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The Impacts of Big Four on the Privatization of Chinese State-Owned Enterprises

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Date: June 18, 2020

Abstract

Both the formal introduction of Big Four into China and the privatization of Chinese state-owned enterprises started in the 1990s, but few scholars have studied the relationship between them. Theoretically, Big Four can provide more accurate information about the company's value to the market through higher quality auditing services, which could reduce information asymmetry during the privatization process. On the other hand, Big Four could convey positive signals to the market by its own good reputation. Generally, SOEs that employ Big Four have better financial performance, which can boost the confidence of private investors. The paper will take A-share listed companies from 2005 to 2018 in China as the sample, select the enterprise ownership and state-owned shares proportion as the proxy variables to investigate whether Big Four has impacts on the privatization of Chinese SOEs. The principal hypothesis is that Big Four can significantly promote the privatization process of SOEs in China after controlling regional and time fixed effects. In addition, the longer the audit period of Big Four, the higher the probability of privatization and the lower the proportion of state-owned shares.

Keywords: Big Four, Privatization, State-owned Enterprises, Audit Quality

Introduction

China has reopened its door to foreign trade and reformed its state-owned enterprises since 1978. The reform primarily focused on ownership privatization, according to Jefferson (2006), it consisted of four stages in total: firstly, large numbers of new enterprises that are characterized by private or mixed ownership will emerge in the market; secondly, reform managerial control rights within current public ownership system, for example, establish contract responsibility framework to strengthen managerial incentives; thirdly, asset structures changes will occur with the injection of non-state capital into the state-owned sectors; finally, the outright conversion of enterprises from state or collective ownership to some other formal ownership classification will be achieved. However, accounting for about 35% of GDP, state ownership remains significant in the current Chinese economy. Such gradual and selective privatization process has already attracted much attention in the literature. Bai, Lu & Tao (2008) argued that China has maintained state ownership as a second-best way to absorb surplus labor and stabilize society. Another argument is that SOEs in China are supervised by the State Assets Agency which is in charge of managing state-owned enterprises for all people in the society, therefore, they are not entirely profit-driven and could be circumvented, in this case, privatization cannot take place unless the private interests of the management are also taken into consideration properly. Although the speed of privatization has distinguished China from other centrally planned economies and the domestic reform of Chinese SOEs is usually commensurate with mixed ownership reform in 1980s and 1990s, its essence was still consistent with western privatization at the initial stage, which is expected to be completed by ownership transfer and disinvestment. According to Wu & Lansdowne (2015), the details of the privatization are “black boxed” in China since the government didn’t have any systematic records, neither has the central administration nor any local authority ever released a progress report about it to the public. Generally, it is argued that Chinese SOEs have experienced two

large-scale privatization processes since 1990s.

The Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE) were established in December 1990 and April 1991 respectively. Many poorly performed companies were sold off through auctions and corporate transformation because politicians that controlled them usually have high incentives for economically inefficient objectives. Meanwhile, some large- and medium-sized SOEs were given favorable access to transform into publicly listed firms on the stock market and refinance capital through initial public offerings (IPO), which could be regarded as the start of the first large-scale privatization process of Chinese SOEs named Share Issue Privatization (Sun & Tong, 2003). During the reform, there were two types of shares, namely tradable shares and non-tradable shares, which formed a unique split-share-structure in the imperfect Chinese stock markets. On the one hand, the government obtained cash flow by refinancing through the privatization of SOEs, on the other hand, as Yang, Hou & Qian (2015) mentioned, only tradable shares could be publicly issued to ordinary institutions or individuals, but these shares accounted for less than one-third of the stock market. The rest of shares that accounted for more than two-thirds were non-tradable, which indicated that absolute state control and public ownership were actually still maintained at that time of period. In addition, since non-tradable share prices were determined based on the booking value of the company's assets, this part of shareholders became insensitive to all the market fluctuations, resulting in tenuous corporate governance structures and serious principal-agent problems which brought lots of difficulties to the future privatization process. Therefore, Share Issue Privatization can only be called partial privatization in the western terminology.

The existence of non-tradable shares has been regarded as the biggest impediment of Chinese equity market. After going through several attempts for further privatization, state-owned enterprise's second truly viable private process began in 2005 with the split share

structure reform. The "Administrative Measures for the Reform of the Split Share Structure of Listed Companies" promulgated by Chinese Securities Regulatory Commission required listed companies to convert all the listed non-tradable shares into legally tradable shares, and forbade equity refinance before the completion of the changes, which pushed the non-tradable shareholders to figure out a compensation package that was acceptable to the tradable shareholders (Lee, 2008). At the same time, the government targeted foreign direct investment as the primary approach to cushion the potential shock in the stock market. The problem of split share structure was solved gradually, and the reform of state-owned enterprises has entered the fast track. To be more specific, during the Share Split Reform, the withdrawal of state-owned capital gave private investors much more new opportunities to enter into the field originally occupied by the government. A large amount of non-tradable shares such as legal person shares which were originally held by the central or local government started to be absorbed by non-state-owned capital. Since then, the privatization of a great number of people entering and government leaving has provided a sample possibility for this empirical study.

