Privatisation with Chinese Characteristics? A Dynamic Panel Analysis of the Privatisation in Chinese State Sector (1994-2008)[1,2]

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Abstract. This paper identifies the privatisation dynamics in China by a panel dataset covering 31 provinces during 1994-2008. Nine theoretical hypotheses of transitional economics are generalised from literature and tested by various estimators. Empirical evidence fails to challenge conventional orthodoxy. Chinese privatisation is proven to be a complex process driven and balanced by a number of stimulants. It is this multi-level equilibrium that characterises the privatisation in Chinese state sector after 1994.

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1. Introduction

For advanced economies, privatisation is probably one among many tools to improve efficiency and rescue a bankrupting state-owned enterprise (SOE). For transitional economies, however, privatisation could be a vital therapy to save an economy from collapsing entirely. Chinese privatisation is closer to the later. Core task of this transition from central-commanded to market-oriented economy is the nationwide transformation from the state to private ownership. Unlike the big-bang approach adopted in the Eastern European and former Soviet Union countries, the ownership transformation in China since late 1970s was characterised by the gradualism, which placed the shrinking process of the state sector in the centre. Chinese state sector has gone through a circle of expansion and contraction in the past four decades (Figure 1). During the two and a half decades after 1970, 60.6 thousand state-owned enterprises were created and 256.2 million state-owned employees were employed. This expansion period ended by the implementation of a massive privatisation in the mid-1990s and the following contraction saw 97.3 thousand enterprises abandoned and 277.8 million employees dismissed by the state until 2008. This huge transition was not achieved in a balanced way. Figure 2 sees a clear

concentration of privatisation among coastal provinces, where marketisation was initiated in earlier days than inland provinces. Figure 3 shows that the downsizing of state employment was particularly concentrated on Liaoning, Heilongjiang and Sichuan provinces, which have strong heritage of military industries.

(FIGURE 1, 2 AND 3 ABOUT HERE)

Nine theoretical hypotheses are generalized from the recent discussions in privatisation literature before being placed into a multi-level analytical framework for empirical testing. The panel, covering the provincial data of thirty-one Chinese provinces in the 1994-2008 period, is collected from various official statistics released by the Chinese National Bureau of Statistics. Preferable estimator is the system generalized method of moments (system-GMM), introduced by Arellano and Bond (M. Arellano and S. Bond, 1991, M. Arellano and O. Bover, 1995) and further developed by Blundell and Bond (1998). This testing tends to bridge the privatisation theories and the real practices in China.

Below part is structured into four sections. Section 2 lists an integrated review on the literature from where testing hypotheses are generated. Section 3 includes a modified analytical framework, specification of econometrics and a data summary. A complex dynamics balanced under a multi-level equilibrium in the process as the major finding is argued in the second 4, and the final section concludes the characteristics of Chinese privatisation indentified by this research.

2. Literature review and hypotheses

Empirical studies identifying the determinants of privatisation are rarely seen in the 1990s. Ramamurti's (1992) work was one of the pioneering papers in this field. With a logit model having data covering 83 developing countries during 1965-1985, he measured the correlation between financial pressure and the initiative of privatisation. Privatisation was assumed to be a policy tool for government to respond to macroeconomic pressure at a difficult time. So the fiscal stringency should be the explanation of the prevalence of privatisation among developing countries. Lopez-de-Silanes, Shleifer and Vishny (1997) asked more questions than Ramamurti in theories. With U.S. county-level governments' data on the provision record of private services, they expanded concerns from macroeconomics to political economy. They suggested that the removal of soft budget constraint will urge local governments to contract out public services to private providers. They also shed light on the role of political ideology by asking whether people's voting behaviour, like voting for the Republican Party which is traditionally inclined to the free market doctrine, would have effects to privatising public provision. Li and Xu (2002) conducted a similar

research focusing particularly on the telecommunication sector in 45 countries, arguing the positive impacts toward privatisation brought by the worsening deficit problem and the inclination of right-wing ideology. They also stressed the international pressure came from the stabilisation therapy advocated by the World Bank and the International Monetary Fund (IMF) in the 1990s. A possible tradeoff of the scale between public and private sectors in developing economies was argued by Plane (1997), whose empirical evidence covered data from 35 countries in the 1988-1992 period. The later on, Bortolotti, Fantini and Siniscalco (2003) shifted the focus to the market development and suggested that a well-developed stock market would encourage state enterprises to go public listing. They also highlighted the influence of institutional context, in which they thought the legal system of common law would welcome more transactions of privatisation than the French or German alike legal system.

Since 2000, researchers have paid more attention on micro conditions for privatisation. Li and Rozelle (2000) contributed an early empirical evidence to the study of Chinese privatisation, measuring the impact of management characters and firm conditions to the likelihood of privatisation with a survey data collected from 168 TVEs in rural Jiangsu and Zhejiang in the mid-1990s. Wang, Li and Lei (2001) examined the efficiency and revenue effects with a rare database coving data from 657 SOEs during 1980-1997, and they wanted to know if privatisation was triggered by the expectation of the efficiency improvement or of the political interests aftermath.[4] Competition hypothesis was first tested by Li (2003a), who thought that the intensified competition in product markets squeezed the profit margin of SOEs and led to privatisation reform. He also started to distinguish the impacts from upper and lower level of governments. Li, Vertinsky and Zhou (2004) further developed this argument and drew attention to the role of government intervention. They argued that the rent-seeking intervention from the upper level governments would be a constraint for privatisation, and more successful cases would be found if the process was supervised by lower level governments. In this work with 13,520 SOE samples, they also offered an early version of institutional hypothesis, in which the institutional change was measured by the improvement of legal and physical infrastructure. Another constraint factor may come from banks' attitude toward privatisation. Brandt, Li and Roberts (2005) argued that since the accumulation of bad loans has become the biggest worry for state banks, who might want to veto privatisation transactions for this purpose. Also, the crowded-out credits in the capital market would reduce the possibility for privatisation transactions to be funded. The excessive redundancy in

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[4] This dataset is unique because it is the only one firm-level dataset in the literature that records detailed micro data of a certain number of local SOEs from the early period of Chinese Reform.

the labour force of SOEs is the next serious constraint, argued by Guo and Yao (2005). For the sake of social stability, the job security of state workers was a major concern for local governments, even though this political stability is at the expanse of economic efficiency. Liu, Sun and Woo (2006) offered an integrated version of hypothesis covering some assumptions in the above. The success or privatisation, they argued, depends on the meeting of managerial cooperation, workers compensation, and the debt-asset ratio within a firm. Moreover, local officials will be motivated by the expectation of higher sales, faster growth and sustained benefits in the future return. Now we move to the hypothesis setting based on detailed discussion of the above literature.

The correlation between the likelihood of privatisation and the character of human capital within SOEs was first tested in Li and Rozelle's (2000) panel estimation, where they found those SOEs having managers with longer experience serving as local officials were less likely to be privatized. This argument was theorised in Li's later work (2003b), which based on human capital theory and predicted that state ownership will be released when state managers are losing comparative advantage in allocating and distributing economic resources through their personal connections in the government (H. Y. Chen and S. Rozelle, 1999, H. H. Jin and Y. Y. Qian, 1998). Based on a game model, Brandt's work (2005) also proved that the likelihood of privatisation will increase when the management level is endowed with better human capital. However, there is no feasibility to trace personnel information of all SOE managers due to the lack of such data released in the public statistics.[5] The most relevant data available is the labour productivity, which can capture the changing information of human capital level within SOEs.

(1) *Human capital hypothesis*: More decreases of the state-owned enterprises and employees should be observed with the improving condition of human capital within SOEs.

