

**Study of the Effectiveness of China's Corporate Governance Reform – A Board  
Characteristics View**

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## **ATTESTATION OF AUTHORSHIP**

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

## **Abstract**

This study investigates the effectiveness of China's corporate governance reforms in the year 2002 on firm performance. Specifically, the study investigates the relationship between good firm performance and board characteristics that capture boards' monitoring and resource provision abilities before and after the corporate governance reform.

This study firstly examines whether the Chinese corporate governance reform in year 2002 has caused changes in board characteristics, then the study relates the measurements for good firm performance to board characteristics that represent boards' monitoring role (i.e., director independence, CEO-chair duality, concentration of directors appointed after the CEO, and director share ownership) and resource provision role (i.e., board size, directors on multiple board, director tenure, and frequency of supervision board meetings). The study uses a data envelopment analysis (DEA) approach to calculate a firm economic efficiency score as the main measurement of firm performance. For sensitivity analysis, traditional measurements including share returns, return on assets and Tobin's Q have also been applied to consolidate the findings.

The study provides evidence that China's corporate governance reforms in year 2002 has resulted in changes regarding to the number of independent directors on board, CEO-chair duality, director tenure and frequency of supervision board meetings. Those changes are towards enhancing investor protection and improving firm performance, which the evidence is consistent with the prediction that the year 2002 corporate governance reforms will change the corporate governance factors of Chinese listed firms. However, inconsistent with the agency theory and resource dependence theory predictions, this study shows that board characteristics do not have a significant relationship with firm economic efficiency score. The additional tests of using traditional performance measurements also shows corporate governance factors before and after the reform do not influence firm performance.

These findings point to a significant problem. It would seem that China's corporate governance reform in year 2002 has made Chinese listed firms simply obeys the governance code, rather than fully utilise it. Therefore, the corporate governance reform in the year 2002 has enhanced the corporate governance factors, however failed to

improve firm performance. Therefore, the findings have implications for regulators in emerging economies, that the corporate governance code should be developed and modified based on the specific characteristics of a countries economy, rather than simply following the developed countries' regulatory system.

## 1.0 Introduction

According to the study of Tricker (2009), China is a country with strong central control, in which the National People's Congress, the state Council, and the Communist Party play significant roles in the governance of enterprises, and share ownership is not the obvious basis for governance power. As stated by Tricker (2009), in the early days, many Chinese listed companies were dominated by their majority internal shareholders, who tended to represent state, provincial, or local governments. Board membership overlapped management, the roles and responsibilities of key players were often unclear and internal management control measures were not clearly established. Hence, the study of Tricker (2009) found during the early stage of Chinese companies' corporate governance, the duties of the board and top management were often vague, the chairman sometimes usurped the chief executive's role, and the chief executive encroached on the work of the chief operations officer and divisional heads. In some cases, information was manipulated, delayed, even falsified. Performance assessment of individual directors was immature and not necessarily linked to incentives (Tricker, 2009).

To resolve the problems listed above, in the year 2001, the China Securities Regulatory Commission (CSRC) formulated some basic norms of corporate governance, promoting the separation of listed companies from controlling shareholders, then in year 2002, a Code of Corporate Governance for listed companies was formulated (Rajagopalan and Zhang, 2008; Tricker, 2009; Jiang and Kim, 2014). The code include basic principles for the protection of investors' rights, basic behaviour roles, and standards for directors, supervisors, and senior management. The Code was intended to be the major measuring standard for evaluating listed companies' corporate governance structure (Tricker, 2009).

Therefore, this study has set the year 2002 as a turning point, and conduct an event study, to examine whether the Chinese corporate governance reform in that year has had a significant impact on Chinese firms' subsequent performance. The study uses board characteristics as independent variables to reflect corporate governance reform, the selections are based on two functions for the board suggested by Hillman and Dalziel (2003), which are (1) monitoring management to ensure that the board acts in the interests of shareholders, as advanced by agency theory, and (2) facilitating access to information and other resources, as promulgated by resource dependence theory. Therefore, the first research question is raised, which is has there been change in the corporate governance

factors following the reform?