Arthur Andersen, Arthur Young, Coopers & Lybrand, Haskins & Sells, Ernst & Ernst, Peat Marwick Mitchell & Co., Price Waterhouse, and Touche Ross were collectively known as the Big Eight for much of the twentieth century (Stevens, 1981). According to Gillis (2011), each of the Big Four firms now traces its origins to the U.K. and the U.S. in the nineteenth century, specifically, Peat Marwick Mitchell & Co. merged with Netherlands based Klynveld Main Goerdeler to create KPMG in 1987. Afterwards, in 1989, Ernst & Whinney merged with Arthur Young to form Ernst & Young, in the same year, Deloitte, Haskins and Sells merged with Touche Ross to become Deloitte & Touche. In 1993, Deloitte & Touche changed its name to Deloitte Touche Tohmatsu to recognize the importance of its Japanese firm. In 1998, Coopers & Lybrand merged with Price Waterhouse to create PricewaterhouseCoopers. In 2002, Arthur Andersen failed in the wake of a criminal conviction for its complicity in the Enron scandal and

the Big Five became the Big Four (Toffler, 2003). In this paper, the term Big Four represented these four firms.

The introduction of the Big Four in China and the privatization of China's SOEs began almost simultaneously. After Deng Xiaoping encouraged to accelerate reforms during his well-known Southern Tour in 1992, foreign investment flooded into China, helping it become the second largest destination for foreign direct investment only behind the United States (Gillis, 2011). As mentioned before, China reopened its stock exchanges and privatized the economy rapidly, therefore, many Chinese companies started to publicly list in international stock exchanges in order to improve their competitiveness in the global markets. Such acceleration of reform created huge opportunities for the Big Four to capture the expanding accounting markets since foreign investors preferred to choose their own accounting firms and investment bankers also advised Chinese companies that were seeking for international stock listings to hire the Big Four. According to Gillis (2011), in 1992, Big Four won the official right to offer audit services in China by forming joint ventures with State institutions and obtained a dominant position in the market quickly, in turn, these four international firms promoted the standardized development and reform of Chinese SOEs. Therefore, the introduction of Big Four and the privatization of SOEs were mutually reinforcing, which have encouraged the construction and development of market economy in China.

The state-owned enterprises in this article refer to those are listed on the A-shares market and ultimately controlled by the central or local government, or all other levels of state-owned asset management committees and platforms. Generally, state investment percentage in these firms is more than 50%. According to Lin & Lu (2019), they are generally considered as inefficient in productivity, but Chinese economy that relies on them heavily has been proven to be successful over the last few years, indicating their importance in the future economic success.

Given that privatization has become one of the most important directions in the reform of Chinese state-owned enterprises, studying the factors that affect the implement of it could help promote deeper reform and healthier development of SOEs. However, in fact, researches about factors that affects privatization as well as the corresponding influence mechanism are relatively lacked. Although the introduction of Big Four and the privatization of SOEs have attracted lots of interests from scholars in a separate manner, few literatures have tried to investigate the relationship between them. Therefore, this paper will study whether the Big Four can promote the privatization process of Chinese SOEs based on empirical evidence. Specifically, the privatization process is reflected in the change of the company's controlling shareholder from a state-owned one to a non-state-owned one, or a decline in the state-owned shares percentage. In addition, the paper will explore the micro-mechanisms of such potential effects and provide some insights to improve the effectiveness of market policies designed for Big Four and local accounting firms.

Literature Review

There are few literatures that directly study the impact of auditing on privatization, but some studies have shown that institutional factors such as the extent of state ownership can significantly affect listed companies' auditor choice decisions. For example, Wang & Wong (2008) argued that Chinese SOEs are more likely to hire small auditors compared with non-state-owned firms within the same region, which could be explained by SOE's collusion incentives and small auditors' superior local knowledge. To be more specific, according to Chen et al. (2000), an acquiescent auditor would allow its client to manipulate profits by not issuing a modified opinion that could cause a decrease in share prices. Although all listed companies have incentives to collude with auditors, government owners face the least collusion costs due

to their political power. Bushman, Piotroski & Smith (2004) investigated corporate transparency, which is defined as the availability of firm-specific information to those outside public listed firms, their results indicated that financial and governance transparency display a significant and negative association with the level of state-owned shareholding. Liu & Saidi (2014) examined the effect of state ownership on firms' earning quality, showing that Chinese SOEs exhibit a lower earnings quality than non-state-owned firms. Particularly, SOEs have less frequent timely recognition of losses, and significantly higher discretionary current accruals. Therefore, the conclusion that Chinese government had incentives and also actually created some regulatory backing for self-serving purposes that negatively impact listed companies' financial information disclosure through its controlling power of listed SOEs and political influence on accounting firms can be reached.

According to Guedhami & Pittman (2009), foreign owners who require more credible financial information to reduce information asymmetry may prefer to hire Big Four auditors since these investors may perceive that an auditor from Big Four is qualified to ensure that managers who are responsible have less discretion to manipulate the accounting numbers. Indeed, the conversion from state to private ownership generally brings serious agency conflicts between minority investors and corporate insiders, who frequently remain politically connected afterward (Boubakri et al., 2008; Fan et al., 2007). In other words, foreign investors choose Big Four to monitor the newly privatized companies better and prevent expropriation by controlling insiders and their political backers. Guedhami (2009) also checked how the dynamics of auditor choice evolve during the transition from state to private ownership, the results showed that the higher the state-owned shareholdings in a company, or the lower the foreign-owned shares, the higher probability that the company will choose a low-level external auditor, and the probability of employing Big Four as the auditor after privatization is 64% higher than before. However, the paper also points out potential endogeneity problems. There is no explanation about the

causal relationship between audit choices and privatization.

