more likely to be preferred by the local state, the expected benefits that the central state can obtain by choosing its preferred projects will increase. As a result, the central state will be compensated for the loss of fiscal control and thus becomes more inclined to decentralize fiscal control to the local state, resulting in a higher value of e^* . Nonetheless, the premise for such a relationship to hold is that the benefits that the local state can obtain by picking the central state's preferred project must be sufficiently large. This means that projects that the central state mandatorily asks the local state to implement must also sufficiently benefit the latter; otherwise there will be no incentive for the local state to undertake its preferred projects and α , in turn, could not have higher values.

The second comparative static analysis we are interested in conducting pertains to how the optimal level of fiscal decentralization varies with the benefit that the central state can obtain by picking its preferred project when such a project is also fully favored ($\alpha = 1$) by the local state, which is B. Based on Equation (9), we again use the implicit functional technique to derive the expression for $\frac{\partial e^*}{\partial B}$:

$$-8\frac{\partial e^*}{\partial B} B - 8e^* + \frac{\partial e^*}{\partial B} \alpha B + e^* \alpha = 0.$$

(12)

From (12), we can derive the expression for $\frac{\partial e^*}{\partial B}$:

$$\frac{\partial e^*}{\partial B} = \frac{8e^* - e^*\alpha}{\alpha B - 8B} < 0 .$$

(13)

Thus, from (13), we have our next lemma.

Lemma 3.2 *When the benefit that the central state can obtain from picking its preferred projects increases, the optimal level of fiscal decentralization decreases.*

The theoretical result derived from Lemma 3.2 is reasonable. Once the central state obtains sufficiently large of benefits from picking its preferred projects, it will become less willing to decentralize fiscal control to the local state, because doing so would decrease its benefits, including obtaining lower central–local shared tax revenues under the tax-sharing reform scheme, most of which is remitted by the local state.

The third comparative static analysis we are interested in conducting pertains to how the optimal level of fiscal decentralization varies with the benefit that the local state can obtain from choosing the central state’s preferred project when the former's preferred project is also fully favored ($\beta = 1$) by the latter, which is b . Based on Equation (9), we again use the implicit functional theorem to derive the expression for $\frac{\partial e^*}{\partial b}$:

$$-8 \frac{\partial e^*}{\partial b} B + \alpha B \frac{\partial e^*}{\partial b} = 4 \frac{\partial e^*}{\partial b} + 4 \frac{\partial e^*}{\partial b} b + 4e^* + 4E \frac{\partial e^*}{\partial b} + 2e^*(2b - 18) \frac{1}{\sqrt{b^2 - 18b - 31}} + 1 + \frac{2b - 18}{\sqrt{b^2 - 18b - 31}} .$$

(14)

From (14), we could obtain the expression for $\frac{\partial e^*}{\partial b}$:

$$\frac{\partial e^*}{\partial b} = \frac{-2e^*(2b-18)\frac{1}{\sqrt{b^2-18b-31}} - 1 - \frac{2b-18}{\sqrt{b^2-18b-31}}}{8B - \alpha B + 4 + 4b + 4E}.$$

(15)

From (15), it can be seen that $\frac{\partial e^*}{\partial b}$ is valid if and only if $b \geq 9 + 4\sqrt{7}$. This means that we must have

$\frac{\partial e^*}{\partial b} < 0$. Thus, we have our next lemma:

Lemma 3.3 *When the benefit that the local state can obtain from picking the central state's preferred project increases, the optimal level of fiscal decentralization (the local state's fiscal control) decreases if and only if the benefit that the local state can obtain from picking its preferred projects is sufficiently large.*

Lemma 3.3 reveals a very important message: the central state is not willing to delegate additional fiscal autonomy to the local state if the latter gains too much benefit from picking its preferred projects. This is because, given that the local state has already benefited greatly from fiscal decentralization, the central state does not want to experience further loss of fiscal control, which might then reduce the shared tax revenue that it can collect from the local state. As a result, the central state will not be compensated sufficiently for the loss of fiscal control.

3.5.4 The Determinant of the Optimal Level of Central-local Shared Tax Revenues Collected from Large Local SOEs

In this section, we to study the dynamics of the optimal level of central–local shared tax revenues that the local state can collect from local resources and capital-intensive large SOEs. The first channel we are interested in exploring is connected with how the optimal level of central–local shared tax revenues that the local state can collect from large local SOEs might vary with interest-

misalignment parameter α . The optimal level of central–local shared tax revenues that the local state can collect from large local SOEs can be computed as follows: $t^*=2e^* + 1$. We then substitute this equation into the Nash equilibrium function trajectory for e^* indicated by (9). Next, we obtain the corresponding Nash equilibrium function trajectory for t^* :

$$(4t^* - 4) \left(-1 + \frac{t^*-1}{2} \alpha \right) B = (2t^* - 2) + (2t^* - 2)b + (2t^* - 2)\sqrt{b^2 - 18b - 31} + b + \sqrt{b^2 - 18b - 31} - 1. \quad (16)$$

From (16), we can use the implicit function technique to compute the channel through which t^* changes with α :

$$4B \left(\frac{\partial t^*}{\partial \alpha} \right) + (4t^* - 2)\alpha B \left(\frac{\partial t^*}{\partial \alpha} \right) + [2(t^*)^2 - 2t^*]B = 2 \left(\frac{\partial t^*}{\partial \alpha} \right) + 2b \left(\frac{\partial t^*}{\partial \alpha} \right) + 2\sqrt{b^2 - 18b - 31} \left(\frac{\partial t^*}{\partial \alpha} \right), \quad (17)$$

$$\left(\frac{\partial t^*}{\partial \alpha} \right) = \frac{-[2(t^*)^2 - 2t^*]}{4B + (4t^* - 2)\alpha B - 2 - 2b - 22\sqrt{b^2 - 18b - 31}}. \quad (18)$$

From (18), because $1 \leq t^* \leq 3, 0 \leq \alpha \leq 1, b \geq 9 + 4\sqrt{7}$, then $\left(\frac{\partial t^*}{\partial \alpha} \right) > 0$ if and only if B is sufficiently small, such that $4B + (4t^* - 2)\alpha B - 2 - 2b - 22\sqrt{b^2 - 18b - 31} < 0$.

Thus, we have the following lemma:

Lemma 3.4 *The increase in the extent to which the central state's preferred project is also preferred by the local state (signifying a higher level of alignment of interests between the central and local states) increases the optimal level of central-local shared tax revenues that the local state can collect from large local SOEs if and only if the benefit that the central state can obtain from its preferred project is sufficiently small.*

The intuition behind lemma 3.4 is as follows. The rise in the alignment of interests between the central and local states would lead to a corresponding increase in the fiscal autonomy that the latter could have, which is e^* . As a result, the local state is better able to collect central–local shared tax revenues from large local SOEs, thus leading to the increase in t^* . However, as indicated by Lemma 3.2, the rise in the benefit that the central state can obtain from its preferred project can also reduce fiscal decentralization to the local state. In turn, this decreases t^* . Hence, there can be a competing effect with the first channel that we just pointed out. From this point of view, one must ensure that B is sufficiently small to make it possible for the positive relationship between t^* and α to hold.

3.5.5 Inter-governmental Competition, Fiscal Decentralization and the Optimal Level of Tax Revenues from Large Local SOEs

In this section, we study how the optimal level of central–local shared tax revenues that the local state could collect from large local SOEs might change with respect to the degree of inter-governmental competition across local administrative units. In the political economy literature on China, internal inter-local state competition for GDP growth—the so-called “political tournament” between Chinese local government officials—has been credited as one of the most important drivers of the economic miracle of the Chinese economy (Li and Zhou, 2005 and Zhou, 2004). As the GDP growth criteria are based on political turnover, which might give incentives to local government officials to be promoted into higher government rankings, the incentive structure for each local state to collect the taxes from the large local SOEs might correspondingly change. Second, it is also interesting to detect the channel through which the performance measurement in terms of GDP and the political promotion benefit could affect the incentives for the local state to

collect taxes from large local SOEs.

To allow our theory to be generalized to a situation wherein the local state bureaucrats can respond to both inter-governmental competition and the performance measurement, we first assume that a central state has authority over m identical local governmental units, each of which could be a province, a county, and so on. Here, m can be interpreted in two ways. First, m can be treated as a proxy for the intensity of inter-governmental competition, such that the higher the value of m , the higher the intensity of inter-governmental competition. Second, m is a direct measure of the span of political control that the central government official has. Each local government official i screens a set of projects described in the previous section and learns the corresponding payoff structures at probability e_i . The central government official's disutility for efforts is $g_p(\sum_i^m E_i)$, where E_i is the degree to which the central state could exert fiscal control over the local state when the latter picks the central state's preferred project. Each investment project picked by the local state is assumed to be independent of each other. Furthermore, central government officials must still offer a political promotion incentive scheme to local government officials. This could be expressed as follows: $P(m,w)=k(e)+w$, where k is the political benefit that local government officials could derive from the promotion, and W is the fixed wage level that local government officials receive. It is noted that the political benefit is a function of the degree of fiscal decentralization, which could be written as follows: $k(m)=e(m) + k_{min}$, where $e = m^2$. Hence, the degree of fiscal control possessed by each local state is positively contingent on the intensity of inter-governmental competition it faces. The logic behind this is that, when local government officials face more intense inter-governmental competition caused by the political promotion tournament, it provides greater incentives for the local state to exert stronger fiscal control to be able to invest more in its preferred projects. This, as a result, might contribute to the

local GDP growth, which enables the local government officials to be more likely to be promoted up the political hierarchy.