Next, the firm size has been proved to be correlated with the privatisation in empirical studies (R. Ramamurti, 2000). Small SOEs are easier to be privatised than large ones for following reasons. From the buyer side, a small firm usually means fewer managerial challenges, technical requirements and, more importantly, cheaper in sale price. Even under a market with weak institutional infrastructure, it is easier for a small firm to get internally financed. Small size also make them flexible to tackle difficulties caused by the separation of ownership and management (J. F. Earle et al., 1994). In addition, from the political side, privatising small SOEs is less likely

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[5] The best data a researcher can get from public statistics is from two tables listing the basic conditions of civil servants and administrative personnel in enterprises, but these two tables are only published once in the *China Statistical Yearbook 1996* with the data in 1994 across 14 provinces according to a sampling survey. It is not qualified for a panel analysis.

to cause political resistance because these firms are less visible to the public attention and their workers have relatively limited political clout. Clarke and Cull (2002) confirmed that Argentine banks with larger size were less likely to be privatised in late 1990s. Li (2003a) used the employment scale of the state sector as the variable of firm size and found that the privatisation evidence in rural China was supportive to this argument. His variable definition is followed by the later examination in this paper.

(2) *Firm size hypothesis*: More decreases of the state-owned enterprises and employees should be observed when the average size of SOEs is decreasing.

When establishing a general theory of state behaviour, Yarrow (1999) argued that privatisation would tend to occur earlier in less efficient SOEs for reducing the cost of government finance. Also, the constant losses of SOEs cannot provide enough patronage but impose high costs to politicians. So, argued by Clarke and Cull (2002), the institutional change that reduces the comparative advantage of public ownership would eventually push less efficient SOEs to the edge of privatisation. Li's (2005) optimal timing model revealed this dynamics. He pointed to a positive relationship between income expectation and privatisation, suggesting that poorly performing SOEs are likely to be privatised earlier because more tax revenue is expected in reward. In other words, profitable SOEs are more likely to be kept in state hands to prevent income reduction. Another bargaining model of game theory inferred a similar negative relationship between efficiency and privatisation (H. L. Wang, D. K. Li and D. M. Lei, 2001). Nevertheless, there are counterarguments (L. Brandt, H. B. Li and J. Roberts, 2005, K. Guo and Y. Yao, 2005, N. Gupta et al., 2008). Considering bank's role in the process, Brandt et al. (2005) predicted that privatisation may occur under two conditions. First, banks are happy to lend to profitable private firms but reluctant to lend to SOEs. Or, secondly, banks are still happy to fund SOEs but local leaders find privatisation more profitable and insist on doing so. Therefore, profitability should yield a positive correlation with the likelihood of privatisation. This argument may be better addressed by the so-called 'ice-pop effect,' which says: if SOEs are always kept in state's hands, frequent mismanagement and possible corruption will eventually make productive assets melt down (R. Garnaut et al., 2003). Guo and Yao (2005) borrowed the old Chinese saying 'the prettier daughter marries first' to describe this effect and further argued that if local governments do really care about efficiency then they will take the ice-pop effect into consideration and privatise better performing SOEs as soon as possible in order to save valuable state assets. Gupta and his colleagues (2008) supported this argument from a political perspective. They believed that privatisation is a platform for governments to please voters in election, because people will value profitable SOEs more than poorly performing ones.

If a government is interested in pursuing popularity, it should be keen to hand efficient SOEs over to the people. In short, there are two predictions contradictory to each other in the above. Which argument accounts? Should poorly performing or profitable SOEs to be privatised first? The hypothesis set here is open to the answer, and the efficiency variable will be represented by the ratio of asset contribution to profits in provinces.

(3) *Efficiency hypothesis*: More decreases of the state-owned enterprises and employees should be observed if the economic efficiency of SOEs is improving.

Just as argued by Ramamurti (2000), '[n]owhere in the literature is there any theoretical argument in favour of state ownership of firms in competitive market,' privatisation seems to be a natural solution to improve the competitiveness of SOEs. This assumption between competition and privatisation has several origins in theories. Agency argument suggests that those SOEs in competitive markets are more likely to be privatized than those in monopolistic markets because the profit margin squeezed by competition will amplify the problem of agency cost.[6] The second argument is given by the theory of ambiguous property rights (D. D. Li, 1996), suggesting that government ownership is a reluctant response to the imperfections of market functions and also the best solution to tackle various difficulties in transactions.[7] Yet, this advantage of ambiguity, the rationale of public ownership, will be consumed by intensive competition, which will result in a new incentive arrangement that is more efficient. The third argument is based on the assumption of a revenue-maximising bureaucrat (S. M. Li et al., 2000), whose revenue margin is highly squeezed by intensive competition in product market.[8] Hence, privatisation is used to maximise revenue to secure the interests for local bureaucrats. Similarly, Li et al. (2004) argued that the market competition will encourage the search for most effective institutional arrangements; as once theorized by Glaeser and Scheinkman's (1996) model that private ownership will better bridge the information gap between consumer demand and production cost especially in somewhere the uncertainty or ignorance is great. Following above logics, non-state share of the gross value of industrial output will be used to represent the intensiveness of competition in the product market.

(4) *Market competition hypothesis*: More decreases of the state-owned enterprises and employees should be observed when the product market is becoming more competitive.

Examining the privatisation wave among 83 developing countries after mid 1960s,

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[6] Agency cost is caused by the information asymmetry between the owner and the manager who have innate conflict in interests.

[7] The foundation of property right theory is the incentive arrangement, which attributes the inefficiency of public ownership to the lack of right to claim residuals.

[8] The basic difference between a public bureaucrat and a private manager, in the theory of public choice, is that the former is closer to a budget-maximiser than a profit-maximiser.

Ramamurti (1992) provided a financial pressure argument that those countries with worse budget deficits, larger domestic or external debts have higher probability to take privatisation for raising short-term cash flows. This assumption was later theorised by Yarrow's (1999) microeconomic equilibrium model, in which the rising cost in government finance, due to a higher public expenditure, would trigger ownership transformation for getting back the balance of books. Privatisation is thus preceded by a period of increasing financial stringency. A stronger version of this hypothesis is the crisis argument, in which privatisation is urgently needed as a therapy to stabilise macroeconomic crises, such as the hyperinflation or severe balance-of-payments problems (R. Ramamurti, 2000). Money that can be directly collected from privatisation sales is one reason. But, the more important one is, privatisation is frequently regarded as a condition when an economy expects to seek the last-resort loans from the IMF or the World Bank (G. Roland, 2001, C. Zinnes et al., 2001). However, there are counterarguments. Li and Xu (2004) casted a 'cash cow argument,' in which local bureaucrats are possibly ignorant to fiscal deficit in attempts to maintain a rent-seeking structure in the management of state sector. They argued that, as long as the load of public debt is manageable, local bureaucrats would tend to keep state monopoly because privatisation may block their channel to extract rents. In this case, SOEs may be treated like cash cows by local bureaucrats, who actually treasure the cash flows in the long term much more than the transaction profits of privatisation in the short term. Empirical evidence is provided by Guo and Yao (2005) but from a different angle. For bankers, the possible debt evasion after privatisation is their major concern. They will not hesitate to block privatisation programmes if this concern becomes a real fear. So the excessive debt in the balance sheet of SOEs may be a serious constraint. Another research shows, unless bankers are convinced by the proposal and confident in the return of investment, the privatisation may be vetoed (G. S. Liu, P. Sun and W. T. Woo, 2006). In practice, the liability-asset ratio of SOEs in each province is chosen to measure the financial pressure among local governments.

(5) *Financial pressure hypothesis*: More decreases of the state-owned enterprises and employees should be observed when the financial pressure of provincial governments is getting heavier.

The key role of institutional environment for the success of privatisation has been well promoted by theories and proved by empirical evidence (J. D'Souza et al., 2005, S. Djankov and P. Murrell, 2002, World Bank, 1995). The rationale is that institutional infrastructure is a key stimulant to financial development and market competition, and will encourage privatisation as a result. The other way round, weak quality of institutional infrastructure almost equals to a serious constraint to the development of private sector. Therefore, just as argued by Ramamurti (2000), market-supporting

institutions do matter, especially those 'protection for property rights, business laws, competent regulatory agencies to ensure fair competition or to protect minority shareholder rights, independent courts to enforce laws, financial institutions that can mobilise and loan out private savings, managerial and entrepreneurial talent, and so on.' Lack of the support from these institutions will retard the privatisation pace. This test will use a legal index to measure the change of institutional infrastructure. This index is the arithmetic mean combined by two sub-indexes: the patent index, which is the total number of patent granted, and the technical market index, which is the total amount of transaction value in local technical markets. Both indexes are calculated by the way suggested in the first index report of marketisation in China (G. Fan et al., 2007).