Many empirical papers have also studied the relationship between state ownership and firm performance, but the results are mixed. Generally, state-owned firms are found to be less efficient and less profitable than private ones given that politicians have both the motives and the power to impose their multiple social objectives on affiliated companies which resulted in poorer performance (Xu & Wang 1999; Hanwen et al. 2011; Yu 2013). On the other hand, Sun et al. (2002) examined a sample of public listed firms in China from 1994 to 1997 and found that state ownership has an inverted U-shaped or concave relationship with stock market performance, therefore, government support through state ownership is valuable and necessary to vitalize performance. However, Ng et al. (2009) and Hess et al. (2010) examined Chinese listed companies from 1996 to 2003 and 2000 to 2004 respectively, both of them argued a convex relationship between state ownership and firm performance.

In conclusion, the existing researches about the impacts of Big Four audits mainly focus on audit quality, whether there are other aspects except it, for example, reputation mechanism still requires further investigations.

Hypothesis

Chinese SOEs do not just set maximizing shareholders' value as the single corporate governance objective. They may take actions that can harm the value of the company and the interests of small and medium shareholders due to political considerations. As a result, SOEs will tend to choose low-level audit services to reduce effective and truthful disclosures of their financial information which could have negative impacts on the company. However, during the privatization of state-owned enterprises, non-state-owned capital will pay more attention to the

real financial status and profitability of the target, then will require higher quality financial statements. That is, non-state shareholders generally have greater demands for high-quality auditing service. Since past literatures have shown that Big Four is usually more qualified to strengthen the external supervision of the company, the paper assumes that non-state investors are more inclined to invest in state-owned companies that hire Big Four as their auditors, which means that Big Four can positively impact the privatization process of Chinese SOEs. The two principal assumptions are as following:

Hypothesis 1: Compared with Non-Big-Four auditors, Big Four can significantly promote the conversion of Chinese state-owned enterprises from state-owned to non-state-owned.

Hypothesis 2: Compared with Non-Big-Four auditors, Big Four can significantly reduce the state-owned share proportion in Chinese SOEs.

It is also assumed that the length of period that audited by Big Four can affect audit quality. Geiger & Raghunandan (2002) found that there is a positive relationship between auditor tenure and the likelihood of the auditor issuing a going concern opinion, also audit failures are more likely to occur during the first years of auditor tenure. On the other hand, an accounting firm that has performed a long-term audit in a specific industry could accumulate deeper professional knowledge and experience, which can avoid recurring mistakes made before, reduce human error, and improve auditing quality. It is assumed that if Big Four has provided audit services to certain public listed companies for a long time, they will definitely understand the company's industry characteristics, business models, and financial conditions better, which could help to improve the quality of audit services and then promote the privatization process of SOEs.

Hypothesis 3: The probability that a Chinese state-owned enterprise will change from state-owned to non-state-owned increases with the increase of Big Four auditing tenure.

Hypothesis 4: The state-owned share proportion in Chinese SOEs decreases with the increase of Big Four auditing tenure**.**

Data and Variables

The research sample is derived from CSMAR database and WIND database which disclose various financial statements, financial indicators, and equity structure of listed companies every year in detail. This paper summed the top ten largest shareholders of state-owned shares and legal person shares to obtain the proxy variable for state-owned shares proportion as what most of the previous researches did. Since companies with dual listings in the Mainland and Hong Kong are required to hire accounting firms from both Mainland and Hong Kong, the level of supervision they face is expected to be much higher than that of A-share listed companies. Therefore, A + H listed companies are excluded from the dataset. In addition, financial companies are not included because they are not comparable with the majority of other industries. After dealing with the samples from financial industry, missing data, as well as A + H listed companies, the remaining panel dataset includes a total of 23,517 firm-level observations were obtained over the period 2005 to 2018.

The extent of privatization is regarded as the endogenous variable. It is described by two proxy variables: one is control attribute, which takes value 1 if the enterprise is state-owned and takes value 0 if it is non-state-owned; another is State Ownership, which is evaluated by the proportion of state-owned shares. One of the exogenous variables is the auditing firm, which takes value 1 if the company employs one of the Big Four (PwC, DTT, EY or KPMG) and takes value 0 otherwise. The audit tenure of Big Four is treated as the second explanatory variable. It is also important to control other factors that can potentially affect the privatization process of Chinese SOEs. In this paper, the control variables are divided into micro level and macro level.

For example, in the firm level, return on assets (ROA) is an indicator of how profitable a company is relative to its total assets, which indicates how efficient the management is at using total assets to generate profits. Debt-to-capitalization ratio measures the amount of debt in a company's capital structure and indicates the financial leverage. Market value ratio is used to evaluate the current share price of a publicly-held company's stock, which could help current and potential investors to determine whether a company's share prices are overpriced or underpriced. In addition, year and region dummy variables are included to absorb the variations among different provinces over time.

Table 1: Variables

	Variables	Symbol	Definition
Endogenous Variables	Privatization	SOE	define state-owned holding as 1; non-state-owned holding as 0
		State Ownership	calculate state-owned share proportion
Exogenous Variables	Audit Firm	BIG FOUR	define Big Four as 1, otherwise 0
	Audit Tenure	TENURE	years audited by Big Four
Control Variables	Size	SIZE	natural logarithm of market value
	ROA	ROA	ratio of net profit to total assets
	Leverage Ratio	LEV	$\frac{short\ term\ debt + long\ term\ debt}{short\ term\ debt + long\ term\ debt + shareholders' equity}$
	Revenue Growth	GROWTH	growth ratio of revenues
	Inventory Ratio	INV	ratio of inventory to total assets
	Market Value Ratio	MB	ratio of market value to book value
	Province	PROV	province code
	FDI	FDI	natural logarithm of total foreign direct investment
	GDP	GDP	natural logarithm of GDP

Model

According to Bell, Fairbrother & Jones (2019), random effects indicated zero correlation between the observed exogenous variables and the unobserved effects. Conversely, fixed effects allowed for arbitrary correlation between them. In this case, (Durbin-Wu-) Hausman test is conducted in order to choose between fixed and random effects estimation. The results indicated that the p-value is small (less than 0.01), therefore, the null hypothesis that difference in coefficients is not systematic should be rejected. Random effects model is not consistent, fixed effects estimation is preferred.