Moreover, the reason for assuming a positively linear relationship between the political benefit and the degree of fiscal decentralization is that, if the local state is able to exert greater fiscal control in terms of investing in its preferred GDP growth-enhancing projects, then local government officials might be more likely to be promoted up the political hierarchy. We express the respective utility functions for the central state and each local state as follows:

$$u_p = \sum_i E_i B + (1 - E_i)e_i(m)\alpha B - F + [(z(e_i(m), E_i)]t(e_i(m)) + t(E_i) - w - g_p(\sum_i E_i), \quad (19)$$

$$u_A = E\beta b + (1 - E)e_i(m)b + F + [1 - z(e_i(m), E)]t(e_i(m)) + P(m, w) - g_A(e_i(m)). \quad (20)$$

For (19), assuming the property of symmetry, according to which we can take the derivative of (19) with respect to m , we can obtain the functional trajectory of the optimal degree of inter-governmental competition (the optimal span of political control) throughout the political hierarchy:

$$EB + 2(m^*)\alpha B - E\alpha B + 6(m^*)^2 E^2 + E^2 t_{min}^d - 12(m^*)^5 - 4(m^*)^3 t_{min}^d + (E + t_{min}) - m^* E = 0. \quad (21)$$

We can rearrange (21) to solve E as a function of the optimal level of inter-governmental competition (the optimal span of political control), as shown below.

$$\begin{cases} E_1 = \frac{-B + B\alpha - 1 + m^* + \sqrt{(B - B\alpha + 1 - m^*)^2 - 4(6(m^*)^2 + t_{min})(2Bm^*\alpha - 12(m^*)^5 - 4(m^*)^3 t_{min}^d + t_{min})}}{2(6(m^*)^2 + t_{min})} \\ E_2 = \frac{-B + B\alpha - 1 + m^* - \sqrt{(B - B\alpha + 1 - m^*)^2 - 4(6(m^*)^2 + t_{min})(2Bm^*\alpha - 12(m^*)^5 - 4(m^*)^3 t_{min}^d + t_{min})}}{2(6(m^*)^2 + t_{min})} \end{cases}$$

$$(22)$$

From (22), we know that it is impossible to have a negative value of E given that the optimal level of inter-governmental competition cannot be sufficiently large.⁵³ Hence, the only solution we want is the first part of (22), which is expressed below.

$$E_1 = E = \frac{-B + B\alpha - 1 + m^* + \sqrt{(B - B\alpha + 1 - m^*)^2 - 4(6(m^*)^2 + t_{min})(2Bm^*\alpha - 12(m^*)^5 - 4(m^*)^3 t_{min}^d + t_{min})}}{2(6(m^*)^2 + t_{min})} \quad (23)$$

From (23), with the parametrization of $t_{min}=1$ and $t_{min}^d = 1$, we can derive the following:

$$\frac{\partial E}{\partial m^*} = \frac{-36(m^*)^6 + 144B\alpha(m^*)^4 - 18(m^*)^4 - 6(m^*)^3 + 18B(m^*)^2 - 18\alpha(m^*)^2 + 12(m^*)^2 - 6(m^*)^2 L - 12B^2(m^*) + 12B(m^*)L - 24B(m^*) - 12B^2\alpha^2(m^*) - 12B\alpha(m^*)L + 24B^2\alpha(m^*) + 24B8\alpha m^* - 23m^* + 12m^*L - B - 3B\alpha - 1 + L}{2(6m^2 + 1)^2 L} \quad (24)$$

In the equation above,

$$L = \sqrt{-12(m^*)^5 - 48B\alpha k(m^*)^3 - 4(m^*)^3 + (m^*)^2 - 2B(m^*) - 6B\alpha(m^*) - 2(m^*) + B^2 + 2B + B^2\alpha^2 - 2B^2\alpha - 2B\alpha + 2}$$

Given (24), because $m^* \geq 2$, that $\frac{\partial E}{\partial m^*} > 0$ can be computed. For a more analytical look at the dynamic relationship between the central state's fiscal control and the optimal level of inter-

⁵³ Central government officials would choose to have an infinite number of local government official subordinates in the absence of fixed fiscal payment transfers.

governmental competition (the optimal span of political control) m^* , we can simulate the functional trajectory of $\frac{\partial E}{\partial m^*}$ when $\alpha = 0.5$ as follows: ⁵⁴

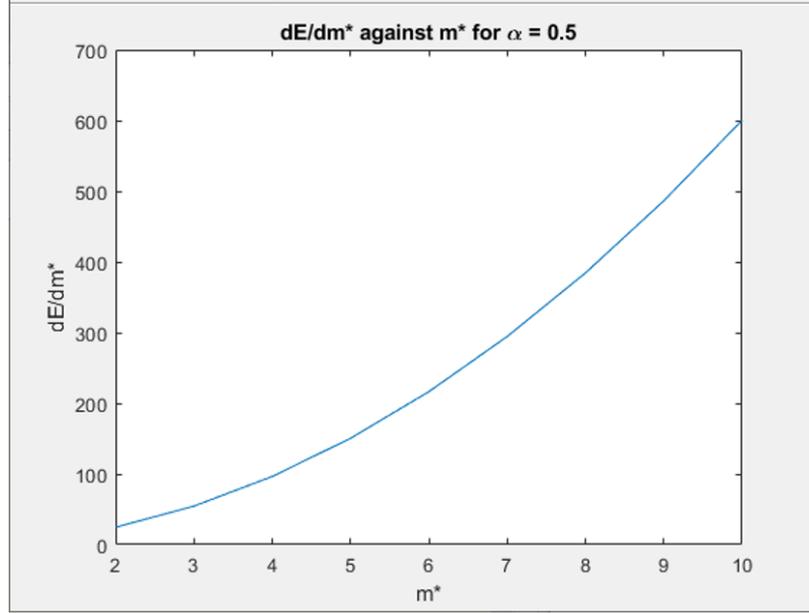


Figure 3.7 Dynamics of $\frac{\partial E}{\partial m^*}$

Thus, we have Lemma 3.5.

Lemma 3.5 *The degree of fiscal control of the central state will increase as the optimal level of inter-governmental competition (the optimal span of political control) measured by m^* increases.*

Lemma 3.5 implies that once the optimal level of inter-governmental competition increases, the central state will exert greater fiscal control. The reason behind this positive relationship is that

⁵⁴ The reason we parameterize $\alpha = 0.5$ and $\beta = 0.5$ is that assuming the neutrality of the preference in terms of project selections for the central and local states is logical. By making $\alpha = 0.5$ and $\beta = 0.5$, that the project selected by either side (local or central) will be half preferred by the other can be ensured, which is more consistent with what happens in reality especially with reference to the neutrality assumption of the state preference in terms of selecting projects to invest. In addition, the set of parameterized values of B and b to be 2 can be generalized to the cases of other positive parameterized values for the respective benefits that the local and central states can derive from their preferred projects. The same logic holds true for t_{min} and t_{min}^d when their values are parameterized to be 1.

once the optimal level of inter-governmental competition at the local level increases, the optimal fiscal control possessed by the local state will also increase. Once the competition between local administrative units intensifies, it will incentivize each local state to exert greater fiscal control in terms of collecting more taxes from the local region because doing so can raise its political benefit. In this case, given the nature of the strategic complementary relationship in terms of fiscal control arising in the presence of the tax-sharing reform scheme, the degree to which the central state can exert fiscal control (the level of taxation capacity) also increases.

Moreover, we can derive how the optimal proportion of the central-local shared tax revenues stemming from the large local SOEs that the local state must remit to the central state, which is z , varies with the optimal level of inter-governmental competition (the optimal span of control). To achieve this objective, we first substitute (23) into $z(m^*)=E(m^*)^2 - e(m^*)^2$ and we obtain the following:

$$z(m^*)=\left[\frac{-B+B\alpha-1+m^*+\sqrt{(B-B\alpha+1-m^*)^2-4(6(m^*)^2+t_{min})(2Bm^*\alpha-12(m^*)^5-4(m^*)^3t_{min}^d+t_{min})}}{2(6(m^*)^2+t_{min})}\right]^2 - (m^*)^4 \quad (25)$$

From (25), with the parameterization of $t_{min} = 1$ and $t_{min}^d = 1$, $B = 2$, $b = 2$, $\alpha = 0.5$, $\beta = 0.5$ and then we can take the derivative of (25) with respect to m^* and demonstrate that $\frac{\partial z(m^*)}{\partial m^*} < 0$. For a more analytical look at the dynamic relationship between the optimal proportion of the collected central-local shared tax revenues that the local state must remit to the central state and the optimal level of inter-governmental competition (the optimal span of political control) m^* , we can simulate the functional trajectory of $\frac{\partial z}{\partial m^*}$ when $\alpha = 0.5$, as shown in Figure 3.8.

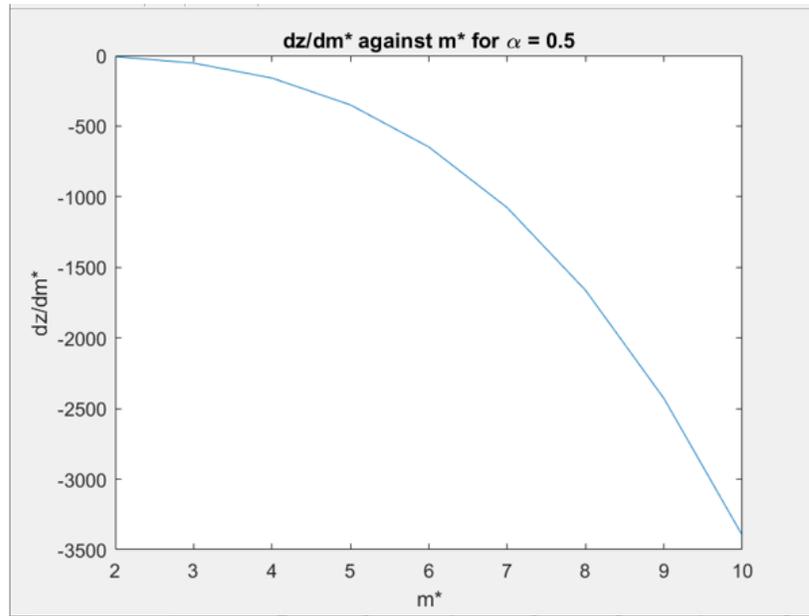


Figure 3.8 Dynamics of $\frac{\partial z}{\partial m^*}$

This dynamics leads to our next lemma.

Lemma 3.6 *The optimal proportion of the collected central–local shared tax revenues that the local state must remit to the central state will decrease as the optimal level of inter-governmental competition (the optimal span of political control) m^* increases.*

Lemma 3.6 indicates that once the optimal level of inter-governmental competition increases, the local state can remit the lower level of the optimal proportion of the central-local shared tax revenues stemming from the local large SOEs to the central state. The rise in the optimal level of inter-governmental competition will induce the higher optimal level of local fiscal control for each local state. As a result, the proportion of the collected central-local shared tax revenues that the local state requires to remit to the central state will decrease. Lemma 3.6 also indicates that the increase in the optimal degree of inter-governmental competition can be lower $z(m^*)$, but it does not necessarily mean that the central state will receive lower tax revenues in the end. From (19),

the level of tax revenues obtained by the central state depends on two terms. The first is the term $[(z(e_i(m)), E_i(m))]t(e_i(m))$ that represents the central–local shared tax revenues the central state can receive from the local state. The lower value of $[(z(e_i(m^*)), E_i(m^*))]$ will be compensated for by the increase in $t(e_i(m^*))$, which is the resulting higher total local tax revenues that the local state can collect when the optimal degree of inter-governmental competition increases. The second term is $t(E(m^*))$, which captures the total central tax revenues collected by the central state. According to Lemma 3.5, once m^* increases, $E(m^*)$ will also increase, implying that the total level of central tax revenue will also increase as a result of the rise in m^* . Overall, the rise in the optimal degree of inter-governmental competition will have an ambiguous effect on the level of total revenues received by the central state.