(6) *Institutional infrastructure hypothesis*: More decreases of the state-owned enterprises and employees should be observed when institutional infrastructure is developing.

Kornai (1979) defined the term of 'soft budget' by differentiating it from the definition of 'hard budget,' which constraint is 'asserted with iron discipline: the firm can spend only as much money as it has.' So the budget nature is defined as soft 'if this principle does not get asserted consistently.' Incentive mechanism of public ownership is assumed to be the root problem of soft budget constraint (J. Y. Lin and Z. Y. Li, 2008). The removal of this constraint is necessarily accompanied by the reduction of public ownership, and this hardening reform in budget system is therefore correlated with the prevalence of privatisation. This dynamic has been proved by a number of empirical evidence (O. Debande and G. Friebel, 2004, S. Djankov and P. Murrell, 2002, J. P. Fidrmuc, 2007, World Bank, 1996, H. L. Wu and D. Parker, 2007). Lopez-de-Silanes, Shleifer and Vishny (1997) tested this hypothesis in the social provision of public services in the U.S.. They found that when the budget constraint in county governments became harder, more public provision would be handed over to private providers. In operation, share of the industrial loans to the total loans lent by local financial institutes is used as a quantitative variable to measure the softness of budget nature. The reason is because these loans are basically granted to industrial SOEs for funding their short term cash flows, so the decrease of loan scale will immediately crowd out the limited credits for the local state sector.

(7) *Soft budget constraint hypothesis*: More decreases of the state-owned enterprises and employees should be observed when the budget constraint is hardened.

Lopez-de-Silanes and his colleagues (1997) were among the earliest researchers to explore the possible relationship between political ideology and privatisation decision. They assumed voters' antigovernment sentiment will damage government's

determination on releasing public ownership to private hands. This assumption is confirmed by their finding, in which more social services were privately provided when the Republican Party, traditionally committed to the ideology in favour of private ownership, got more votes in gubernatorial elections in the U.S. This ideological assumption was further hypothesized by Ramamurti (2000). Based on the privatisation experience in the Czech Republic, Hungary, and Russia in the 1990s, he generalised that the ideological shift from the central planning doctrine to the free market belief was the chief driver of privatisation. Biais and Perotti (2002) gave an explanation in their Machiavellian argument by showing the dynamics how would a right-wing government use privatisation as a strategy to reverse the unfavourable political situation it faces. Although there is no such kind of 'right-wing' governments in the central or local China, local bureaucrats' ideology committed to private ownership was still well accepted as a crucial support to privatisation, and this ideological variable is measured by the increasing scale of private employment in provinces.

(8) *Ideology hypothesis*: More decreases of the state-owned enterprises and employees should be observed when the ideology is more committed to private ownership.

Decentralisation hypothesis, first given by Cao, Qian and Weingast (1999), is a widespread assumption but without empirical support so far. They argued that the Chinese style privatisation was induced by the market-preserving federalism offering political incentives through two channels: the hardening process of budget constraint and the intensifying pressure of market competition. This kind of federalism originated in the decentralisation of central fiscal power in the early 1990s. This decentralising process resulted in the increasing cost of running inefficient SOEs, led to the rearrangement of incentive structure, and gradually reshaped local bureaucrats' attitude to privatisation (Y. Z. Cao, Y. Y. Qian and B. R. Weingast, 1999). Perhaps, Hayek is the first one to give this argument a theoretical explanation, in which he believed the decentralisation can solve the information problem of ignoring local 'circumstances of time and space' among decision makers. So the rationale of privatisation under decentralisation is that only privatisation would allow price mechanism communicating information among local economic sectors in a better way. That is to say, information problems will only be partially solved if the decentralisation is adopted without privatisation, argued by Glaeser and Sheinkman (1996). The self-funding ability in the investment of total capital construction is capable of revealing the increasing autonomy of local finance and it is thus used as the variable of decentralisation hypothesis.[9]

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[9] In principal, local governments have five options to raise money needed for capital construction:

(9) *Decentralisation hypothesis*: More decreases of state-owned enterprises and employees should be observed when local governments are more financially autonomous in funding themselves.

3. Methodology and econometrics

These hypotheses will be placed into a multi-level framework, modified from Ramamurti's (2000) previous work, to describe the dynamics of privatisation. In his framework, privatisation variables are considered as *ex ante* and *ex post* effects in terms of three levels: firm, industry, and country. As criticising the privatisation practices in the Eastern Europe, he argued that privatisation was a complex process in which 'firm-, industry- and country-level reforms should be implemented in stages, rather than as a one-shot event where all reforms are implemented fully and simultaneously.' [10] This paper borrows his framework with the author's own modification. There seems to be a wonder if Ramamurti's framework is a proper classification in terms of economic theories, because all determinants are classified by the impact scale rather than by the economic essence for each. An obvious limitation of his methodology is that it may fail to dig out the root of problems. [11] Origins of the factors discussed in the above are instinctively difficult to be classified as just the firm, industrial or national level. Each hypothesis should have its unique theoretical basis in a specific subfield of economics but Ramamurti's framework fails to address that. In accordance, this paper tries to develop a newly modified version, which reclassifies privatisation determinants by each theoretical foundation in economics and puts them into three groups: micro-, macro-, and the politico-economical level. Hypotheses in the first group of micro-level determinants have the rationale based on microeconomic conditions, including the human capital, firm size or economic efficiency. Hypotheses in the macro-level group have rationale based on macroeconomic stimulation, including market competition, financial pressure, and

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planned budget, domestic loans, foreign investment, self-funding, and some other ways. Self-funding is usually the major part and this variable shows the ability of local governments to get themselves enough money for capital investment.

[10] His firm-level determinants include the agency/property rights failures, firm size, and the firm's experience as a private one beforehand; industry-level determinants have the competitive pressures and the potential for exploiting regulatory innovations; and the country-level determinants include the ideological commitment to private ownership, macroeconomic crisis, and the quality of market-supporting institutions.

[11] For instance, the factor of soft budget constraint can be regarded as a firm-level determinant in Ramamurti's classification, but its theoretical nature could be closer to the interaction of political economy between enterprises and the state. So this factor's impact goes across into the country level. Similarly, the nature of the financial pressure factor and the institutional infrastructure factor could be regarded as what is closer to the macroeconomic stimulation in the market environment than to the policy role of the state.

institutional infrastructure. Then the politico-economical group includes hypotheses of soft budget constraint, political ideology and decentralisation, which focus on the interaction between enterprises and the state. In this case, the factors of financial pressure and institutional infrastructure should be regarded as macroeconomic conditions instead of the country-level determinants because they have nothing much to do with the interaction between the state and enterprises. The soft budget constraint would not be wrongly allocated to the firm-level determinant, and its game essence in the state/enterprise relationship could be clearly highlighted in the model. In short, this new framework helps us distinguish three kinds of economic relationships for SOEs during the privatisation: the consideration of own internal conditions, the response to the change in external environment, and the interaction with the state. This dynamics is briefly drawn in the following (Figure 4.1).