Models 1 and 2 are designed to test Hypothesis 1 and Hypothesis 3, the endogenous variable is the ownership attribute of listed companies which is a binary variable with a value of 1 or 0. In these two models, logit regression will be applied to avoid heteroscedasticity, which can estimate the coefficients of explanatory variables and explain the statistical probability of privatization effectively. The model controls other financial factors that could affect the privatization process, as well as the fixed effects of region and time.

Model 1: SOE = $\alpha + \beta_1$ BIG FOUR + $\sum Control\ Variables$ + $\sum Fixed\ Effects$ + error

Model 2: SOE = $\alpha + \beta_1$ TENURE + $\sum Control\ Variables$ + $\sum Fixed\ Effects$ + error

Models 3 and 4 correspond to Hypothesis 2 and Hypothesis 4. The average state-owned share percentage is a continuous variable with a value between 0 and 1, so the ordinary least square regression is applied. The model also controls other financial factors that may impact the probability of privatization, as well as the regional and time fixed effect.

Model 3: State Ownership = $\alpha + \beta_1$ BIG FOUR + $\sum Control\ Variables$+ $\sum Fixed\ Effects$+ error

Model 4: State Ownership = $\alpha + \beta_1$ TENURE + $\sum Control\ Variables$ + $\sum Fixed\ Effects$ + error

Descriptive Statistics

As shown in the following table, 51% of the listed companies are state-owned. The average state-owned shares ratio is approximately 22.68%. The highest ratio of state-owned shares in A-share listed companies is 97.16%. Among the whole sample, companies that hired one of the Big Four accounting firms accounted for only 13.5%, and the average period audited by Big Four was about one year and seven months. The province codes are derived from Touchstone Exposure Data Validation Reference which range from 11 to 65, more details could be found in the appendix.

Table 2: Descriptive Statistics

Variables	Means	SD	Min.	Max.
SOE	0.51	0.50	0	1
STATE	22.68	23.85	0	97.16
BIG4	0.14	0.34	0	1
TENURE	1.68	3.50	0	16
SIZE	21.84	1.28	14.94	28.51
LEV	0.46	0.21	-0.20	1.00
ROA	0.04	0.17	-1.00	20.76
GROWTH	0.81	40.52	-0.97	47.20
INV	0.16	0.15	0	0.94
MB	2.25	9.97	0.05	983.30
PROV-CODE	45.79	13.02	11	65

Furthermore, as the results shown in Table 3, 20,343 observations in the sample data were not audited by the Big Four. Except that there is no significant difference in ROA and GROWTH, the remaining indicators are significantly different from each other in the two groups. 66.5% of the companies audited by the Big Four are state-owned, by contrast, 49% of the companies audited by non- "Big Four" are state-owned. Likewise, among the public listed companies audited by Big Four, the state-owned share ratio (29.33%) is higher, the size, ROA and leverage ratio of companies audited by Big Four are also significantly higher than those listed audited by non- “Big Four”. But the revenue growth rate of Big Four audited firms are lower.

Table 3: Mean Difference

Variables	Non- Big Four	Means	Big Four	Means	Mean Diff.
SOE	20343	0.487	3174	0.665	-0.178***
STATE	20343	21.64	3174	29.33	-7.693***
SIZE	20343	21.70	3174	22.73	-1.028***
LEV	20343	0.456	3174	0.489	-0.034***
ROA	20343	0.042	3174	0.045	-0.003
GROWTH	20343	0.822	3174	0.739	0.083
INV	20343	0.165	3174	0.152	0.013***
MB	20343	2.344	3174	1.641	0.703***
PROV-CODE	20343	45.85	3174	45.41	0.442*

Table 4 is the correlation matrix. From the results, the binary variable Big Four is positively correlated with both SOE and state ownership. Therefore, the SOEs included in the sample that are in the process of privatization tend to be more likely to hire one of the Big Four accounting firms. In addition, the probability of employing Big Four increases with the state-

owned shares proportion. Likewise, the audit period of Big Four is also positively correlated with variable SOE and state ownership, indicating that when the central or local government holds more shares in the state-owned enterprises, Big Four tend to be hired for a longer period of time in order to complete their privatization process. With regards to the control variables, firm size, leverage ratio and inventory ratio are significantly and positively correlated with the control attribute of the enterprise and the state-owned share percentage. Specifically, larger Chinese SOEs are more inclined to hire Big Four and generally would keep the Big Four auditors for a longer period of time compared to smaller firms. Return on assets and market-to-book ratio are found to be negatively correlated with SOE, indicating that state-owned enterprises have worse performance in using their total assets to generate earnings and their share prices are potentially overestimated on the stock market. Growth and inventory rate are not significantly correlated with the variable SOE and the state ownership.