Furthermore, we can insert (23) into (20) and rearrange the utility of the local governmental state in terms of m^* .

$$\begin{aligned}
& u_A[E(m^*), e(m^*)] \\
&= \frac{-B + B\alpha - 1 + m^* + \sqrt{(B - B\alpha + 1 - m^*)^2 - 4(6(m^*)^2 + t_{min})(2Bm^*\alpha - 12(m^*)^5 - 4(m^*)^3 t_{min}^d + t_{min})}}{2(6(m^*)^2 + t_{min})} (\beta b) \\
&+ [1 - B + B\alpha - 1 + m^* + \sqrt{(B - B\alpha + 1 - m^*)^2 - 4(6(m^*)^2 + t_{min})(2Bm^*\alpha - 12(m^*)^5 - 4(m^*)^3 t_{min}^d + t_{min})}]
\end{aligned} \tag{26}$$

With the parameterization of $t_{min} = 1$, $t_{min}^d = F = 1$, $k_{min} = 1$ and $w = 1$, $b = 2$, $B = 2$, we can take the derivative of (26) with respect to m^* to examine how the optimal payoff for each local state may vary with the optimal degree of inter-governmental competition (the optimal span of political control). After taking the derivative, we obtain the following: $\frac{\partial u_A[E(m^*), e(m^*)]}{\partial m^*} < 0$. For a more analytical look at the dynamic relationship between the utility of the local state and the

optimal degree of inter-governmental competition (the optimal span of political control) m^* , we simulate the functional trajectory of $\frac{\partial u_A[E(m^*),e(m^*)]}{\partial m^*}$ when $\alpha = 0.5$, as shown in Figure 3.9:

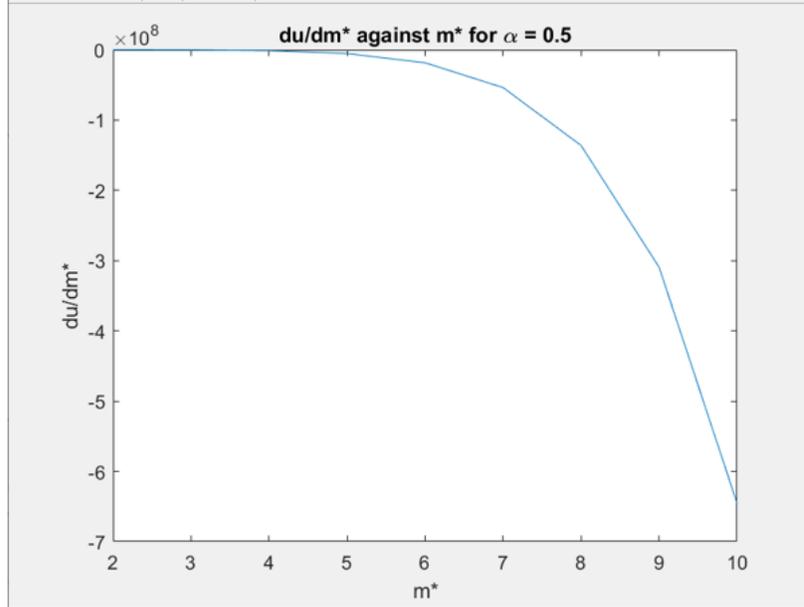


Figure 3.9 Dynamics of $\frac{\partial u_A[E(m^*),e(m^*)]}{\partial m^*}$

We then have the following lemma:

Lemma 3.7 *The optimal payoff for each local state will decrease as the optimal degree of inter-governmental competition (the optimal span of political control) m^* increases.*

Lemma 3.7 implies that when the optimal degree of inter-governmental competition increases, a corresponding decline will occur in terms of the optimal payoff for each local state. The increasing level of intensification of local competition will mitigate the monopolization of each local state in terms of collecting taxes and deriving political benefits by local government officials. Consequently, the optimal payoff for each local state will decrease as a result of the rise in m^* .

3.6 Conclusions

This chapter provides a comprehensive picture of how the presence of central-local shared tax revenues under the tax-sharing reform scheme wherein the local state remits to the central state after collecting taxes from the large local SOEs may play a crucial role in sustaining the strategic complementary relationship between the local and central states in terms of fiscal control. We extend an incentive contract model developed by Aghion and Tirole (1997) to resolve the paradox as to how political centralization and fiscal decentralization can coexist within the Chinese economy. It postulates a crucial factor that has been surprisingly absent from the literature, which this chapter tries to capture. Following the 1994 tax-sharing reforms, the fiscal decentralization supported by the politically centralized economic structure in China is endogenous to the rise in and expansion of local upstream resources and capital-intensive large SOEs that can provide high value-added, resource, and income tax revenues to the local state. The local state can in turn remit most of these central–local shared tax revenues to the central state such that the central state’s loss of fiscal control can be compensated for. In this situation, once the central state receives sufficient benefits from the central–local shared tax revenues under the tax-sharing reform scheme remitted by the local state through local resources and capital-intensive large SOEs, the rise in monitoring efforts by the central state can even further enhance the initiative taken by the local state to invest, thus leading to the emergence of fiscal decentralization under a politically centralized governance structure. That such an incentive-compatibility mechanism between the local and central states, which can resolve the trade-off between the loss of control and local initiative-taking, has ensured the smooth and successful transition of the Chinese economy as well as its dramatic decade-long economic growth can be argued.

We also study the determinants of the optimal level of fiscal decentralization under a politically centralized governance structure like China's. We find that three factors are crucial in determining the optimal level of fiscal decentralization in the Chinese economy. The first is the degree of interest alignment between the local and central states. If the benefits that the local state obtains from picking its preferred projects are sufficiently large, the rise in the degree of interest alignment between the central and local states will increase the optimal level of fiscal decentralization. The second and the third factors are the level of benefits that the local and central states can obtain from picking their respectively preferred projects. We show that these factors can negatively affect the optimal level of fiscal decentralization. After introducing our extension model, we analyze the inherent dynamics between the optimal level of tax revenues, the degree of interest alignment between the local and central states, the optimal level of inter-governmental competition, the optimal degree of fiscal control possessed by the central state, and the optimal utility of the local state. These theoretical results largely enrich our extension model, providing the literature with important additional insights into the governance structure of the Chinese economy since the opening-up policies have been initiated.

Chapter 4

Foreign Ownership of Large SOEs and Partial Privatization Policies in China

4.1 Introduction

After opening-up policies were initiated in 1978, Foreign Direct Investment (FDI) became one of the most important engines for the growth of the Chinese economy. Research indicates that greater inflow of foreign direct investment is normally accompanied by more economic liberalization in the host country, and China is no exception. In this chapter, we study how partial privatization policies (with private shares between 0% and 50%) enacted by the Chinese government as well as foreign ownership policies over local private firms affect foreign ownership regulations over large SOEs in the country. It is widely known that China's accession to the WTO was followed by dramatic developments in the economy's private sector as well as the liberalized state sectors. Moreover, since the 1980s, Chinese government's promotion of mixed-ownership and further corporatization reforms of large SOEs via joint ventures, greenfield investments, and other foreign direct investment have become one of the most hotly debated topics in scholarship, particularly the avoidance of full privatization (Shen, Fang and Deng 2017; Q. Zhang, J. Zhang and Liu 2017; Shen.et.al 2018 and Huang.et.al 2014.) However, the complex dynamics between the foreign ownership policies regulating domestic private firms, partial privatization policies over large SOEs, and foreign ownership policies over large SOEs are also surprisingly un-explored in the literature.

This chapter uses a three-stage sequential game model to demonstrate that the optimal degree of partial privatization will positively vary with the increasing degree of foreign ownership shares over large SOEs in the presence of an *empire-building effect*. The rationale for his argument is as follows: In the absence of foreign ownership, if the optimal amount of private shares over a large SOE is below 50%, thus leaving the large SOE still state-owned, large-SOE managers in China will attach greater importance to empire-building activities including perk consumption, network-building, and expanding the size of SOEs to maximize their private control over benefits rather than pursuing profits or aggregate social welfare (Qian, 1996; Shen et al., 2018). This chapter further argues that increases in foreign ownership over partially privatized large SOEs will cause the government to become less resistant to domestic partial privatization, and will ultimately prevent increasing profits from being transferred abroad, thereby mitigating the loss of the aggregate social welfare. In addition, such increases could undermine the empire-building activities by enabling large-SOE managers to more effectively pursue profit maximization. This results from the fact that, from the perspective of large-SOE managers, larger foreign shares within large SOEs could result in losses, which would decrease parts of the large-SOE managers' payoff. Implementing ownership restructuring by transferring some private shares to individual managers could compensate them for their losses in the portion of the payoff related to profit-maximization objectives and, we contend, make them more committed to maximizing profits.

We also analyse how foreign share changes in domestic private firms affect the optimal level of foreign shares over large SOEs. We found that increases in foreign shares in domestic private firms cause a corresponding decline in the optimal level of foreign shares in large SOEs. This result indicates a so-called *substitution effect* in terms of foreign ownership regulation policies across firms with varying ownership structures. As we will describe, allowing more foreign shares

for firms regardless of ownership structure will certainly lead to losses in social welfare as the profits obtained by the foreign firms are transferred abroad. Thus, it will be difficult to persuade the government to allow an increase in foreign shares in both private firms and large SOEs simultaneously, as doing so will cause a disproportionate loss of social welfare.

Our model describes how optimal partial privatization policies might influence foreign ownership regulation policies toward large domestic SOEs, as well as the inherent dynamic in foreign ownership policies across large SOEs and domestic firms. The model assumes both SOEs and private local firms will have a mixed ownership structure in forming international joint ventures with foreign investors. It also assumes the market for partially privatized large SOEs offers mixed duopolistic competition. These assumptions are in line with several studies in the partial privatization literature, including Matsumura (1998, 2003), Gupta (2005), Chao and Yu (2006), Fujiwara (2007), Tomaru (2006), Maw (2002) and Schmitz (2001).

The present chapter contributes to this literature by folding the partial privatization models proposed primarily by Matsumura (1998, 2003) into work on international mixed oligopolies (White, 1996; Fraja and Delbono, 1990; Fjell and Pal, 1996; Pal and White 1998; Fjell and Heywood 2002; Barcena-Ruiz and Garzon 2005; Dadpay and Heywood 2006). This hybrid approach allows us to investigate, as noted, question of both optimal partial privatization and the inherent dynamics of foreign ownership. More specifically, we have incorporated empire-building activities into the manager's weighed objective function in the sense that the large-SOE manager in our model setting faces a multi-tasking problem that includes both profit privatization and total revenue maximization, which might later enable the SOE manager to derive private control over benefits. To the best of our knowledge, the empire-building effect, which is a widely discussed

factor in corporate finance, has not been incorporated into the mixed oligopoly and partial privatization literature so far, and thus offers a substantial contribution to work in the area.