(FIGURE 4 ABOUT HERE)

The shrinking process of Chinese state sector is specified in a dynamic model as

$$y_{it} = f(y_{i,t-1}, x^*_{1it}, x^*_{2it}, ..., x^*_{kit}), \text{ for } i = 1, ..., N, t = 1, ..., T, \quad (1)$$

where the shrinking degree in i-th province and t-th period y_{it} is determined by its value in the past period $y_{i,t-1}$, the dynamic variable, with other explanatory variables $x^*_{1it}, x^*_{2it}, ..., x^*_{kit}$ in the same period. This dynamic autoregressive-distributed linear model is expressed as

$$y_{it} = \alpha y_{i,t-1} + \sum_{l=1}^{k} \beta'_l x^*_{lit} + u_{it}, \text{ for } i = 1, ..., N, t = 1, ..., T, \quad (2)$$

$$u_{it} = \eta_i + \lambda_t + v_{it},$$

where the disturbance u_{it} is decomposed by unobservable individual-specific effects $\eta_i \sim \text{IID}(0, \sigma^2_\eta)$, year-specific effects λ_t, and the remainder stochastic disturbances $v_{it} \sim \text{IID}(0, \sigma^2_v)$.

There are some reasons to apply the system-GMM estimator (M. Arellano and O. Bover, 1995, R. Blundell and S. Bond, 1998, R. Blundell et al., 2000) in this research. First, the dynamic nature is only captured by the GMM estimator without bias and inconsistency, which are problems inevitable in traditional pooled or fixed effects, also known as the within group (WG), ordinary least squares (OLS) estimations (B. H. Baltagi, 2009, R. Blundell, S. Bond and F. A. G. Windmeijer, 2000, S. J. Nickell, 1981). [12],[13] Second, the GMM estimator allows researchers to consider more explanatory variables in a regression without growing worries of the endogeneity

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[12] The correlations between explanatory variables and errors brought by the dynamic specification would prevent the probability limits of pooled-OLS and WG estimators to approach to the true value. So this problem of endogeneity would make results being not consistent when the sample size increases.

[13] This dynamic nature would also lead to an asymptotic upward bias in the pooled-OLS estimator as well as downward bias in the WG estimator.

problem. Thirdly, the bias caused by the decrease of data variation in the first differences in the difference-GMM method (that is a problem particularly for those highly persistent series) is corrected by getting the level values of variables back to the regressions in the system-GMM method.[14] So, the precision of coefficients is improved through the removal of the bias caused by weakened instruments, and better efficiency is obtained in results.

Concerning the robustness in econometrics, alternative specifications—including the pooled-OLS, WG, and difference-GMM estimators—are provided all together to detect the appropriateness of results from the system-GMM estimator. Finite sample bias in the difference-GMM should be corrected by the system-GMM estimator because it introduces back the level equations into estimations (R. Blundell and S. Bond, 1998). Validity of instruments is detected by the Sargan and Hansen test.[15] Difference-in-Sargan/Hansen test detects the validity of the subsets of instruments using in level equations (D. Roodman, 2009a).[16] Potential problem of the instrument proliferation, also known as too-many-instruments bias, is considered. Some Monte Carlo simulation tests have shown that the over-identification caused by too many instruments in GMM estimators will lead to the failure of expunging endogenous components (D. Roodman, 2009b). Two theoretical solutions are adopted: first, the instrument count will be severely reduced by the matrix technique of collapsing the instruments using in first differenced equations, and, second, the time depth of instrument lags is considerably limited.[17] In short, a conservative strategy of econometrics is strictly committed in following examinations.

There are six sources of this dataset, which covers 31 Chinese provinces from 1994 to 2008.[18] The majority of data is collected from the *China Statistical Yearbooks* in various years, while the minority is from a number of Chinese provincial statistical yearbooks, *China Industrial Economic Statistical Yearbooks*, *The Third Industrial Census 1995*, *The First China Economic Census 2004* and a small part of data are calculated from above given data by the author. Two dependent variables are set to

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[14] This problem is supposed to lead to a downward bias among coefficients, and this situation is clearly seen in following results.

[15] Theoretically speaking, Sargan test is not robust because of its assumption of homogeneity, but this test will not be affected by too-many-instrument problem. On the contrary, Hansen test is robust for assuming heterogeneity, but its effectiveness could be weakened by instrument proliferation.

[16] If the subset instruments introducing by the system-GMM is valid, this statistic should be asymptotical to Chi-squared, with degree of freedom equal to the number of suspect instruments.

[17] Yet, it is well accepted in relevant discussion that there is no clear guidance from the literature on a proper number of instruments.

[18] Chongqing was not separated from Sichuan until 1998 in statistics, so its data are included in Sichuan's throughout this analysis and thus the number of cross-sections in estimations is 30.

measure the changing degree of the state sector. *SoeUnit* denotes the total number of state-owned and state-holding industrial enterprises with independent accounting system in each province in a certain year, while *SoeEmployment* denotes the total number of staff and workers employed in state-owned enterprises.[19] In addition, regional GDP, population, literacy, industrialisation degree, income per capita are variables for controlling general effects of basic economic growth, regional scale, people education, industrial structure, and development level. Variable definition, summary statistics and correlation table are listed in the Table 1.

(TABLE 1 ABOUT HERE)

It is worth noting that all variables have been transformed into the form that data values are strictly limited between 0 and 1. This data transformation will be helpful to highlight the relationship among variables by excluding the scale dimension of row data. So, there is no need for transformation if the variable is already presented in percentage or ratio form, such as the literacy rate, asset-contribution ratio, non-SOE share of industrial output, and so on. Yet if the variable is of scale data—like the amount of regional GDP (yuan), population (person), labour productivity (yuan/person) and so on—its value will be transformed into indexes before putting into regressions. Two kinds of indexation are used to serve different purposes. Control variables with scale data will be indexed according to a whole panel comparison, which means each datum will be compared with all data in all provinces in all years. So this index will not only show the change in each province over time but also its relative status to the rest of data in the panel. Consequently, the information of other regional characters will be included in this index. However, this kind of information should be excluded when the variable is not serving for controlling purpose; otherwise, the impact from other provincial data will be introduced into the hypothesis testing. For this worry, those explanatory variables with scale data will be indexed only according to their own serial comparison.[20] Here are the two ways of transformation in mathematics:

(1) Indexation with the panel comparison:

$$I_{ij} = \frac{V_{ij} - V_{\min}}{V_{\max} - V_{\min}},$$

while I_{ij} denotes the index in the *i*-th province in the *j*-th year, V_{ij} the original

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[19] There are different SOE numbers listed in statistics according to different definitions, including (1) SOE without limited definition, (2) SOE above a certain scale (usually for sales over 5 million yuan) per year, (3) SOE controlled by local government above a certain level (village or township), and (4) SOE with independent accounting system. Only the last one would be accompanied by other economic and financial data released in same statistics, and it is accordingly the only definition feasible for following examinations.

[20] Only two explanatory variables of infrastructure are indexed by national panel comparison due to their institutional nature.

value of variable, V_{max} the maximum value in all provinces in all years, and V_{min} the minimum value in the same scale.

(2) Indexation with the serial comparison: it is done by the same formula but with different definition in V_{max} and V_{min}, where they are respectively the maximum or minimum value in that specific province in all years.

After transformation, the maximum datum in the panel or series will be transformed into 1 or -1, while the minimum datum into 0, and the rest of data between maximum and minimum will be proportionally distributed in the interval between ± 1 and 0.

4. **Empirical findings and interpretations**

Econometric validity is first considered before the interpretations of findings. Table 2 presents the results of all specifications in terms of the privatisation of state-owned enterprises. Those high values of R-squared tests in the pooled-OLS and WG models imply specification problems in the data, and this situation also gives the justification to the application of GMM estimators in the following examinations. Coefficients of the dynamic variable, the lagged term of dependent variable, are supposed to be upward-biased in the pooled-OLS estimator and downward-biased in the WG estimator (M. Arellano and O. Bover, 1995, R. Blundell and S. Bond, 1998). This assumption is confirmed in the results, where two coefficients of that variable obtained from system-GMM estimators are as assumed as between the 0.440-0.674 range, given by the model (1) and (2). Finite sample bias, that is assumed to scale the coefficient of dynamic variable down to zero, is apparently magnified in the difference-GMM estimator, and it reveals the fact that the effectiveness of instruments has been weakened. But this bias will be corrected by introducing back the level equations by using the system-GMM estimator later on. In principal, the validity of GMM estimator depends on three conditions: (1) the presence of autocorrelation of order one in the residuals, (2) the absence of autocorrelation of order two in the residuals, and (3) the confirmation of validity of instruments by the Sargan or Hansen test. These three requirements are firmly held in most GMM models in the below, except only one. The perfect value of 1.000 in the Hansen test in the model (5) means the effectiveness of this test is weakened by the problem of instrument proliferation (D. Roodman, 2009b), but it does not necessarily mean that this instrument set is not valid. Its finding is still referable in the comparison with others. The difference-in-Sargan/Hansen tests also confirm the necessity of replacing difference-GMM by the system-GMM in the specification. Same concerns with above econometrics can be applied to the results in the Table 3, but discussion will not

continue for having no meaningful difference over there.