Table 4: Correlation Matrix

	SOE	STATE	BIG4	TENURE	SIZE	LEV	ROA	Growth	INV	MB
SOE	1									
STATE	0.107***	1								
BIG4	0.131***	0.129***	1							
Tenure	0.111***	0.106***	0.728***	1						
SIZE	0.243***	0.132***	0.362***	0.389***	1					
LEV	0.252***	0.007	0.059***	0.071***	0.364***	1				
ROA	-0.051***	0.057***	0.018***	0.011*	-0.004	-0.116***	1			
Growth	-0.003	-0.006	-0.004	-0.003	0.006	0.004	0.013**	1		
INV	0.006	-0.029***	-0.031***	-0.040***	0.107***	0.302***	-0.032***	0.018***	1	
MB	-0.070***	-0.002***	-0.025***	-0.024***	-0.156***	-0.095***	0.063***	0	-0.049***	1

Results

Firstly, set the control attribute as the explained variable. Big Four and tenure are regarded as the independent variables respectively. Under the whole sample, whether the public listed company is audited by one of the Big Four auditing firms has a significant and positive impact on the probability of privatization. After controlling firm size, financial performance indicators and other fixed effects, the regression coefficient of the binary variable Big Four is about -0.167, and it is significant at the 0.01 level, indicating that the probability of privatization for listed SOEs that are audited by Big Four could significantly increase by 16.7%.

When audit tenure is included as the independent variable, the estimated coefficient of it is -0.0224 and is significant at the 0.01 level, indicating that when SOEs are audited by Big Four for one more year, the probability of privatization could increase by 2.24%. Therefore, Big Four promoted the privatization process of listed state-owned companies. These results confirmed Hypothesis 1 and Hypothesis 3 respectively. With regards to the coefficients of control variables, the results showed that it tends to be more difficult for larger SOEs to be privatized, in addition, the higher the leverage ratio, return on assets, growth and market value ratio, the higher the probability of privatization.

Table 5: Regression – Dependent Variable: SOE

Dependent Variable	SOE	
BIG4	-0.167***	
	(-3.94)	
Tenure		-0.0224***
		(-5.38)
SIZE	0.419***	0.431***
	(-5.02)	(-5.17)

LEV	-1.155***	-1.162***
	(-5.15)	(-5.18)
ROA	-1.066***	-1.067***
	(-3.27)	(-3.28)
Growth	-0.00400*	-0.00403*
	(-1.72)	(-1.73)
INV	-0.253*	-0.266**
	(-1.95)	(-2.05)
MB	-0.0347***	-0.0330***
	(-3.43)	(-3.34)
_Cons	-4.757**	-4.817**
	(-2.20)	(-2.23)
N	23517	23517
R-square	0.1629	0.1641

After dividing the whole sample into state-owned enterprises and non-state-owned enterprises, the regression results in Table 6 showed that whether to hire one of the Big Four accounting firms has different effects on the variable state ownership among state-owned and non-state-owned enterprises. For Chinese state-owned enterprises, the audit of Big Four can significantly reduce the proportion of state-owned shares since the coefficient of independent variable BIG4 is –1.220, and it is significant at the 0.05 level. Therefore, SOEs that were audited by Big Four tend to be more attractive to private institutions or individuals and more likely to be privatized successfully, which confirms Hypothesis 2. In addition, the coefficient of Big Four tenure is -0.248 and it is significant at the 0.01 level, indicating that the longer SOEs are audited by Big Four, the lower proportion of state-owned shares, which confirms Hypothesis 4. The state-owned shares percentage increase with the firm size since the coefficient of size is positive and significant. Return of assets, inventory ratio and market value ratio also have a

positive impact on the dependent variable.

For non-state-owned enterprises, the coefficient of BIG4 is 0.505, and the coefficient of the Big Four tenure is 0.0195, but both of them are not statistically significant at the 0.1 level, therefore, hiring one the Big Four accounting firms as auditors cannot increase the proportion of state-owned shares in non-state-owned enterprises, which is reasonable since the demand of auditing for state-owned and non-state-owned enterprises are heterogeneous. The coefficients of firm size and return on assets are positive and significant, indicating that the central or local authorization tend to invest more on larger private enterprises with better financial performance.

Table 6: Regression – Dependent Variable: state ownership

	State-owned		Non-state-owned	
BIG4	-1.220**		0.505	
	(-1.98)		(-1.03)	
Tenure		-0.248***		0.0195
		(--4.21)		(-0.3)
SIZE	3.535***	3.785***	1.709**	1.584*
	(-2.97)	(-3.17)	(-2.04)	(-1.89)
LEV	-9.559***	-9.859***	1.161	1.145
	(-3.13)	(-3.22)	(-0.66)	(-0.65)
ROA	20.83***	20.60***	1.739***	1.696***
	(-5.20)	(-5.15)	(-3.96)	(-3.95)
Growth	-0.0107***	-0.0107***	-0.00146*	-0.00136*
	(-3.64)	(-3.65)	(-1.81)	(-1.75)
INV	2.281	1.988	-2.784**	-2.672**
	(-1.23)	(-1.07)	(-2.46)	(-2.36)

MB	0.775***	0.807***	0.0248***	0.0238***
	(-4.32)	(-4.44)	(-3.07)	(-3.02)
_Cons	275.1***	273.9***	37.93*	37.50*
	(-12.29)	(-12.24)	(-1.76)	9-1.75)
N	12027	12027	11490	11490
R-square	0.2604	0.2613	0.0945	0.00973

According to Allison (2012), multicollinearity is a potential problem when estimating linear or generalized linear models, including logistic regression. It occurs when independent variables are highly correlated with each other, causing unreliable and unstable estimations of regression coefficients. So, the variance inflation factor (VIF) is tested in table 7. It estimated how much the variance of a coefficient is inflated due to linear dependence with other predictors. From the results, VIFs of return on assets and market ratio are 3.357 and 4.604 respectively, which are higher than 2.5, but these two collinear variables are only treated as control variables, and adjusted R square in this model when Big Four is the explained variable is 0.168, therefore, multicollinearity problem could be safely ignored.