As mentioned previously, the empire-building effect implies that, if the optimal level of private shares is below 50% (meaning the large SOE is still state-owned), large SOE managers will attach greater importance to empire-building activities, including perk consumption, network-building, and the expansion of large SOEs at the price of profitability. Our model demonstrates that this empire-building effect can be mitigated only if there is a further increase in foreign ownership of partially privatized large SOEs, which increases the government's willingness to issue private shares to managers. Moreover, an inverse relationship between foreign shares in domestic private firms and the optimal level of foreign shares in large SOEs produces a substitution effect. We demonstrate that it is impossible for the government to allow foreign shares on both private firms and large SOEs simultaneously because doing so will lead to disproportional losses in total social welfare. This work contributes a unique perspective to extant research, which has not systematically studied the substitution effect across ownership types in a mixed oligopoly model with reference to partial privatization and foreign ownership regulation policies in a host country.

The rest of the chapter is organized as follows: section 4.2 is the literature review; section 4.3 is devoted to our dynamic game model; section 4.4 explores the policy implication of our model with reference to the Chinese case; and finally, Section 4.5 offers our conclusions.

4.2 Literature Review

This chapter is closely linked with several mixed oligopoly studies on the inherent dynamics between the optimal degree of partial privatization and foreign ownership penetration (Corneo and Jeanne, 1994; Fjell and Pal, 1996; Long and Stahler, 2009; Mukherjee and Suetrong, 2009; Wang

and Chen, 2010; Sun et al 2005; Ogawa and Sanjo, 2007; Wang and Chen, 2011). Corneo and Jeanne (1994) argue that in an international mixed oligopoly setting, public firms' objective is expressed in the form of an export equilibrium; they also found that the volume of exports must be equal to the capacity of private firms. The theories in this chapter differ from their work in several ways. First, we demonstrate that rather than maximize social welfare, the objective of partially privatized public firm in the Chinese context is best understood via features of the empire-building activities undertaken by SOE managers, who are interested in maximizing private control over benefits through revenue maximization. Second, while our model agrees with Corneo and Jeanne (1994) that the capacity of domestic firms is contingent on the level of foreign investment (exports), we offer a detailed inherent mechanism. Specifically, the output capacity of private domestic firms is negatively determined by the foreign shares of its large-SOE competitors: these shares create a crowding-out effect between large SOEs and domestic private firms.

Other researchers have theorized the impact of foreign shares in various ways; for example, Fjell and Pal (1996) found that domestic firms' level of foreign shares determined both equilibrium price and output in the host country. However, we examine not only how foreign ownership penetration affects the equilibrium output of domestic firms, but also how the government's foreign ownership regulation policies toward domestic firms shape domestic partial privatization policies. We have also benefited from work by Long and Stahler (2009) that demonstrates that in a mixed oligopoly model, the degree of state ownership does not affect social welfare if the government chooses optimal trade instruments. The difference between that paper and our framework is that we have endogenized the degree of state ownership and detected the channel foreign ownership regulation policies enacted by the government affect state ownership.

Further adding to these discussions of foreign investment and state control, Mukherjee and Suetrong (2009) contribute the idea of a two-way causality between privatization and greenfield FDI. In their work, privatization enhances incentives for FDI, which in turn increases the level of privatization compared with the absence of FDI. Furthermore, they argue that the optimal degree of privatization depends on both the cost difference for firms as well as the entry mode of foreign firms. Our work differs in several key ways. First, we focus on the dynamics of partial privatisation rather than on privatization. Second, the entry mode of foreign firms considered in our framework is the joint venture, whereas in the model developed by Mukherjee and Suetrong (2009), FDI enters in the host market through greenfield investments. We chose the joint venture as the form of foreign capital entry because compared with greenfield investments, the former is much more commonly seen in the Chinese context. Third, in contrast to their modelling framework's emphasis on the determinants of privatization from the perspective of the cost schedules of domestic firms, we find that the optimal degree of partial privatization of a large SOE in China depends on three factors: the output capacity of private firms, the output capacity of large SOEs, and the extent to which a partially privatized large SOE is owned by foreign investors.

In making broader arguments of this kind, we have studied the work of Wang and Chen (2010), and in particular their idea that, in contrast to the exogenous number of foreign private firms, partial privatization is always the best policy for public firm in the long-run equilibrium. They further argue that the cost gap between private and public firms plays a crucial role in determining the larger long-run degree of privatization. Our framework differs from theirs in two respects. First, in their model, the degree of partial privatization depends on the critical cost difference between private and public firms, whereas the optimal level of partial privatization in this chapter depends on the level of foreign shares in the large SOE. This difference results from the fact that Wang and

Chen (2010) do not endogenize the cost difference between private and public firms. In contrast, we find the difference in cost schedules between private and public firms could itself be endogenous to the level of partial privatization. Thus, we also consider reverse-causality issues in determining the degree of optimal privatization and the cost level of domestic firms, whereas Wang and Chen's (2010) paper does not. Second, our framework assumes the joint venture will be the entry mode of foreign firms, whereas Wang and Chen (2010) assume greenfield investments made by foreign firms as their entry mode.

We have also considered factors like social efficiency in our model. For this we have turned to the work of Sun et al. (2005), which demonstrates that the employment burden's effects on the optimal state shares differ between the government and social planners when the cost efficiency of SOEs is lower than that of private firm. They make two main points: first, the socially efficient solution implies a reduction in state shares. Second, SOE output rises as foreign competition intensifies, despite a possible reduction in social efficiency. By contrast, we consider Chinese SOEs as the main carriers for SOE managers to derive personal control over benefits through empire-building investments, as opposed to research that views SOEs as embodied entities bearing the burden of employment. Although we agree with their view that a reduction in state shares could enhance social efficiency, we disagree on the sources of such social inefficiency. In Sun et al.'s (2005) paper, reduced state shares could increase social efficiency by enabling SOEs to bear less of the employment burden. However, our model suggests that social efficiency increases once state shares decrease due to the related de-regulation of foreign ownership policies bearing on partially privatized large SOEs. Furthermore, Sun et al.'s (2005) paper points out the negative relationship between SOE output and the degree of intensification of foreign competition. Our model shows increasing foreign shares of large SOE's will increase their output; we argue that the rising

proportion of foreign shares in the large SOE will generate a positive spillover effect from the foreign firms, which in turn will enhance the output capacity of the large SOE.

Building on these points, in a Hotelling-type spatial competition mixed-oligopoly model, Ogawa and Sanjo (2007) demonstrate that public firms will capture bigger market shares as the foreign shares increase in private (multinational) firms. The ideas in their paper align with our results in predicting how the level of foreign shares might affect the output of domestic firms. However, whereas their paper examines how foreign shares in domestic private firms affect domestic firm output, we focus more closely on the dynamics of foreign shares in large SOEs and the relationship between foreign ownership and the output of both domestic private and partially privatized SOEs.

Finally, this chapter relates to work by Wang and Chen (2011) that found the government should increase the degree of privatization along with the proportion of domestic ownership of multinational firms. They point out that intensive competition from private firms will gradually increase the degree of privatization, while the presence of multinational firms will lower the level of privatization. Regarding the equilibrium profits of public firms, their work argues that an increase in the domestic ownership of multinational firms will have an indeterminate effect. The framework proposed by this chapter differs in three ways: first, we analyse the dynamics of partial privatization in which the large SOE's private shares cannot be larger than 50%. This is more closely aligned with the reality of the Chinese economy, which does not legally allow the full privatization of SOEs. Second, the foreign shares owned by foreign firms large SOEs directly affects the level of private shares held by large SOEs, rather than a competition effect arising from the increased number of private firms and the presence of multinational firms. Third and last, we explicitly state that the equilibrium payoffs of large SOEs depend on three effects: (1) the empire-

building effect, (2) the positive spillover effect arising from the joint-venture entry mode of foreign firms, and (3) the partial privatization effect.

4.3 A Model

Let us consider a mixed duopoly market, where there is a partially privatized large SOE (or joint-stock public enterprise) and one private domestic firm. These two firms operate in a market with an inverse demand function given by $p=1-Q$ where p is the market price and $Q=q_1 + q_2$ is total output in this market. Given the functional form of inverse demand, it is assumed that $0 \leq Q < 1$.⁵⁵ Firm 0 is a partially privatized large SOE, which maximizes the following objective function:

$$R_0 = \underbrace{\theta\pi_0(1-z)}_{\text{profit maximizing effect}} + \underbrace{(1-\theta)TR_0}_{\text{empire building effect}}$$

(1)

The rationale behind (1) is that θ is the degree of partial privatization between 0.0 and 0.5, which is decided by the government. When $\theta=0$, the large SOE is wholly nationalized, and when $\theta=1$, the large SOE is fully privatized. However, in this chapter, θ will be never bigger than 0.5 as we study only problems with partial privatization. Hence $\theta \in [0,0.5]$. When $\theta=0$, the manager of a fully nationalized SOE is interested only in expanding the size of the firm at the expense of profitability, since s/he may not get a residual claim to the operating income of the SOE. This is the story stemming from Baumol's (1962) famous AER paper theorizing the expansion of firms. A similar approach may be found in the corporate governance literature (Tirole, 2010; Hart, 1995; Stein,2003). These papers view revenue maximization behaviour as the managers' empire-

⁵⁵ We will see later that this assumption is crucial for us to ensure the optimal level of private shares lying between 0% and 50%.

building effect, as managers without legal residual claims to operating a firm's cash flow will be interested only in maximizing revenue. Z is the proportion of foreign shares owned by the foreign firm over this partially privatized large SOE. It is noted that $0 \leq z \leq 0.5$, because the level of foreign shares that can be owned by a foreign firm in large SOEs cannot be legally higher than 50% according to China's constitution. In the later part of the sequential game model, the government would choose the optimal level of foreign shares in the large SOE to maximize aggregate social welfare.

In a nutshell, when a large SOE is partially privatized, the objective function faced by this SOE is precisely the weighted function between profits and revenue, as indicated by (1). The cost function faced by this partially privatized SOE may be expressed as follows: $C_0 = \frac{k_0(q_0)^2}{2}$, where $0.5 \leq k_0 \leq 1$, which is the cost parameter. k_0 is also inversely related to the degree of partial privatization: $k_0 = (1 - \theta)$. This inverse relationship between the cost parameter and the degree of partial privatization implies that, once SOE managers are given more private shares, they have stronger incentives to promote cost-reducing activities such as innovation.