(TABLE 2 AND 3 ABOUT HERE)

Going straight to the hypothesis of interest, it is first noted in the Table 2 that the ideology variable, the private share of total employment, is highly correlated with the first privatisation variable, the total number of state-owned enterprises in a province. This correlation is found in the model (4) with confirmation of its robustness in the model (5) and it is assured again by a narrower comparison with fewer explanatory variables in the model (8). Clearly, ideology factor is the most significant one comparing to the others. The coefficient range between -0.363 and -0.517 in these models points to a negative correlation, which represents a pushing force given by the expansion of the private sector toward the shrinkage of state sector in a provinces. The original hypothesis is confirmed—the commitment to private ownership held by local governments was a key element in the process of Chinese privatisation. Although whether a Machiavellian motivation exists or not remains unknown (B. Biais and E. Perotti, 2002),[21] this finding is consistent with those empirical evidences found in the transitional processes. China is not an exception of this ideological transition.

The second determinant found significant is the factor of market competition. Its influence is repeatedly confirmed in the model (2), (3), (4) and (7). First two results from the WG and difference-GMM estimators may be ignored for respective reasons of bias. Yet the result in the model (4) should be regarded concrete, and its robustness can be confirmed by the model (8). All coefficients collectively point to a negative correlation between the degree of market competition and the scale of state sector. It means that the intensified competition in the product market has pushed Chinese SOEs to the edge of privatisation reform. This finding, being consistent with the theories suggested by mainstream economics (E. L. Glaeser and J. A. Scheinkman, 1996, D. D. Li, 1996, S. M. Li, S. H. Li and W. Y. Zhang, 2000, R. Ramamurti, 2000), demonstrates the comparative advantage of private ownership under a competitive market environment,[22] and it also provides another piece of supportive evidence to the literature (K. Guo and Y. Yao, 2005, H. B. Li and S. Rozelle, 2000).[23] In addition,

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[21] Which means the motivation of privatisation is for pursuing legitimacy, such as winning votes in democratic countries, from society. To confirm this motivation may require another qualitative study.

[22] This stimulant force of market competition toward privatisation is assumed to have some origins: (1) the agency failure of public management, (2) the imperfection of market function, (3) the expectation of higher return of self interests, or (4) the better reward for more efficient arrangement of institution after privatisation.

[23] There is another concrete message coming from control variables: the coefficients of the indexes of GDP and income per capita (in model (4) and (5)) jointly demonstrate that the state sector would be relatively large in the provinces with more production of GDP or with higher income per capita. This evidence makes a common sense of the distribution of Chinese SOEs, which are more concentrated on the provinces with more advanced economy.

the first significant determinant in the Table 3, referring to the privatisation of state-owned employees as well as the second dependent variable, is also the factor of market competition. It is supported by all system-GMM estimators in the model (14), (15) and (17) and with robustness in the last two. For the same reasons discussed, this finding shows that competition pressure is influential in a comprehensive way to the privatisation of enterprises and employees.

The next driver to the privatisation of state workers is the average level of human capital. This factor is found significant in the model (14) and robust in the model (15).[24] Results suggest a stimulant role of the human capital level within enterprises themselves toward the downsizing process of state employment. This finding agrees with the original assumption: the quality of human capital is attractive to private investors, who by nature pursue labour productivity and prefer fewer challenges for the management after takeover. This evidence is also supportive to those in the literature (L. Brandt, H. B. Li and J. Roberts, 2005, H. H. Jin and Y. Y. Qian, 1998, H. B. Li, 2003a, H. B. Li and S. Rozelle, 2000).

Finally, financial pressure should be regarded as another influential factor under a slightly loosened requirement of statistics. This factor is found robustly significant in the model (15) and (17) with the significance level at 15 per cent, which is a standard acceptable in some cases. The author holds the belief that to confirm this financial impact should not be an over-generalisation or exaggeration. In fact, if ignoring the significance level, all coefficients of this factor in system-GMM models are jointly pointing to a pushing force of financial pressure to the downsizing of state employment. In interpretation, this finding is consistent with the traditional argument of financial stringency: the rising liability-asset ratio was indeed part of the motivation for local governments to layoff more state workers, just like other cases prevailing in transitional economies (B. Bortolotti, M. Fantini and D. Siniscalco, 2003, R. Ramamurti, 2000, G. Roland, 2001). Nevertheless, this evidence is actually against the cash-cow argument, assuming bureaucrats' rent-seeking behaviour via privatisation. No evidence supports that SOEs were treated like cash-cows for local bureaucrats, who could be reluctant to relieve fiscal burden by taking privatisation just because they want to maintain current structure to seek more rents from state assets under control. In fact, Chinese local bureaucrats were found to be more benevolent.

To sum up, an integrated story about the Chinese privatisation after 1994 may be illustrated. This process was driven by four major stimulants: the ideology committed to private ownership held by local governments in the politico-economical context,

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[24] Though the significance is lost in the model (17), which has a smaller group of explanatory variables, for unknown reason, the author believed that it would not be econometrically sufficient to overthrow the original finding due to this loss.

the intensified competition in the product markets and the rising pressure of finance in the macro environment, and the improvement of human capital within SOEs *per se* as the micro condition. This story does not entirely deny the impacts from other factors discussed above, but, instead, it highlights that these four factors are likely to be more determinant than others. In other words, to take a relative position, following hypotheses simply lack concrete and convincing supports from the data. First, the constraint effect of size factor is not as obvious as expected. Second, economic efficiency does not make the difference between the privatisation degrees across areas. Thirdly, legally institutional change is argued to be potentially important, but the result is distant from robust.[25] Fourthly and fifthly, the hardening reform of budget system and the decentralisation of central fiscal power are not key elements in the whole process of privatisation. So, the chief implication may cast a question to the so-called 'Chinese characteristics.' After all, throughout the examination, there is nothing found to be really against conventional economic theories. Some arguments based on Chinese characters—such as the pretty daughter argument, also known as the ice-pop effect, the cash-cow argument, and the Chinese-style federalisation argument—are eventually not supported by the empirical reality. It could be fair to say that the most significant characteristic to this privatisation dynamic should be its multi-driven nature, which is well balanced among micro conditions, macro stimulations and politico-economical interactions. It is this multi-level equilibrium that better characterises the privatisation in Chinese state sector in the past fifteen years.

5. Conclusions

The results presented in this paper are, by and large, robust to a range of alternative estimation methods, and the findings collectively suggest a privatisation dynamics driven by multi-level forces across micro, macro and politico-economical contexts. In this dynamics, market competition, political ideology, human capital and financial pressure are four major significant stimulants. There is no sufficient empirical evidence to support the possible impacts from the factors of firm size, economic efficiency, legal reform, budget system and fiscal decentralisation toward the shrinkage of Chinese state sector. All meaningful findings in the data are consistent with the transitional orthodoxy in the mainstream economics. Conventional Chinese characters did not characterise Chinese privatisation. It is thus implicated that the 'privatisation with Chinese characteristics,' if any, does not go against or reshape the theories. The whole process of privatisation is much closer to a kind of

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[25] See the models (4), (5) and (7).

equilibrium balanced among multi-level forces, which has made Chinese privatisation so different from other transitional cases.