Table 7: VIF – Dependent Variable: Big Four

	Standardized Coefficients			Collinearity Statistics	
	Beta	t	Sig.	Tolerance	VIF
(Constant)		-24.269	.000		
LEV	-.054	-5.101	.000	.690	1.449
ROA	.114	6.995	.000	.298	3.357
INV	-.071	-5.587	.000	.489	2.047
Growth	-.007	-.739	.460	.967	1.034
Size	.288	24.423	.000	.567	1.764
MB	.154	8.071	.000	.217	4.604

Robustness

Since 1992, the emergence of Sino-foreign cooperative accounting firms has made great contributions to the international convergence of audit standards. Many studies have shown that Big Four is superior in terms of audit quality than domestic accounting firms in China. After 20 years of rapid development, revenues of Big Four have accounted for about 34% of the total revenue of 100 Chinese accounting firms in 2011. With the continuous development and growth of China's securities market, the demand for high-quality audit services is still increasing. At the same time, the improved market-oriented economic system with Chinese characteristics has also set higher requirements and more challenges for auditors, the form of cooperation between Chinese and foreign firms before 2012 can no longer meet the new needs. Therefore, in May 2012, China's Ministry of Finance and other four major departments jointly issued the "Scheme for Localized Transformation of Sino-foreign Cooperative Accounting Firms" (hereinafter referred as the "Scheme"). The scheme required Big Four to reduce their differences with local accounting firms in order to promote legal compliance as well as weaken their competitive advantages in China. For example, partners of Big Four are required to hold Chinese certified public accountant (CPA). According to China Briefing (2012), the percentage of partners who hold the qualifications of CPA validated by foreign countries or regions is less than 40 percent of the total number of partners upon the issuance of the practicing certificate of the General Special Partnership Agreement, which is the joint venture license specifically issued to the MNC audit profession in China. This percentage is required to be reduced to no more than 20 percent by 2017. The existing favorable terms about joint ventures will expire and Big Four had to make some necessary adjustments in order to renew their licenses, for instance, hire more local partners and employees. As a result, Big Four faced with the challenge of higher employees' turnover.

It is possible to study how Big Four impacts the probability of privatization before and after the transformation by taking advantage of this exogenous policy shock happened in 2012. Define the companies that employed Big Four both before and after the 2012 policy implementation as the experiment group. The companies that were audited by local accounting firms both before and after the policy shock are the control groups. Since the scheme had great impacts on business activities of Big Four accounting firms, but almost no impacts on the local accounting firms' operations, a quasi-natural experiment could be expected. Treat the state-owned shares percentage of public listed SOEs as the explained variable, set control variables as the same as former specifications, and obtain the difference-in-differences estimators of the 2012 policy effects using the following model:

$State\ Ownership_{it} = \alpha + \beta_1\ Scheme_{it} + \sum Control\ Variables + Y_t + R_i + \varepsilon_{it}$, Where:

$Scheme_{it}$ is a dummy variable that equals 1 for every year after 2012 for every SOEs that hired one of the Big Four accounting firms, 0 otherwise; Y_t is a year fixed effect; R_i is a regional fixed effect; ε_{it} is the error term.

This regression considered all the other firms in the sample as the control group. As the following results showed, the coefficient of scheme is 2.408, and it is significant at the 1% significance level, indicating that the difference between Big Four and other local firms was indeed weakened by the 2012 policy implementation. In addition, the policy implementation had positive effects on the share percentage owned by the state, and the impacts of Big Four on the privatization of state-owned enterprises declined since the gap between Big Four and local accounting firms was narrowed.

Table 8: Difference in Difference Model

Independent Variables	State Ownership
Scheme	2.408***
	(-1.65)
SIZE	3.403**
	(-2.78)
LEV	-8.546***
	(-3.63)
ROA	18.14**
	(-4.31)
Growth	-0.201**
	(-3.44)
INV	2.064
	（-1.03）
MB	0.684***
	(-4.32)
_Cons	242.1***
	（-10.76）
N	12027
R-square	0.1983

Instrument Variable

Generally, auditing fees of the Big Four accounting firms are higher than local accounting firms since they can provide better audit services. The audit costs are related to decisions whether to hire one of the Big Four accounting firms or not. At the same time, audit fees usually depend on the auditing workload and the complexity of the company's business, so

it has no direct impacts on the decision whether to privatize the company or not. In this case, exogenous requirements are satisfied and audit costs could be used as an instrumental variable of the Big Four.

In table 9, audit cost is treated as the instrumental variable. Columns 1, 3, 5 and 7 reported the results of the first stage regression. The estimated coefficient of audit cost is statistically significant, indicating that the audit cost is indeed positively correlated with the variable Big Four. Columns 2, 4, 6, and 8 reported the estimation results of the second stage regression. The coefficients of Big Four are all significantly negative at the 0.01 level, indicating that Big Four could help increase the probability of privatization and decrease the proportion of state-owned shares in Chinese SOEs. Therefore, after considering the potential endogenous problems caused by the relationship between Big Four and state control, the former results are still valid.