Given this set-up, we rewrite the weighted payoff function for this partially privatized large SOE as follows:

$$R_0 = (\theta) \left[(1 - Q)q_0 - \frac{k_0(q_0)^2}{2} \right] (1 - z) + (1 - Q)q_0(1 - \theta) \quad (2)$$

Firm I is a profit-maximizing private firm that is partially owned by foreign investors. The cost function is written as follows: $C_i = \frac{k_i(q_i)^2}{2}$, where $0 \leq k_i \leq 1$. The rationale behind this is that unlike their private counterparts, large SOEs in China normally possess some non-commercial

objectives, such as political tasks imposed by the state, which raise the costs for these firms, (Lin, Cai and Li, 1999). The objective function of this private firm may be expressed as follows:

$$R_i = (1 - \alpha) \left[(1-Q)q_i - \frac{k_i(q_i)^2}{2} \right] \quad (3)$$

Note that α is the proportion of shares owned by a foreign firm over this private firm. Hence $\alpha \in [0,1]$. α_i here represents the restrictions to foreign ownership of private domestic firm I , and $\alpha_i = 0$ ($\alpha_i = 1$) represents the status in which (full) foreign ownership is prohibited (allowed). In other words, α_i represents the share of a foreign firm in a corporate joint venture. When $\alpha = 0$, foreign ownership is totally banned, and private firms are fully owned by domestic owners. When $\alpha = 1$, firms are completely owned by foreign investors. When $0 < \alpha_i < 1$, private firms are joint-ownership enterprises.

We can now introduce the objectives for the government. The government aims to maximize total social welfare. Social welfare as a whole is derived from three sources: (1) the consumer surplus (CS), (2) the payoff function of the partially privatized large SOE; and (3) the profits of the private firm that are not owned by foreign investors.⁵⁶ Social welfare may thus be written:

$$W = CS + R_0 + (1 - \alpha_i)\pi_i \quad (4)$$

where $CS = \frac{Q^2}{2}$ is the consumer surplus.

4.3.1 *Equilibrium*

The timing of our three-stage game is as follows:

⁵⁶ This is because the profits owned by foreign investors in the joint-venture ownership structure will be returned to the home countries of the FDI and therefore cannot be accounted as part of the welfare of the host countries.

Stage 1: *The government chooses the optimal level of foreign shares z^* over the partially privatized large SOE to maximize the total social welfare implied by (4).*

Stage 2: *After observing the z^* , private firm i and the partially privatized large SOE compete in a Cournot-quantity competition to choose their optimal quantity. At this stage, private firm I maximizes profits, as indicated by (3) and the partially privatized large SOE maximizes the weighted objective function implied by (2).⁵⁷*

Stage 3: *The government chooses the optimal level of private shares (θ^*) being transferred to private hands after observing the optimal level of quantity chosen respectively by the partially privatized large SOE and the domestic private firm i .*

We solve this game by backward induction.

In the third stage, the government chooses the optimal level of private shares θ^* of the partially privatized large SOE that it is willing to transfer to private hands: the optimization problem the government faces can be understood as follows:

$$\underbrace{\text{Max}}_{\theta} \theta \left[(1 - Q)q_0 - \frac{k_0(q_0)^2}{2} \right] (1 - z) + (1 - Q)q_0(1 - \theta)$$

(5)

Where $k_0 = 1 - \theta$

⁵⁷ Here we do not make the level of foreign shares over the domestic private firm endogenous because it is not decided by the government. Rather, it is a decision made by the private firm itself. The situation is different for the partially privatized large SOE in China, as the degree to which foreign firms should own local SOEs is purely determined by the government. Hence, we need to endogenize z in our dynamic game model.

Suppose we parametrize $k_i = \frac{1}{5}$ and then we take the derivative of (5) with respect to θ and make it equal to 0 to obtain the optimal level of private shares in this partially privatized large SOE.

Solving for (5), we obtain the following optimal level of private shares θ^* for this partially privatized large SOE:

$$\theta^* = \frac{(3q_0 + 2q_i - 2)z - q_0}{2(q_0z - q_0)} \quad (6)$$

Proposition 4.1 *The optimal level of partial privatization for this large SOE is:*

$$\theta^* = \frac{(3q_0 + 2q_i - 2)z - q_0}{2(q_0z - q_0)}$$

From (6), it can be seen that when $z=0$ (full prohibition of foreign shares in large SOEs), the optimal level of partial privatization is $\theta^*|_{z=0} = \frac{1}{2}$. However, when $z=0.5$ (the state allows half of the shares in large SOEs to be foreign owned), the optimal level of partial privatization is $\theta^*|_{z=\frac{1}{2}} =$

$\frac{0.5q_0 + q_i - 1}{-q_0}$ Therefore, we can derive the following lemma:

Lemma 4.1 *The optimal degree of partial privatization is higher when the government allows half of shares in the large SOE to be foreign-owned ($z = \frac{1}{2}$) than in the case where the government fully prohibits foreign ownership in this large SOE. ($z = 0$), namely*

$$\theta^*|_{z=\frac{1}{2}} - \theta^*|_{z=0} > 0$$

Lemma 4.1 indicates that, by allowing 50% of the large SOE's shares to be foreign-owned, the government is willing to adopt a higher optimal degree of partial privatization than in the case where the government fully bans foreign ownership. This is because a further increase in foreign ownership of partially privatized large SOEs will make the state less resistant to domestic partial

privatization; it could prevent profits from being transferred abroad, which would mitigate the loss in aggregate social welfare. In addition, from the perspective of large-SOE managers, the larger foreign shares of the large SOE could result in lost profits that would also decrease large-SOE managers' payoffs related to profitability. Thus, restructuring ownership by transferring some private shares to individual managers could compensate for their losses in payoffs related to profit-maximization objectives.

Equation (6) represents the optimal level of private shares (partial privatization) θ^* that must fall between 0.0 and 0.5. As $q_0 + q_i = Q \leq 1$, one can then ensure that $\theta \in [0,0.5]$. The next step is to predict how the optimal level of private shares will vary with the proportion of foreign shares owned by the foreign firm in this partially privatized large SOE. To achieve this, we take the derivative of (6) with respect to z :

$$\frac{\partial \theta^*}{\partial z} = \frac{3q_0 + 2q_i - 2}{2(q_0 z - q_0)} - \frac{[(3q_0 + 2q_i - 2)z - q_0]q_0}{2[(q_0 z - q_0)]^2} > 0 \text{ for } z \in [0,0.5].$$

(7)

From (7), we can derive the following proposition:

Proposition 4.2 *The optimal level of private shares of this partially privatized large SOE will increase as its proportion of foreign shares increases. Mathematically, $\frac{\partial \theta^*}{\partial z} > 0$.*

The idea behind proposition 4.2 is as follows: the further increase in foreign ownership of partially privatized large SOEs makes the government less resistant to domestic partial privatization by preventing profits from being transferred abroad; this would also mitigate the loss in aggregate social welfare. Second, from the perspective of large-SOE managers, larger foreign shares within the large SOE could result in losses, which would also decrease their payoff. Thus,

as suggested, restructuring ownership by transferring some private shares to individual managers could compensate for their losses in payoffs related to the profit-maximization objectives. The opposite situation applies when foreign share levels decline in this large SOE, for two reasons. First, the state will resist issuing state shares to private managers as there is no need to worry about the loss in aggregate social welfare caused by the larger foreign shares in the large SOE. Second, with fewer foreign shares, large-SOE managers will experience fewer losses in payoffs related to profit-maximization; thus, there will be fewer incentives for the government to diversify the ownership structure of large SOEs to compensate the large-SOE managers.

After computing the optimal level of private shares issued by the government in the third stage, we proceed to the second stage of our sequential game (Stage 2). In the second stage of the game, the private firm I and the partially privatized large SOE compete in a Cournot-quantity competition to choose their optimal quantity. First, we set out the respective objective function that private firm I and the partially privatized large SOE will maximize:

$$\underbrace{Max}_{q_0} \theta^* \left[(1-Q)q_0 - \frac{k_0(q_0)^2}{2} \right] (1-z) + (1-Q)q_0(1-\theta^*) \quad Max_{q_i} = (1-\alpha) \left[(1-Q)q_i - \frac{k_i(q_i)^2}{2} \right] \quad (8)$$

By plugging the optimal level of private shares indicated by (6) into the payoff function of this partially privatized large SOE, we can rewrite the objective functions indicated by (8) as follows:

$$\left\{ \begin{array}{l} \underbrace{Max}_{q_0} \left[\frac{(3q_0+2q_i-2)z-q_0}{2(q_0z-q_0)} \right] \left[(1-Q)q_0 - \frac{k_0(q_0)^2}{2} \right] (1-z) + (1-Q)q_0 \left[1 - \frac{(3q_0+2q_i-2)z-q_0}{2(q_0z-q_0)} \right] \\ \underbrace{Max}_{q_i} = (1-\alpha) \left[(1-Q)q_i - \frac{k_i(q_i)^2}{2} \right] \end{array} \right.$$

(9)

From (9), we can compute the best output response function for private firm o and the partially privatized large SOE:

$$\begin{cases} q_0 = -\frac{2[3(q_i-1)z^2-3(q_i-1)z+2q_i-2]}{9z^2-14z+9} \\ q_i = -5q_0 - 5q_i + 5 \end{cases}$$

(10)

Given these two best response functions indicated by (10), we can compute the subgame perfect Nash equilibrium output of the private firm I and the partially privatized large SOE, respectively:

$$\begin{cases} q_0^* = \frac{3z^2-3z+2}{12z^2-27z+17} \\ q_i^* = -\frac{5}{6}\left(\frac{3z^2-3z+2}{12z^2-27z+17}\right) + \frac{5}{6} \end{cases}$$

(11)

From (11), we conduct comparative static analysis to detect how the optimal output yielded by the partially privatized large SOE and the domestic private firm I varies with the proportion of shares owned by the foreign investor in this large SOE:

$$\begin{cases} \frac{dq_0^*}{dz} = -\frac{3(3z^2-3z+2)(8z-9)}{(12z^2-27z+17)^2} + \frac{3(2z-1)}{12z^2-27z+17} > 0 \text{ for } \forall z \in [0.0.5] \\ \frac{dq_i^*}{dz} = \frac{5(15z^2-18z-1)}{2(12z^2-27z+17)^2} < 0 \text{ or } \forall z \in [0.0.5] \end{cases}$$

(12)

From (12), we can state the following lemma 4.2:

Lemma 4.2 *The increase in the proportion of the foreign shares in the partially privatized large SOE would increase the optimal output and vice versa for domestic private firm i .*

The rationale for lemma 4.2 is: the rise in foreign shares in this partially privatized large SOE generate a stronger positive spillover effect from the technologically advanced foreign firm. This spillover increases the output capacity of the large SOE owing to efficiency improvements.⁵⁸ This is not surprising; much of the literature on the efficiency implications of FDI for Chinese domestic firms has found that technological spillovers from foreign FDI have significantly and positively impacted the economic performance of domestic firms in China (Yao, 2006; Liu.et.al, 2002, Whalley and Xin, 2010; Sun and Parikh, 1999; Zhang, 2001; Berthelemy and Demurger 2000). Meanwhile, as the large SOE expands its output as a result of increasing foreign shares, it crowds out the output growth of the domestic private firm i .