This study is however subject to a number of limitations. First, the relatively small data size makes it difficult to do regional or serial comparisons. Second, the feasibility to apply variables used in the literature onto Chinese cases is highly limited. A serious lack of proper and persistent variable candidates in whatever central or local statistics is one of the major difficulties. Thirdly, the system-GMM estimator is effective in avoiding most regression problems unsolvable in traditional estimators but a bigger dataset is still required to improve the accuracy of results as well as to further probe the reality. Finally, econometric limitation is always hiding somewhere, and it cannot be too careful to repeatedly check the robustness of regression results. This conservative stance on econometrics is what has been seriously taken throughout this paper.

Table 1
Variable definitions and summary statistics

Variables	Definition
SoeUnitX	Index of the number of SOE units with independent accounting system in each province
SoeEmploymentX	Index of the number of employees in SOEs with independent accounting system in each province
GdpX	Index of the total amount of regional GDP among all provinces
PopulationX	Index of the regional population among all provinces
Literacy%	Share of the population of literacy to the total, over 15 years old, in a province
Industrialisation%	Rate of the output by industrial sector to the total GDP in a province
IncomePercapitaX	Index of the disposable income per capita among all provinces
LabourProductivityX	Index of the labour productivity (i.e. SOEs' value-added per worker) in each provinces
AveEmployeeX	Index of the average number of SOE employees in each province
AssetContribution%	Rate of the asset contribution (i.e. the total amount of capital to that of profits, tax and interests) in provinces
NonSoeOutput%	The rest share of SOE industrial output in provinces
LiabilityAsset%	Ratio of the total amount of SOE liabilities to total assets in provinces
LegalInfrastructureX	Arithmetic mean of patent (i.e. three kinds of patents granted by local governments) and technical market (i.e. the business volume in local technical markets) index in all provinces
IndustrialLoan%	Share of the industrial loans to total loans granted by local financial institutes in provinces
PoeEmployment%	Share of POE employment to total employment in both urban and rural areas in provinces
SelfFunding%	Share of the self-funding part in total investment of capital construction in provinces

Variables	Code	Obs	Mean	S.D.	Min	Max	Var.	Skewness	Kurtosis
SoeUnitX	dv1	450	0.573	0.275	0.126	1.000	0.075	0.149	1.627
SoeEmploymentX	dv2	450	0.663	0.231	0.262	1.000	0.053	0.078	1.638
GdpX	con1	450	0.129	0.145	0.000	1.000	0.021	2.612	11.841
PopulationX	con2	450	0.341	0.244	0.000	1.000	0.060	0.691	2.843
Literacy%	con3	450	0.863	0.098	0.313	0.969	0.010	-2.350	10.437
Industrialisation%	con4	450	0.367	0.099	0.061	0.565	0.010	-0.922	4.087
IncomePercapitaX	con5	450	0.220	0.166	0.000	1.000	0.028	1.453	5.669
LabourProductivityX	h1	450	0.350	0.306	0.033	1.000	0.093	0.963	2.556
AveEmployeeX	h2	450	0.678	0.183	0.251	1.000	0.034	0.223	2.219
AssetContribution%	h3	450	0.098	0.062	-0.013	0.611	0.004	3.217	20.124
NonSoeOutput%	h4	450	0.444	0.202	0.101	0.886	0.041	0.353	2.131
LiabilityAsset%	h5	450	0.600	0.091	0.191	0.840	0.008	-1.994	8.563
LegalInfrastructureX	h6	450	0.048	0.086	0.000	0.643	0.007	3.754	19.423
IndustrialLoan%	h7	429	0.178	0.064	0.029	0.374	0.004	0.227	2.612
PoeEmployment%	h8	450	0.062	0.078	0.001	0.572	0.006	3.573	19.301
SelfFunding%	h9	450	0.479	0.123	0.085	0.839	0.015	0.236	3.018

	dv1	dv2	con1	con2	con3	con4	con5	h1
dv1	1.000							
dv2	0.922	1.000						
con1	-0.474	-0.474	1.000					

con2	-0.141	-0.061	0.585	1.000				
con3	-0.328	-0.371	0.342	0.247	1.000			
con4	-0.326	-0.313	0.531	0.380	0.561	1.000		
con5	-0.650	-0.738	0.693	0.068	0.294	0.355	1.000	
h1	-0.773	-0.784	0.543	0.052	0.175	0.238	0.814	1.000
h2	-0.686	-0.544	0.524	0.335	0.331	0.375	0.505	0.575
h3	-0.264	-0.257	0.227	0.120	0.146	0.279	0.246	0.353
h4	-0.227	-0.286	0.670	0.430	0.308	0.465	0.570	0.318
h5	0.152	0.206	-0.081	0.237	0.316	0.207	-0.365	-0.295
h6	-0.356	-0.409	0.853	0.324	0.305	0.383	0.755	0.449
h7	0.639	0.694	-0.260	-0.019	-0.033	0.105	-0.580	-0.672
h8	-0.397	-0.515	0.431	-0.122	0.312	0.327	0.768	0.478
h9	-0.498	-0.478	0.538	0.357	0.454	0.515	0.449	0.511

	h2	**h3**	**h4**	**h5**	**h6**	**h7**	**h8**	**h9**
h2	1.000							
h3	0.237	1.000						
h4	0.469	0.046	1.000					
h5	0.090	-0.080	-0.060	1.000				
h6	0.339	0.152	0.548	-0.222	1.000			
h7	-0.331	-0.157	-0.191	0.425	-0.225	1.000		
h8	0.236	0.132	0.381	-0.305	0.634	-0.334	1.000	
h9	0.554	0.437	0.434	0.137	0.296	-0.265	0.215	1.000

Source: China Statistical Yearbook 1995-2009, provincial statistical yearbooks 1995-2009, *The Third Industrial Census 1995*, and *The First Economic Census 2004*.
Note:
All data periods are between 1994 and 2008.
Chongqing's data are included in Sichuan's, so the cross-section number is 30, instead of 31.
Names of variables are all followed by -X or -%, while X means it is an index variable and % means it is a percentage variable.
Code dv1 denotes the first dependent variable; con1 denotes the first control variable; h1a and h1b denote the two variables in hypothesis 1; etc.

Table 2
Determinants of Chinese privatisation in state-owned enterprises (1994-2008)

| | Pooled-OLS | WG | Difference-GMM | | System-GMM | | | |
| | | | 5 lags robust collapsed | 2 lags robust collapsed | 3 lags robust collapsed | 3 lags robust collapsed | 3 lags robust collapsed | 3 lags robust collapsed |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SoeUnitX.lag(1)	0.674***	0.440***	0.364**	0.591*	0.572**	0.589**	0.873***	0.659***
	20.920	12.310	2.470	1.680	2.190	2.230	2.700	2.750
Micro-level								
LabourProductivityX	-0.084#	-0.190***	-0.125	-0.065	-0.030	-0.029		
	-1.580	-3.030	-0.360	-0.260	-0.200	-0.180		
AveEmployeeX	-0.222***	-0.407***	-0.501***	-0.016	-0.097	-0.087		
	-7.370	-10.300	-2.640	-0.060	-0.490	-0.440		
AssetContribution%	-0.026	-0.146#	-0.321	0.156	0.147	-0.065		
	-0.370	-1.440	-1.310	0.590	0.650	-0.250		
Macro-level								
NonSoeOutput%	0.010	-0.150**	-0.552*	-0.232	-0.188#		-0.430*	
	0.340	-2.500	-1.640	-0.640	-1.520		-1.700	
LiabilityAsset%	0.130***	0.032	-0.497#	-0.151	-0.170		-0.333	
	2.630	0.460	-1.620	-0.700	-1.020		-0.760	
LegalInfrastructureX	-0.274**	-0.058	0.190	-0.582	-0.395		-0.582	
	-2.040	-0.360	0.460	-1.220	-1.350		-1.280	
Politico-economical level								
IndustrialLoan%	-0.155#	0.176	-0.050	-0.191	-0.160			-0.136
	-1.560	1.440	-0.080	-0.490	-0.570			-0.270
PoeEmployment%	-0.129*	-0.023	-0.027	-0.416#	-0.470***			-0.496**
	-1.710	-0.190	-0.040	-1.510	-3.570			-2.280
SelfFunding%	0.005	0.086*	0.225	-0.055	-0.046			-0.062
	0.110	1.860	1.410	-0.300	-0.300			-0.240
Controls								