Table 9: Two Stage Regression

	Big4	SOE	Big4	State ownership	Big4	State ownership	Big4	State ownership
	Full Sample		Full Sample		State Owned		Non-State Owned	
Big4		-0.180***		-11.067**		-13.821***		2.645
		(-0.027)		(-1.802)		(-2.198)		(-2.45)
Audit Cost	0.201***		0.173***		0.193***		0.121***	
	(0.007)		(0.005)		(0.007)		(0.008)	
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	12439	12439	22096	22096	11251	11251	10845	10845

Conclusion

The paper used China's A-share listed companies from 2005 to 2018 as the sample to

conduct an empirical study on whether audit services can promote the privatization process of Chinese SOEs. The study found that after controlling the firm-level relevant factors, regional fixed effects, and time fixed effects, whether the listed SOEs employed Big Four as their auditors had a significant and positive impact on the privatization process. Specifically, hiring one of the Big Four accounting firms can improve the probability of privatization by about 16%, and decrease the proportion of state-owned shares in state-owned enterprises. In addition, when the company is audited by Big Four for one more year, the probability of ownership conversion increases by 2.24%, though such promotion effect was weakened after the localization of Big Four accounting firms in 2012. Furthermore, audit fee is treated as an instrumental variable of Big Four for two-stage regression analysis. After considering potential endogenous problems, same conclusions can still be reached.

Previous studies have shown that the transfer of state-owned shares is often accompanied by serious information asymmetry problems. This paper believes that the management of state-owned enterprises has a strong motivation to deviate from profit maximization behaviors, so there is an incentive to avoid employing Big Four accounting firms for auditing services in order to reduce the information disclosure about their real financial performance. Generally, the auditing reports published by the Big Four are more reliable and accurate. Given that audit services can significantly improve the transparency of financial information in public listed companies, as well as monitor the behaviors of mangers and protect investors, thereby, Big Four can reduce the agency costs and information asymmetry faced by all parties in public during the privatization process and then promote the probability of privatization. In addition, the stakeholders in the market tend to have a much higher degree of recognition and trust on auditing reports issued by Big Four than those were published by local accounting firms. Therefore, SOEs that hired one of the Big Four accounting firms became more attractive to potential private investors and more likely to finish privatization successfully.

In 2012, the Scheme for Localized Transformation of Sino-foreign Cooperative Accounting Firms required the Big Four to localize further and reduce their differences with local accounting firms. So Big Four enjoyed less competitive advantages since then. However, the impact of such organizational restructure on Big Four is still limited since they still maintain better reputation arisen from their rich international auditing experience and best corporate governance practice. From the empirical evidence, Big Four still play a vital role in promoting the privatization process of state-owned enterprises in China. The imperfectness of domestic accounting and auditing systems is also an important factor that restrict local accounting firms to improve their auditing quality. Therefore, it is necessary to fully improve the domestic institutional environment, legal environment and investor protection environment, and further help local auditors to learn about advanced auditing standards in order to gradually close the gap between local accounting firms and the international Big Four. Currently, China is making great efforts to implement deeper reforms of state-owned enterprises, promoting the integration of state-owned and private capital is one of the most important directions. As an effective external regulatory agency and information transmitter for public listed companies, the accounting firms have obligations to play a more significant role in the privatization process, for example, improve audit quality, reduce the opacity of financial information, provide protection for sparse investors to help promote privatization of state-owned enterprises.

In summary, the paper used empirical research methods to explore the impact of Big Four audits on the privatization process of state-owned enterprises and explained the mechanism of such impacts. However, the paper is limited by the acquisition of available data. For example, in the calculation of the state-owned shares percentage, a keyword search method is adopted to identify the shareholders of public listed companies, it is difficult to distinguish whether some institutional shareholders are state shareholders or not, causing potential deviations in the measurement of the variable state ownership, which requires further

investigation. Another limitation is the endogeneity problem, although instrument variable is used for Big Four to conduct a two-stage regression, there are no theoretical evidence from past literatures to support the rationality. Other control variables included in the regression such as ROA and leverage ratio are also impacted by government involvement in many studies. For example, Abolhassani, Wang & Hann (2019) have found that government's direct and indirect control can influence the financial performance of public listed companies on the stock exchanges of Shanghai and Shenzhen. So potential endogeneity problem was not solved.

Chinese SOEs have now entered a crucial stage of deep ownership reform, improving their efficiency and realizing the enlargement and strengthening of them are important to ensure the country's economic growth. Future researches can explore the role of effective external supervision in improving the operating efficiency of state-owned enterprises and study other potential factors that could have impacts on the privatization process to find more feasible suggestions to help SOEs complete reform, at the same time, achieve sustained, stable and healthy development.

Reference

Alastair, L., Miguel, M.M., & Ping, Z. (2011). Can Big 4 versus Non-Big 4 Differences in Audit-Quality Proxies Be Attributed to Client Characteristics? The Accounting Review, 86(1), 259-286.

Allison, P. (2012). "When Can You Safely Ignore Multicollinearity?" Statistical Horizons. September 10, 2012. Retrieved from http://statisticalhorizons.com/multicollinearity.

A. Ng, A. Yuce, E. Chen (2009). Determinants of state equity ownership, and its effect on value/performance: China's privatized firms Pacific-Basin Finance Journal, 17 (4), 413-443.