Plugging the sub-game perfect Nash equilibrium output indicated by (11) into the payoff function, we can obtain the implicit functional form of the equilibrium payoffs of this partially privatized large SOE:

$$R_0^*(z) = [\theta^*(z)][\pi_0^*(z)](1 - z) + TR_0(z)[1 - \theta^*(z)] \quad (13)$$

From (13), we can derive the following lemma 4.3, which shows the condition under which the equilibrium payoffs for the partially privatized large SOE might increase as the proportion of foreign shares over the partially privatized large SOE increases:

⁵⁸ We assume that the larger proportion of foreign shares in domestic firms could lead to a positive spillover effect generated by the foreign firm based on the work of Han and Ogawa (2009), which describes how the less efficient domestic private firm could observe and imitate the more advanced technology possessed by the foreign firm when the domestic firm and foreign firm form the joint venture (Muller and Schnitzer, 2006; Kinoshita, 1998, 2000; Javorcik and Spatareanu, 2008). The joint venture would also enhance the technological spillover through reverse engineering, the demonstration effect, skilled labor turnover, and the supplier-customer relationship (Cheung and Ping, 2004; Barry.et.al 2003). We do not consider the case of a negative spillover effect here, for two reasons. first, existing studies on technological spillover between domestic firms and foreign firms in China attribute improvement in domestic industrial capability, especially at the firm level, to the massive scale of FDI inflow from other countries. As this chapter focuses on China, it is reasonable to consider only the positive spillover effect. Second, in accordance with Javorcik (2004), FDI could generate a positive spillover effect on local industrial enterprises if and only if multinational firms and domestic firms form joint ventures rather than another entry mode such as greenfield investment. As our chapter considers the entry mode of foreign firms to be the joint venture, the negative spillover effect is not considered here.

Lemma 4.3 *The increase in the proportions of foreign shares in the partially privatized large SOE lead to a higher equilibrium payoff if and only if the large-SOE manager's new gains from the partial privatization effect, the positive spillover effect, and the empire-building effect strictly dominate the case and there is no increase in foreign shares to this large SOE.*

Proof of Lemma 4.3

We can first take the derivative of $R_0^*(z)$ with respect to z and obtain the following:

$$\begin{aligned} \frac{\partial R_0^*(z)}{\partial z} = & \underbrace{\theta^*[(z)]' \{[\pi_0^*(z)] + z[\pi_0^*(z)] - TR_0^*(z)\}}_{>0} + \underbrace{[TR_0^*(z)]'}_{>0} - \\ & \underbrace{\theta^*(z)[TR_0^*(z)]'}_{>0} + \underbrace{\theta^*[(z)]'[\pi_0^*(z)]}_{>0} + \underbrace{[\pi_0^*(z)]'\theta^*(z)}_{>0} - \underbrace{[\theta^*(z)][\pi_0^*(z)]}_{>0} \end{aligned} \quad (15)$$

We can rearrange (15) as follows:

$$\begin{aligned} \frac{\partial R_0^*(z)}{\partial z} = & \underbrace{\theta^*[(z)]' \{[\pi_0^*(z)] + z[\pi_0^*(z)] - TR_0^*(z)\}}_{\substack{\text{partial privatization effect} \\ \text{manager's new gains from the increase in foreign shares}}} + \underbrace{[TR_0^*(z)]'(1 - [\theta^*(z)])}_{\text{empire building effect}} + \underbrace{\theta^*[(z)]'[\pi_0^*(z)]}_{\text{partial privatization effect}} + \underbrace{[\pi_0^*(z)]'\theta^*(z)}_{\text{positive spillover effect}} - \\ & \underbrace{\{\theta^*(z)[\pi_0^*(z)]\}}_{\text{manager's old gains without the change in foreign shares}} \end{aligned} \quad (16)$$

From (16), we know that $\frac{\partial R_0^*(z)}{\partial z} > 0$ if and only if

$$\begin{aligned} & \underbrace{\theta^*[(z)]' \{[\pi_0^*(z)] + z[\pi_0^*(z)] - TR_0^*(z)\}}_{\substack{\text{partial privatization effect} \\ \text{manager's new gains from the increase in foreign shares}}} + \underbrace{[TR_0^*(z)]'(1 - [\theta^*(z)])}_{\text{empire building effect}} + \underbrace{\theta^*[(z)]'[\pi_0^*(z)]}_{\text{partial privatization effect}} + \underbrace{[\pi_0^*(z)]'\theta^*(z)}_{\text{positive spillover effect}} \\ & > \underbrace{\{\theta^*(z)[\pi_0^*(z)]\}}_{\text{manager's old gains without the change in foreign shares}} \end{aligned}$$

Proof Completes

Lemma 4.3 implies that when a large SOEs sees rising foreign shares, an additional increase in the equilibrium payoff depends on three effects. The first is the partial privatization effect: namely, an increase in the degree of partial privatization responding to the increase in foreign shares. This

is captured by $\underbrace{\theta^*[(z)]'\{\pi_0^*(z) + z[\pi_0^*(z)] - TR_0^*(z)\}}_{\text{partial privatization effect}}$ and $\underbrace{\theta^*[(z)]'[\pi_0^*(z)]}_{\text{partial privatization effect}}$. This effect occurs

because, as stated, the rise in foreign shares make the government more likely to implement a higher degree of partial privatization resulting in larger payoffs related to profitability. Second, the positive spillover effect arises from the larger foreign shares in this large SOE. This positive spillover effect is captured by the term $\underbrace{[\pi_0^*(z)]'\theta^*(z)}_{\text{positive spillover effect}}$. It results from technological

transfers from foreign firms to domestic large SOEs through joint ventures. The third effect is the empire-building effect that stems from the increase in foreign shares in this large SOE. This effect is captured by the term $\underbrace{[TR_0^*(z)]'(1 - [\theta^*(z)])}_{\text{empire building effect}}$. Such an effect follows when a higher level of foreign

shares enhances the large SOE's equilibrium output, which in turn encourages empire-building activities. $\underbrace{\{[\theta^*(z)][\pi_0^*(z)]\}}_{\text{manager' old gains without the change in foreign shares}}$ captures the large-SOE manager's initial

gains when there is no change in the SOE's foreign shares. From (16), it can be seen that this large SOE's equilibrium payoff increases along with foreign shares if and only if the additional gains from the increase in foreign shares caused by the positive spillover and empire-building effects are strictly higher than the manager's initial gains without the rise in foreign shares.

Next, we proceed to the first stage of the game, which concerns the government's design of the optimal joint-venture policy over this partially privatized large SOE to maximize aggregate social welfare W indicated by (4) (*that is, choose z^**). From (4), we can state the optimization problem faced by the government in the first stage as follows:

$$\underbrace{Max}_z W(z) = \frac{(q_i^* + q_0^*)^2}{2} + \theta^* \left[(1 - q_i^* - q_0^*)q_0^* - \frac{(1 - \theta^*)(q_0^*)^2}{2} \right] (1 - z) + (1 - q_i^* - q_0^*)q_0^*(1 - \theta^*) + (1 - \alpha_i) \left[(1 - q_i^* - q_0^*)q_i^* - \frac{k_i(q_i^*)^2}{2} \right]$$

(17)

$$\text{Where } q_i^* = -\frac{5(3z^2-3z+2)}{6(12z^2-27z+17)} + \frac{5}{6} q_0^* = \frac{3z^2-3z+2}{12z^2-27z+17} \theta^* = \frac{(3q_0+2q_i-2)z-q_0}{2(q_0z-q_0)} k_i = \frac{1}{5}$$

(18)

Plugging (18) into (17) and we can rewrite (18) as follows:

$$\begin{aligned} \underset{z}{\text{Max}} W(z) = & \frac{[Q(z)]^2}{2} + \theta^*(z) \left[[1 - Q(z)]q_0^*(z) - \frac{(1-\theta^*(z))(q_0^*(z))^2}{2} \right] (1 - z) + (1 - \\ & Q(z))q_0^*(z)(1 - \theta^*(z)) + (1 - \alpha_i)[(1 - Q(z))q_i^*(z) - \frac{(q_i^*(z))^2}{10}] \end{aligned} \quad (19)$$

From (19), we can take the derivative of (19) with respect to z and set it equal to 0 and solve it implicitly in terms of the optimal functional trajectory for the optimal proportion of foreign shares in this partially privatized large SOE:

$$\begin{aligned} Q'(z^*) + \{[\theta^*(z^*)]'\pi_0(z^*) + \pi_0'(z^*) [\theta^*(z^*)]\} - z^* [[\theta^*(z^*)\pi_0'(z^*) + \pi_0(z^*)[\theta^*(z^*)]'] + \\ \theta^*(z^*)\pi_0(z^*) + MR(z^*) - [\theta^*(z^*)]'TR(z^*) - MR(z^*)\theta^*(z^*) + \pi_i'(z^*) - \alpha_i\pi_i'(z^*)] = 0 \end{aligned} \quad (20)$$

From (20), we can rearrange it and derive the expression for z^* :

$$\begin{aligned} z^* = & \frac{Q'(z^*) + \{[\theta^*(z^*)]'\pi_0(z^*) + \pi_0'(z^*) [\theta^*(z^*)]\} + \theta^*(z^*)\pi_0(z^*) + MR(z^*) - [\theta^*(z^*)]'TR(z^*) - MR(z^*)\theta^*(z^*) + \pi_i'(z^*) - \alpha_i\pi_i'(z^*)}{[[\theta^*(z^*)\pi_0'(z^*) + \pi_0(z^*)[\theta^*(z^*)]']} \end{aligned} \quad (21)$$

(21) is the expression for the optimal proportion of foreign shares owned by the foreign investor in this large partially privatized SOE. Given (21), we are interested in how the optimal proportion of foreign shares owned by the foreign investor in this large partially privatized SOE (z^*) varies

along with the foreign shares owned by the foreign investor in the private firm i . (α_i). Taking the derivative of (21) with respect to α_i , we obtain the following:

$$\frac{\partial z^*}{\partial \alpha_i} = - \frac{\pi_i'(z^*)}{[[\theta^*(z^*)\pi_0'(z^*) + \pi_0(z^*)[\theta^*(z^*)]']]} \quad (22)$$

Since $\pi_i'(z^*) < 0$, $[\theta^*(z^*)]' > 0$, $\pi_0'(z^*) > 0$, we must have $\frac{\partial z^*}{\partial \alpha_i} < 0$

The following proposition 4.3 can thus be derived:

Proposition 4.3 *The increase in foreign shares owned by the foreign firm in domestic firm I leads to a decline in the optimal proportion of foreign shares owned by the foreign firm in this partially privatized large SOE. Namely, $\frac{\partial z^*}{\partial \alpha_i} < 0$*

Proposition 4.3 assumes a so-called *substitution effect* in terms of the foreign ownership regulation policies across firms with various ownership structures. The rationale is that, from the perspective of the government, allowing more foreign shares in firms regardless of ownership structure will lead to welfare losses as the profits earned by foreign firms will be transferred abroad, in turn reducing China's overall social welfare. Thus, given that the government has designed its optimal joint-venture policy towards large SOEs, it is unlikely to allow a simultaneous increase in foreign shares in both private firms and large SOEs, as doing so will cause a disproportional loss of social welfare.