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GdpX	0.124#	0.044	0.080	0.309#	0.238#	0.211*	0.490#	0.195#
	1.640	*0.550*	*0.360*	*1.470*	*1.450*	*1.770*	*1.560*	*1.630*
PopulationX	-0.026	-0.115	-0.619	0.019	-0.023	-0.097	0.032	-0.136*
	-1.260	*-0.530*	*-0.400*	*0.150*	*-0.220*	*-1.050*	*0.220*	*-1.810*
Literacy%	-0.080#	-0.181#	-1.131***	0.431	0.138	-0.204	1.686#	0.544
	-1.630	*-1.530*	*-2.810*	*0.900*	*0.410*	*-0.580*	*1.590*	*1.010*
Industrialisation%	-0.002	0.211*	0.704	-0.560	-0.182	-0.185	-0.869#	-0.586
	-0.030	*1.680*	*0.960*	*-1.140*	*-0.820*	*-0.710*	*-1.460*	*-1.370*
IncomePercapitaX	0.308***	-0.084	-0.716	0.801	0.683***	-0.043	0.147	0.366**
	3.430	*-0.590*	*-1.090*	*1.210*	*2.630*	*-0.690*	*0.390*	*2.310*
YearDummies	omitted	omitted	omitted	omitted	omitted	omitted	omitted	omitted
Constant	0.241***	0.934***		-0.123	0.090	0.471#	-0.854	-0.287
	2.890	*6.610*		*-0.230*	*0.290*	*1.550*	*-1.310*	*-0.960*
Observations	401	401	371	401	401	420	420	401
Instruments	-	-	55	43	57	37	37	37
R-square	0.956	0.966	-	-	-	-	-	-
AR(1)	-	-	0.026	0.066	0.018	0.023	0.042	0.003
AR(2)	-	-	0.621	0.921	0.482	0.679	0.441	0.372
Sargan	-	-	0.237	0.207	0.323	0.249	0.824	0.260
Hansen	-	-	1.000	1.000	1.000	0.656	0.990	0.983
Difference-Sargan/Hansen								
Excluding group	-	-	-	-	1.000	0.885	0.689	0.567
Exogenous null	-	-	-	1.000	1.000	0.380	0.997	0.998

Note:

Dependent variable: *SoeUnitX*.

#, *, **, *** denote significance level in 15%, 10%, 5%, 1%, respectively.

Robust z-values for difference- and system-GMM coefficients and t-values for pooled-OLS and WG are in the italic.

Table 3
Determinants of Chinese privatisation in state-owned employees (1994-2008)

	Pooled-OLS	WG	Difference-GMM		System-GMM			
			3 lags robust collapsed	2 lags robust collapsed	3 lags robust collapsed	3 lags robust collapsed	2 lags robust collapsed	3 lags Robust Collapsed
	(11)	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**	**(17)**	**(18)**
SoeEmploymentX.lag(1)	0.853 ***	0.756 ***	0.868 *	0.847 ***	0.877 ***	0.854 ***	0.914 ***	0.900 ***
	31.480	*23.060*	*1.860*	*10.480*	*12.600*	*12.090*	*6.550*	*12.050*
Micro-level								
LabourProductivityX	-0.075 **	-0.140 ***	0.093	-0.241 *	-0.261 **	-0.278		
	-2.010	*-2.820*	*0.270*	*-1.640*	*-2.080*	*-1.360*		
AveEmployeeX	-0.042 **	0.009	0.038	-0.056	-0.069	-0.109 ***		
	-2.330	*0.320*	*0.190*	*-1.110*	*-1.180*	*-2.750*		
AssetContribution%	0.001	0.049	-0.190	0.215	0.120	-0.178		
	0.020	*0.620*	*-0.600*	*1.000*	*0.760*	*-0.700*		
Macro-level								
NonSoeOutput%	-0.033 #	-0.114 **	-0.893 **	-0.097	-0.136 **		-0.582 ***	
	-1.580	*-2.440*	*-2.280*	*-1.170*	*-2.060*		*-2.620*	
LiabilityAsset%	0.002	-0.009	-0.290	-0.193	-0.201 #		-0.256 #	
	0.060	*-0.170*	*-0.620*	*-1.300*	*-1.590*		*-1.520*	
LegalInfrastructureX	-0.005	0.099	-0.555	0.005	-0.463		-0.426	
	-0.050	*0.790*	*-0.990*	*0.020*	*-1.350*		*-1.320*	
Politico-economical level								
IndustrialLoan%	-0.113 #	-0.012	0.313	-0.072	-0.034			0.099
	-1.640	*-0.120*	*0.620*	*-0.400*	*-0.200*			*0.680*
PoeEmployment%	-0.048	-0.086	0.465	-0.094	0.020			0.164
	-0.920	*-0.900*	*0.440*	*-0.890*	*0.100*			*1.400*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SelfFunding%	0.001	-0.012	-0.026	-0.053	-0.081			0.008
	0.040	*-0.330*	*-0.100*	*-0.520*	*-1.140*			*0.110*

Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GdpX	0.033	-0.062	0.371	0.084	0.335 **	0.120	0.190 *	-0.029
	0.630	*-0.980*	*1.020*	*1.200*	*2.270*	*1.410*	*1.860*	*-0.420*
PopulationX	0.004	-0.072	-1.961	0.022	0.014	-0.039	0.213 *	0.053 *
	0.260	*-0.430*	*-1.010*	*0.380*	*0.160*	*-0.630*	*1.670*	*1.710*
Literacy%	-0.129 ***	-0.166 *	-0.943 **	0.082	-0.017	-0.230	0.407	-0.371 *
	-3.740	*-1.800*	*-2.130*	*0.360*	*-0.080*	*-1.100*	*0.910*	*-1.740*
Industrialisation%	0.064 *	0.186 *	-0.577	-0.095	0.012	0.049	0.020	0.070
	1.700	*1.880*	*-0.940*	*-0.450*	*0.050*	*0.300*	*0.060*	*0.390*
IncomePercapitaX	0.022	0.108	-0.086	0.023	0.123	-0.115 *	0.456 #	-0.107
	0.350	*0.970*	*-0.100*	*0.090*	*0.420*	*-1.910*	*1.450*	*-0.940*
YearDummies	omitted	omitted	omitted	omitted	omitted	omitted	omitted	omitted
Constant	0.288 ***	0.406		0.476 *	0.516 **	0.690 **	-0.161	0.381 **
	4.590	*3.750*		*1.730*	*2.010*	*1.970*	*-0.550*	*2.470*
Observations	401	401	371	401	401	420	420	401
Instruments	-	-	39	43	49	33	28	37
R-square	0.969	0.970	-	-	-	-	-	-
AR(1)	-	-	0.061	0.002	0.008	0.014	0.009	0.024
AR(2)	-	-	0.868	0.911	0.807	0.337	0.385	0.924
Sargan	-	-	0.980	0.012	0.101	0.309	0.568	0.028
Hansen	-	-	1.000	0.990	1.000	0.670	0.888	0.440
Difference-Sargan/Hansen								
Excluding group	-	-	-	-	1.000	0.984	-	0.603
Exogenous null	-	-	-	0.990	0.997	0.479	-	0.312

Note:

Dependent variable: *SoeEmploymentX*.

#, *, **, *** denote significance level in 15%, 10%, 5%, 1%, respectively.