Bushman, R., Piotroski, J. & Smith, A. (2004b). What determines corporate transparency? Journal of Accounting Research, 42(2), 207-252.

Boubakri, N., J.-C. Cosset, Guedhami, O. & Omran, M. (2007). "Foreign investor participation in privatizations: Does the institutional environment matter?" Journal of Financial Research 30, 129-146.

Bell, A., Fairbrother, M. & Jones, K. (2019). Fixed and random effects models: making an informed choice. *Qual Quant* 53, 1051–1074.

Chong-En B., Jiangyong L. & Zhigang T. (2009). How does privatization work in China? Journal of Comparative Economics, 37(3), 453-470. ISSN 0147-5967.

China Briefing News (2012). China Orders 'Big Four' Auditors to Restructure. Retrieved from https://www.china-briefing.com/news/china-orders-big-four-auditors-to-restructure/

Essays, UK. (November 2018). What is privatization and its history in China. Retrieved from https://www.ukessays.com/essays/economics/what-is-privatization-and-its-history-in-china-economics-essay.php?vref=1.

Fan, P. H., T. J. Wong & T. Zhang (2007). Politically-connected CEOs, corporate governance and post-IPO performance of China's newly partially privatized firms. Journal of Financial Economics 84: 330-357.

Geiger, M. & Raghunandan, K. (2002). Auditor Tenure and Audit Reporting Failures. Auditing: A Journal of Practice & Theory, 21(1), 67-78.

Gary, H. J. & Su, J. (2006). Privatization and restructuring in China: Evidence from shareholding ownership, 1995-2001. Journal of Comparative Economics, 34(1), 146-166.

Guedhami, O., Pittman, J. A., Saffar, W. (2009). Auditor choice in privatized firms: Empirical evidence on the role of state and foreign owners. Journal of Accounting and Economics, 48(2): 151-171.

Hanwen, C., J.Z. Chen, G.J. Lobo and W. Yanyan (2011). Effects of Audit Quality on Earnings Management and Cost of Equity Capital: Evidence from China, Contemporary Accounting Research, 28(3): 892-925.

Joyce, L. (2008). From non-tradable to tradable shares: Split share structure reform of china's listed companies. Journal of Corporate Law Studies, 8(1), 57-78.

Karen, J. L., Xiaoyan, L., Junsheng, Zh., Ying, Zh. (2020). State-owned enterprises in China: A review of 40 years of research and practice. China Journal of Accounting Research, 13(1), 31-55. ISSN 1755-3091.

K. Hess, A. Gunasekarage, M. Hovey (2010). State-dominant and non-state-dominant ownership concentration and firm performance: evidence from China, International Journal of Managerial Finance, 6 (4), 264-289.

Marzieh, A., Zhi, W. & Jakob de Haan (2020). How Does Government Control Affect Firm Value? New Evidence for China. KYKLOS, Vol. 73 – February 2020 – No. 1, 3–21.

Paul, L. G. (2011). The Big Four in China: Hegemony and Counterhegemony in the Development of the Accounting Profession in China. Macquarie Graduate School of Management, Sydney, Australia.

Qingliang, T., Chee, W.C., Amy, L. (1999). Auditing of state-owned enterprises in China: historic development, current practice and emerging issues. The International Journal of Accounting, 34(2), 173-187. ISSN 0020-7063.

Qian, S. & Wilson, T. (2003). China share issue privatization: the extent of its success, Journal of Financial Economics, 70(2), 183-222. ISSN 0304-405X.

Qian Wang, T.J. Wong & Lijun Xia (2008). State ownership, the institutional environment, and auditor choice: Evidence from China. Journal of Accounting and Economics, 2008, vol. 46, issue 1, 112-134,

Q. Sun, W.H.S. Tong, J. Tong (2002). How does government ownership affect firm performance? Evidence from China's privatization experience, Journal of Business Finance and Accounting, 29 (1-2), 1-27.

Stevens, M. (1981). The Big Eight: An Incisive Look Behind the Pinstripe Curtain of the Eight Accounting Firms whose Practices Affect the Pocketbooks of Every American. New York: Macmillan Publishing Company.

Xiang, L., Reza, S., Mohammad, B. (2014). Institutional incentives and earnings quality: The influence of government ownership in China. Journal of Contemporary Accounting & Economics, 10(3), 248-261. ISSN 1815-5669.

Xu, X. & Y. Wang (1999). Ownership Structure and Corporate Governance in Chinese Stock Companies, China Economic Review. 10(1): 75-98.

Yu, M. (2013). State Ownership and Firm Performance: Empirical Evidence from Chinese

Listed Companies, China Journal of Accounting Research. 6(2): 75-87.

Zheng, Y., Wenxuan, H. & Xiaolin, Q. (2015). The Split-Share-Structure Reform in China: Past, Procedure, and Impact. Sustainable Entrepreneurship in China, 159-177.

Appendix

Table 1 Province Code in China

Province Code	Province Name
11	Beijing
12	Tianjin
13	Hebei
14	Shanxi
15	Inner Mongolia
21	Liaoning
22	Jilin
23	Heilongjiang
31	Shanghai
32	Jiangsu
33	Zhejiang
34	Anhui
35	Fujian
36	Jiangxi
37	Shandong
41	Henan
42	Hubei
43	Hunan
44	Guangdong
45	Guangxi
46	Hainan
50	Chongqing
51	Sichuan
52	Guizhou
53	Yunnan
54	Xizang
61	Shaanxi
62	Gansu
63	Qinghai
64	Ningxia
65	Xinjiang