4.4 Further Discussions and Some Implications of the Model – the Case of China

According to proposition 4.2, the optimal level of private shares held by the large-SOE manager will rise alongside the proportion of foreign shares owned by the foreign firm in the

partially privatized large SOE. This is largely in line with conventional views that the presence of multinational firms leads to greater liberalization in host countries, including higher levels of privatization (Norback and Persson, 2001; Sader, 1993). The Chinese case is not exceptional. The long-lasting mixed ownership reform of large SOEs in China is driven by joint ventures with foreign firms (Hu, 2000; Garnaut et al., 2006). The formation of joint ventures between the large SOEs and foreign investors provides incentives for the former to diversify the ownership structure and accelerate the ownership-restructuring process.

Our three-stage dynamic game model demonstrates that, on the one hand, rising foreign ownership over partially privatized large SOEs makes the government less resistant to domestic partial privatization as it can keep profits at home and thus mitigate social welfare losses. On the other hand, from the perspective of large-SOE managers, larger foreign shares in the large SOE result in lost domestic profits, which decrease large-SOE managers' payoffs. Thus, issuing some private shares to individual managers could compensate for their losses in the parts of the payoff related to profit-maximization objectives.

Several studies corroborate our argument. According to Nolan and Rui (2004), Nolan (1996), and Nolan and Yeung (2001a; 2001b), ever since the beginning of the large-SOE reforms in China in the 1980s, some representative large SOEs, including Shenhua Group, Shougang Group, and Sanjiu Group, despite the absence of outright privatization, have all restructured their ownership by downsizing employment in the core business and transferring certain state shares to large-SOE managers. As argued by Nolan (2014) and Nolan and Zhang (2003), such mixed ownership restructuring (the so-called corporatization process for large SOEs in China) is driven mainly by the state's strategic policy responses to the large SOEs' increasing degree of international cooperation with multinational firms. Nolan and Zhang (2003) attribute the corporatization process

after the 2000s to the state's commitment to building globally competitive state-owned firms, which they did by selecting partners for major international joint ventures after China's entry into the World Trade Organization (WTO). Likewise, Nolan and Wang (1999) link growth in local large SOEs through market-oriented reforms, including ownership restructuring, to their strategic integration into the global economy, including the formation of international joint ventures.

Lemma 4.2 implies a positive spillover effect caused by the increasing level of foreign shares owned by foreign firms in partially privatized large SOEs. A positive spillover effect will likely lead to the enhanced economic efficiency of large SOEs and thus expanded output. Because the entry mode for foreign investors in our model is assumed to be the joint venture, the positive spillover effect is largely generated from technologically advanced firms. Lemma 4.2 is consistent with the fact that, since the late 1990s, the reversal of efficiency declines in large SOEs in China has been largely attributed to its ownership restructuring and corporatization reforms, including their strategic formation of international joint ventures with foreign firms and/or increasing reliance on the external foreign capital market to capitalize the assets of large SOEs. Surprisingly, these economic phenomena have not been given enough attention in the literature. Few studies that are supportive of these stylized facts is worth mentioning here. Aivazian et al. (2005) found that the corporatization reform initiated in the late 1990s, including the formation of international joint ventures in the absence of full privatization, has had a significantly positive impact on sales in large SOEs. Their argument demonstrates that the increased efficiency of large SOEs in China in the late 1990s was largely caused by a positive spillover effect from the formation of international joint ventures between large SOEs and multinational firms. More interestingly, using quarterly data from 1994 Q1 through 2014 Q4, Chen et al. (2017) show that FDI in China in the form of joint ventures has had a crowding-in effect on domestic firms, whereas wholly foreign-

funded foreign enterprises have had a crowding-out effect. Their findings are corroborated by the results derived from Lemma 4.2, which show that increasing foreign shares in partially privatized large SOEs in the form of joint ventures results in rising output from these firms.

Another important implication of lemma 4.2 is that the growth of the large SOEs relying on joint ventures with foreign firms might crowd-out the market shares of private domestic firms. Such a crowding-out effect between large SOEs and private firms has been frequently discussed in the recent literature (Xu and Yan, 2014; Tan, Huang and Woo, 2014). For instance, Xu and Yan (2014) demonstrate that public investment in the provision of private goods in industry and commerce through large SOEs has a significant crowding-out effect on private firms. Likewise, Tan, Huang and Woo (2014) state that sectors dominated by large SOEs lead to zombie firms, which also crowd-out the growth of private firms.

Proposition 4.3 illustrates the relevance of the so-called substitution effect regarding foreign ownership regulation policies towards firms with varying ownership structures. According to proposition 4.3, increases of foreign ownership of domestic private firms correspond with declines in the optimal level of shares owned by foreign firms in large SOEs. The policy implication is that increased foreign ownership of domestic firms leads to increased profits in the domestic firm which are then transferred abroad. This cycle decreases the aggregate social welfare of the host country. In response, the government restricts foreign shares in large SOEs to prevent further profits from escaping, which could also potentially cause disproportional losses in social welfare in the host country. The direct reason for proposition 4.3 is that, given an economy consisting of both state and private sectors, it is not necessarily the case that liberalizing all sectors of the economy is an optimal policy choice for the host country government, as doing so will cause major losses in social welfare. This argument is in line with the re-nationalization of large SOEs in China

after 2008 argued by Huang et al. (2014). Their work describes the large-scale re-nationalization of firms in China in the mid-2000s after China's entry into the WTO. However, although it is true the degree of liberalization of the Chinese economy, including more FDI inflows, has increased after China's entry into the WTO, this liberalization has not applied to large SOEs. Instead the Chinese government imposed even stricter foreign ownership regulations on large SOEs. This is not surprising because, as predicted by our model, relaxing foreign ownership regulation policies towards domestic private firms without restricting foreign shares in large SOEs would lead to major social welfare losses.

4.5 Conclusions

This chapter provided a unified theoretical framework for examining the relationship between optimal partial privatization policies, the regulation of foreign ownership of domestic firms, and the output dynamics of domestic firms (both private and SOE). It offered new insights into how the partial privatization policies for large SOEs in China might respond to the change in foreign ownership regulation policies for domestic firms.

We demonstrated in a three-stage sequential game model that the optimal degree of partial privatization will vary positively with the increasing degree of foreign ownership shares in large SOEs. From the perspective of large-SOE managers, larger foreign shares in large SOEs curtail profits, which decrease their payoffs. Undertaking ownership restructuring in the area of foreign ownership shares by transferring some private shares to individual managers could compensate for them for these losses. From the perspective of the government, further increases in foreign ownership of partially privatized large SOEs lower the barriers to domestic partial privatization, and may help prevent profits from being transferred abroad, thus mitigating their losses in aggregate social welfare. Moreover, in terms of the output dynamics, we show that the rise in

foreign shares in partially privatized large SOEs leads to rising output from the positive spillover effect. However, this comes at a price, as the rising output in large SOEs resulting from relaxed regulation over foreign ownership policies will crowd out domestic private firms' output growth. We ask whether the equilibrium payoff for large-SOE managers will increase along with foreign shares, and find it depends on three effects: the partial privatization effect, the positive spillover effect, and the empire-building effect. These effects contribute to a broader, so-called "substitution effect," in terms of foreign ownership regulation of domestic private firms and partially privatized large SOEs. Our work suggests that to avoid disproportional losses in social welfare, it is impossible for the government to allow the simultaneous rise in foreign shares in both domestic and partially privatized large SOEs.

Chapter 5. Conclusions.

5.1 The main contributions of this thesis

The main contributions of this research will be discussed in this section. First, in chapter 2, we demonstrate in a principal-agent model that, for large SOEs operating in China, there could emerge a trade-off between loss of control by SASAC officials and initiative-taking by large-SOE managers. We show that an over-decentralized internal governance structure in large SOEs could lead to ex-post empire-building behaviours, which could potentially conflict with the overall organizational interests of firms. On the other hand, the adoption of an over-centralized organizational structure in large SOEs could undermine local initiatives taken by managers. We also study how a such trade-off could be affected by the degree of partial privatization of large SOEs. We found that an increase in the degree of partial privatisation of large SOEs could mitigate agency conflicts between large-SOE managers and SASAC officials. The most important technical contribution made by chapter 2 is that we introduce the constrained-delegation mechanism as an organizational structure which could play a very effective role in terms of resolving the trade-off in the loss of control between SASAC officials and large-SOE managers. This kind of study contributes to several fields: to the operations of large SOEs in China from the angle of partial privatization; to the literature on large-SOE reforms in China; and to our understanding of why the installation of party committees in China's large SOEs could be a sub-optimal institutional arrangement given its political infeasibility.

Chapter 3 builds on this work in several ways. First, it outlines the importance of the nature of the local state in China in relation to state sectors. Second, it endogenizes the emerging coexistence between economic decentralization and political centralization of the Chinese

economy, the so-called “decentralized authoritarianism,” from the unique angle of large local SOEs’ tax revenue contributions to the central-local shared tax scheme under the tax-sharing reform initiated in 1994. We argue that in response to the tax-sharing reform of 1994, the local state should surrender most of its central-local shared tax revenue to the central state. This loss, however, is offset by the benefits of greater efficiency; it compensates the central state for losses incurred through the loss of fiscal control. As a result, a *strategic complementary* relationship emerges in terms of fiscal control between the central and the local state that contributes to the policy burden literature. We view the *strategic complementary relationship* in terms of fiscal control between the central and the local state would also determine the fact that the central state will be also unwilling to remove the strategic policy burdens borne by large local SOEs. Our model is a major departure from existing work on policy burdens that contends that large SOEs can improve their efficiency only through removing such policy burdens.