Accordingly, this study investigates whether the Chinese corporate governance reform in year 2002 has enhanced the operation of the board, and the relationship between good firm performance and board characteristics capture the board's monitoring and resource provision abilities. This raises the second research question, that is if the corporate governance reform in 2002 has changed the corporate governance factors, does this influence firm performance?

This study follow the DEA approach from the study of Feroz, Kim and Raab (2003) and Rouse, Van Staden and Tresadern (2014) to proxy firm performance as economic efficiency, and the inputs and outputs are selected following the study of Rouse et al (2014), to calculate the firms' economic efficiency based on the DEA approach. This study then relates the firms' economic efficiency to board characteristics that represent the board's monitoring role (i.e., independence, CEO-chair duality, concentration of directors appointed after the CEO, and directors shareholding) and resource provision role (i.e., board size, directors on multiple boards, director tenure, and frequency of supervision board meeting).

This study finds the Chinese corporate governance reform in the year 2002 did have influenced some corporate governance factors, such as number of independent directors on board has increased, CEO-chair duality has decreased and frequency of supervision board meetings has increased, which support the prediction of first hypothesis. However, inconsistent with the prediction of second hypothesis, the multi-linear regression analysis results show that changes of board characteristics after the reform do not play a significant role in improving firms' economic efficiency.

In order to consolidate this result, the study also performs additional tests, by applying three traditional performance measurements, which are share returns, ROA and Tobin's Q. After controlling for other factors affecting firm performance, this study finds that board characteristics plays an insignificant role in improving firm performance before and after the reforms. Furthermore, the study examines whether the changes in board characteristics before and after the reform have influenced the changes in firm performance, and this gives similar results to the tests reported before. Hence, the study

concludes that the corporate governance factors have changed after the corporate governance reforms, however, those changes do not have an influence over firm performance, which provides evidence that the reforms were ineffective with regards to improving firm performance.

The results of this study will be of interest to shareholders, boards and regulators in emerging economies such as China, by showing whether there are actual benefits from the corporate governance reform, and how to modify the governance code to improve firm performance.

The next section explains why boards influence firms' economic efficiency and presents the theory and hypotheses. Then is followed by a section on the method. The results are reported next, followed by a discussion and conclusion section.

## **2.0 Literature Review and Hypothesis development**

### **2.1 Background**

Since the late 1990s, more than 20 developed and emerging countries have undertaken corporate governance reform, such as Australia, Brazil, Malaysia, India, China and US etc. Although the nature and strength of the reform varies across countries, they all share the common objectives of strengthening investors' protection (Kim and Lu, 2013). Further, Claessens and Yurtoglu (2013) have found many of the changes have occurred in the aftermath, and as a response to crises. For example, Enron and other major scandals in the early 2000s led to the 2002 Sarbanes-Oxley act (SOX) in the US (Kim and Lu, 2013); South Korea has undertaken dramatic legal reforms to improve the transparency of management, internal and external control mechanisms after being criticised for the poor corporate governance and cited as one of the major causes of the 1997 financial crisis (Kim and Lu, 2013); in India, the urgent need for corporate governance reform came from several significant stock market scandals linked to insider trading, this led to the enactment of Clause 49 of the Listing Agreement which improves board characteristics, audit procedures and shareholder rights (Rajagopalan and Zhang, 2008).

Furthermore, comparing developed and emerging economies, the latter are fast becoming the driver of global growth since emerging economies are expected to grow two to three

times faster than developed nations such as the US, which illustrate a tremendous investment opportunity (Rapoza, 2011).