Robust z-values for difference- and system-GMM coefficients and t-values for pooled-OLS and WG are in the italic.
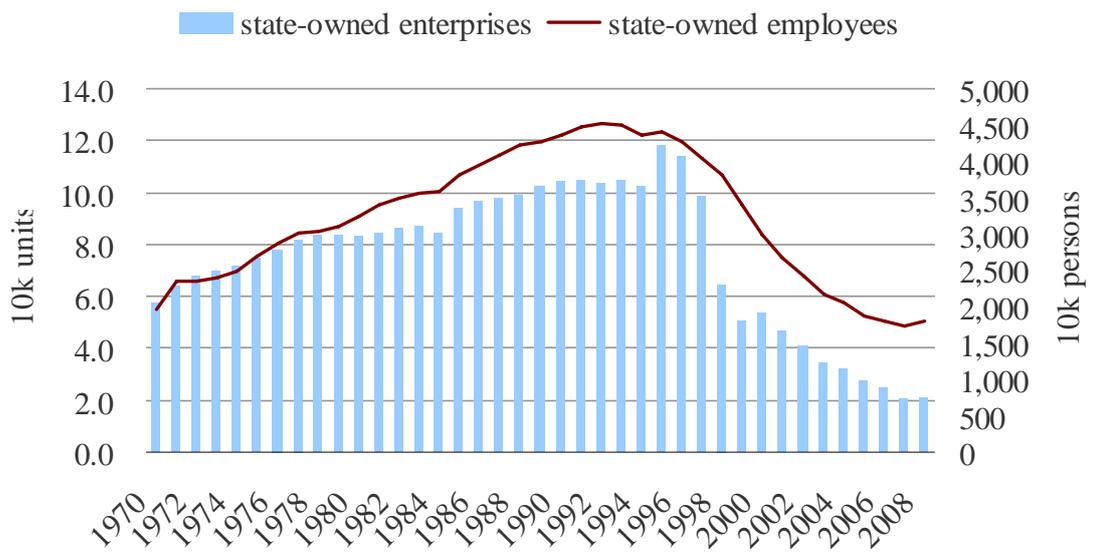
Figure 1: Historical changes of state-owned enterprise and employees (1970-2008).
Source: *China Compendium Statistics 1949-2004* and *China Statistical Yearbooks*, 2006-2009.
Note: Definition of the SOE in this figure has no limitation of scale.
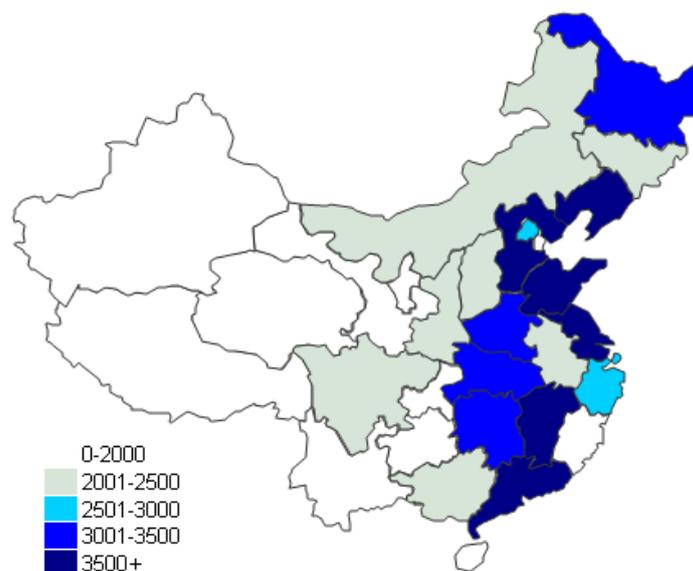
Figure 2: Decreases of state-owned enterprises in China (1994-2008).

Source: *China Statistical Yearbooks* 1995-2009.

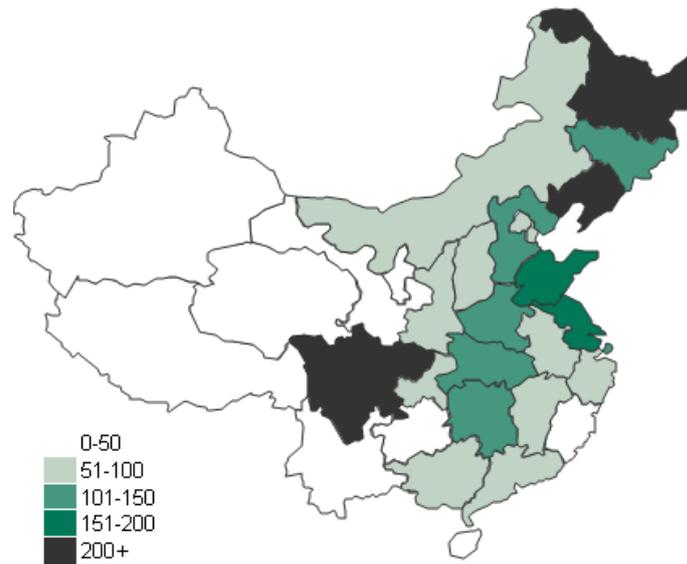*Note*: Sichuan and Chongqing figures are separated drawn by data in 1997-2008 period.

Figure 3: Decreases of laid-off state-owned employees (1994-2008) (10k persons).
Source: *China Statistical Yearbooks* 1995-2009.
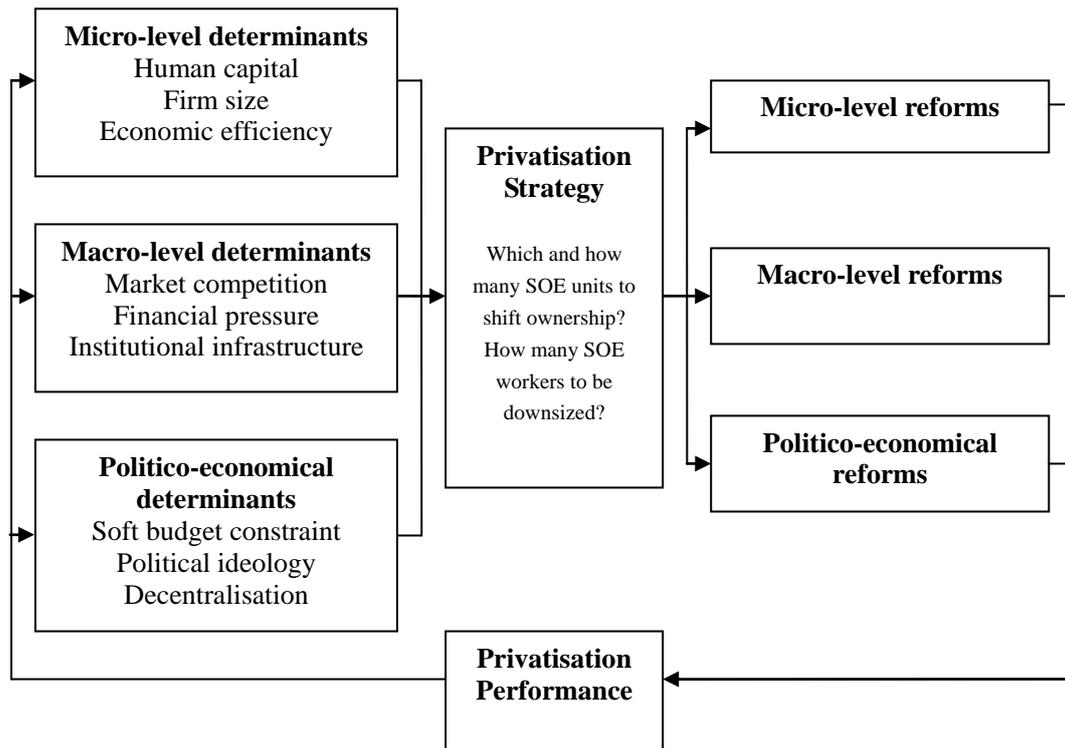*Note*: Sichuan and Chongqing figures are separated drawn by data in 1997-2008 period.

Figure 4: Multi-level framework of privatisation analysis.

Source: Modified from Ramamurti's (2000) framework by the author.

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