Chapter 4 makes one of the first theoretical attempts to extend the partial privatization literature into an open economy setting. It demonstrates in a three-stage sequential game model that the optimal degree of partial privatization will vary positively with the increasing foreign shares in large SOEs in the presence of the empire-building effect. It also contributes to the mixed oligopoly literature by unlocking the dynamic relationship between foreign shares in private firms and in large SOEs (the so-called *substitution effect*). Chapter 4 also reveals the welfare nature of the government in the sense that we assume the objective function of government to be the maximization of aggregate social welfare. This assumption is crucial for analysing the channels through which the substitution effect and the empire-building effect take place that are discussed in the chapter. Our work here integrates the nature of the state literature in development studies with the mixed-oligopoly literature and the partial privatization literature.

5.2 Suggestions for Future Research

This chapter leads to several important recommendations for future research. First, we should further extend the single principal-agent problem discussed in chapter 2 to the multiple principal-agent case. This is to say, rather than having SASAC officials as the only principals in our model, we could have multiple principals in two cases. In one of the cases, we could include state-owned asset investment companies or party committee secretaries, which could function as intermediate principals between SASAC officials and large-SOE managers. In the other case, we could assume that there are multiple SASAC officials who have the right to monitor large-SOE managers.

Extending the single principal-agent problem to the multiple principal agent one could have a sharp impact on the results. For instance, if large-SOE managers face multiple SASAC officials who have the right to monitor their ex-post managerial behaviours, the managers may have opportunities to alternate between SASAC officials. In this case, one must incorporate the optimal switching problem into the existing model. Once the model accounts for the switching costs faced by large-SOE managers in terms of selecting their preferred principals, the objective function for large-SOE managers should be modified to reflect their incurred switching costs. Considering the switching-cost dynamics might further incline managers to undertake empire-building activities because different types of SASAC officials could implement different degrees of monitoring over managers. Second, the dynamic model should be used to extend the existing model to the case of a multiple principals-agent model, because large-SOE managers must also make decisions in terms of switching between principals. This means one must consider the sequential decision-making process during which large-SOE managers make their switching decisions after they observe the types of SASAC officials who will monitor them.

Another agenda for future research from chapter 2 involves extending the single-task type objective function of SASAC officials into a multi-task one. That is to say, instead of assuming that SASAC officials care only about the appreciation of state-owned assets that is proportional to the profitability of large SOEs, SASAC officials could be care about their own personal political benefits rather than strictly fulfilling their responsibility to maintain the appreciation of state-owned assets. Once we consider the weighted objective functions of SASAC officials, their personal payoff structures would likely change in response to the adoption of organizational structures within large SOEs. One possible outcome is eroding the benefits of centralizing the decision-making authority to SASAC officials; an overly centralized governance structure in large SOEs will undermine managers' incentives to take the initiative with local investments, and make it more possible for SASAC officials to attain personal political benefits that deviate from organizational interests.

The most promising future work from Chapter 3 centers on endogenizing the allocation of political decision-making authority to the central state instead of assuming the centralization of political decision-making authority as exogenously given. It would be interesting to see whether fiscal decentralization could still emerge ex-post when the central state does not have the ex-ante political authority to pick their preferred investment projects (a question of political decentralization). Although assuming the allocation of political authority to be ex-ante decentralized is unrealistic given that the authoritarian system in China has prevailed for decades, from an organizational economics point of view it is still worth asking whether a politically decentralized central state is willing to delegate fiscal autonomy to localities even if they are already compensated heavily by the local state. Furthermore, the extension model proposed in chapter 3 to examine wage levels received by local government officials could be further specified

by splitting it into two parts. One part would assume a fixed wage, which is unrelated to the level of tax revenue with which the local state could compensate the central state. The wage level for the other part would depend on a taxation compensation channel through which the local state surrenders most of its central-local shared tax revenues from large local SOEs to the central state.

We would also like to develop a much more complex version of the weighted objective function from Chapter 4. The current version links partial privatization only to the profit maximization and revenue maximization caused by large-SOE managers' empire-building activities. However, the welfare implications of large SOEs should also be incorporated into the weighted objective function. That is to say, large-SOE managers might have a multi-tasked objective function that is inclusive of three elements: profitability, total revenue, and social welfare. Chapter 4 also considers only a mixed-duopoly case under which one private firm competes with one partially privatized large SOE. Such a setting could be generalized to the mixed-oligopoly case in which there is one partially privatized large SOE competing with another identical private firm. Generalizing the setting to the n-firm's mixed-oligopoly case would allow us to further detect the channel through which changes in market structure affect the degree of partial privatization, the extent of foreign shares in large SOEs, and the equilibrium output or profits of large SOEs. It would also be interesting to extend the setting of the model in chapter 4 into cases where domestic private firms and large SOEs are vertically linked. The model would then assume there is a vertically specialized industrial structure in the Chinese economy in which large SOEs operate within upstream industries while private firms operate within downstream industries. Working from the basis of such a vertical production structure with heterogeneous ownership assignments stretching along the domestic industry chains of the Chinese economy would allow us to

ask relevant questions regarding the optimal degree of partial privatization or of foreign shares in upstream large SOEs in China.

Other research agendas on state-sector governance in China could be also explored in greater detail. First, this thesis does not provide a theoretical framework in which to explain the governance structure of state sectors in China from an industrial structure perspective. For instance, it is widely known that there is an uneven division of gains along Chinese industrial chains between upstream monopolistic state-sector firms and downstream competitive private firms. Although the pioneering work of Li et al. (2013) has constructed a general equilibrium model that is consistent with this Chinese style of state-capitalist institutions, a model that is focused more sharply on profit-sharing between the two sectors still needs to be developed to gather empirical evidence. Second, we have not addressed how certain state-owned ownership structures may solve under-investment problems created by purely private ownership and help a developing economy like China jump out of the low equilibrium growth trap. In other words, when one talks about the governance structure of state sectors, it is worth investigating whether such structures could be growth-enhancing or not. This topic is crucial for future research because it has very far-reaching implications in terms of the macro-development nexus between the state sector and developing economies.

5.3 Policy Implications of this Research

One of the most important policy implications from chapter 2 is that corporate governance reforms of large SOEs in China should resolve the trade-off between the loss of control by SASAC officials and initiative-taking by large-SOE managers. Having said this, neither full centralization nor full decentralization can deliver good corporate performance in terms of full elimination of agency conflicts between SASAC officials and large-SOE managers. One feasible policy recommendation,

as suggested at the end of the chapter 2, is to introduce the constrained-delegation mechanism to China's large SOEs. The corporate governance reforms initiated by the central government in China, including the establishment of middle-layer state-owned assets companies throughout its state sector governance hierarchy as well as the introduction of party committees in China's large SOEs can be understood as two separate bodies that reflect the split nature of the constrained-delegation mechanism. Given that the central idea of the constrained-delegation mechanism is to partially centralize the decision-making authority in China's large SOEs by ruling out the empire-building investment choices of large-SOE managers, party committees in large SOEs or middle-layer state-owned asset companies may help monitor the ex-post moral hazard behaviour of large-SOE managers. Briefly, the most important insight for policy in chapter 2 is that agency conflicts in both fully bureaucratic control over large SOEs (full centralization) or fully managerial control over large SOEs (full decentralization) could lead to inefficient outcomes.

Second, chapter 2 also holds policy implications for implementing partial privatization of large SOEs. Transferring some private shares could mitigate agency conflicts in terms of giving private-ownership incentives to large-SOE managers. This implies that transferring certain private shares to large-SOE managers to increase their commitment to profit maximization may improve the efficiency of large SOEs. Chapter 2 also demonstrates a benefit collusion mechanism through which both SASAC officials and large-SOE managers might jointly derive interests from empire-building investment projects. In this case, constrained delegation as an organizational structure might not outperform the decentralized governance structure. Also, the function of partial privatization in terms of ownership incentives may not be necessary in the presence of collusion between SASAC officials and large-SOE managers. If the central government in China is not willing to implement a constrained-delegation mechanism or partial privatization, then allowing a

certain degree of collusion between SASAC officials and large-SOE managers might resolve agency conflict problems. However, this might not be politically feasible as such a collusion mechanism could lead to widespread corruption among government officials, which might delegitimize the central government in China.

The main policy implication of Chapter 3 is that it is necessary to maintain the strategic status of the operations of large SOEs in China. This is because large local SOEs play a key role in allowing the local state to collect central-local shared tax revenues from and surrender most of these taxes to the central state in exchange for the return of local fiscal autonomy. One policy lesson is that the coexistence of fiscal decentralization and political centralization in the so-called decentralized authoritarian system of the Chinese economy is determined by the level of central-shared tax revenues stemming from local capital and resource-intensive large SOEs that the central state could receive from the local state. If fiscal decentralization is one of the most important drivers of the growth of the Chinese economy, then it is crucial to maintain such a system. Chapter 3 also notes that in the tax-sharing reform of 1994, the *strategic substitutive* relationship between central and local states on fiscal control will turn into a *strategic complementary* relationship. This means that the increased fiscal control (or taxation capacity) exercised by the local state would lead to a higher taxation capacity for the central state. Thus central state could not have developed its fiscal strengths without the tax-sharing reform initiated in 1994. From this perspective, to maintain the long-term sustainable growth of the Chinese economy, one must ensure an incentive compatibility mechanism between the central and local states in terms of the *strategic complementary* relationship regarding fiscal control. This cannot happen if large local SOEs are not given a strategic role in capital- and resource-intensive industries in local regions.

Chapter 4 also holds several productive policy implications. First, it sheds light on how local governments in China could optimally design their foreign ownership regulation policies for Chinese domestic firms. The increase in foreign shares in large SOEs has been demonstrated to increase partial privatization. Given the empire-building tendency of managers, the government in China might be more likely to implement partial privatization if they decide to further liberalize the economy by allowing more shares in large SOEs to be owned by foreign firms. Another policy implication regards the substitution effect: local governments in China should not liberalize the economy too much, for example, by simultaneously increasing foreign shares in domestic private firms and large SOEs for the sake of avoiding welfare losses. As suggested by proposition 4.3, this will avoid disproportional welfare losses caused by profit-stealing by foreign firms, as any increase in foreign shares in large SOEs will lead to a corresponding decline in foreign shares in domestic private firms. Further, the equilibrium analysis of large SOEs' output and profits from Chapter 4 also suggests a positive spillover effect in which increasing the number of shares owned by foreign firms enhances both equilibrium profits and the outputs of large SOEs. In this case, encouraging a certain proportion of shares in large SOEs to be foreign owned is crucial for the technological improvement that produce cost-saving efficiencies as well as related knowledge transfers from multinational firms to large domestic SOEs. From this point of view, local governments in China should encourage a certain level of deregulation of foreign ownership of large SOEs, such as promoting joint-venture policies.

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