The study of La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000) provides evidence that compared with developed economies, firms in emerging economies have weaker corporate governance due to the poor legal enforcement and investor protection, and therefore those firms are discounted in financial markets. Furthermore, Rajagopalan and Zhang (2008) state that well-functioning corporate governance mechanisms in emerging economies are of crucial importance for both local firms and foreign investors that are interested in pursuing the tremendous opportunities for investment and growth that emerging economies provide. Hence, improvement in corporate governance can enhance investors' confidence of firms in emerging economies and increase these firms' access to capital. Moreover, according to a 2002 McKinsey investor opinion survey, investors who were open to pay premiums for firms in emerging economies were, on average willing to pay a 25% premium for well-governed Chinese firms, which are the highest among countries with emerging economies, followed by India (23%), Malaysia (22%), South Korea (20%), etc. (Barton, Coombes and Wong, 2004). Previous studies also have shown China's economy has been growing rapidly due to globalization, which leads to continuously reform and improvement of Chinese firms' corporate governance (Rajagopalan and Zhang, 2008; Lin and Liu, 2009; Yu, 2013). Therefore, among all the recent corporate governance reforms in emerging and developed economies, China's situation can be regarded as the one that needs to draw most attention and to be analysed further.

According to Rajagopalan and Zhang (2008), China has been under economic reform since the late 1970s due to the influence of globalisation. For example, the privatisation of state-owned enterprise in the early 1990s, issuing company law and security law in the late 1990s (Cheung, Jiang, Limpaphayom and Lu, 2008). However, China have really aware of the issue of weak corporate governance was after the YingGuangXia corporate scandal in mid-2001, that engaged with RMB 745-million fraud, which is the largest economic scandal in mainland China's history (Chalmers, Haman and Qu, 2014). Therefore, in order to further improve Chinese firms' corporate governance, in January 2002, the China Securities Regulatory Commission (CSRC) released its Code of Corporate Governance for listed companies in China, which follows the US regulatory system (Rajagopalan and Zhang, 2008). The mandatory code aims to establish solid

corporate governance in stock market listed companies by evaluating requirements related to accounting procedures and information disclosure, introducing independent director systems, and tightening the supervision of corporate management. Further evidence is provided by the study of Jiang and Kim (2014), which gives an overview of corporate governance in China from year 1999 to 2012. They have found that the corporate governance reform in 2002 has caused dramatic changes for Chinese firms and particularly for the characteristics of the board of duties. For instance, the study has found after the year 2002, consistent with the reform, the average number of independent directors has increased from almost 0 in the year 1999 to more than 2 in year 2002 and more than 3 after. Although the total number of directors remains almost constant at 9, the percentage of directors that are independent is increasing. The study has also shown improvements in board duties and responsibilities for the year 2002 and onwards, i.e., firms' boards are required to be knowledgeable, law-abiding with proper professional backgrounds. Further, Jiang and Kim (2014) states that in China, firms have two-tier board structures (a board of directors and a board of supervisors), the corporate governance reforms in year 2002 has also require the supervision board to be knowledgeable and meet periodically. All these changes indicates that there have been a significant changes with regard to the board characteristics of Chinese firms after the year 2002.

Prior studies that investigate the Chinese corporate governance reforms in the early 1990s tends to focus on ownership structure rather than specific board characteristics (Chen, Firth and Rui, 2006; Watanabe, 2002; Xu and Wang, 1999). This is because the early stages of corporate governance reforms in China related to state-owned enterprise privatisation, issues are mainly focused on ownership between the state and individual investors. The major and common limitation is that those studies tend to put more weight and interest in the government interference in firms' corporate governance as a whole and analyse firms' subsequent performance, rather than examining the specific governance areas such as board characteristics. While recent studies that have chosen sample periods after the year 2002 and onwards, are more likely to focus on how firms' board characteristic will influence the subsequent firm performance (Conyon and He, 2011; Lo, Wong, and Firth, 2010; Ran, Fang, Luo and Chan 2014). One explanation is that, due to the completion of early stage reform and issuing of the corporate governance code, researchers are now more interested in what specific improvements the Chinese firms should have to better protect investors and improve performance.

## **2.2 Previous studies around board characteristics effectiveness**

According to Bathula (2008), the characteristics of a firm's board can play a crucial role in determining the firm performance. The board not only provides a link between the firm and its external environment and perform the strategic decision making role, also a firm's board can act as a mechanism of internal governance and monitoring of management. These roles are consistent with the framework introduced by Hillman and Dalziel (2003) that board both monitor and provide resources. De Villiers, Naiker and Van Staden (2011) have further explained that under board monitoring role which is supported by agency theory, management initiates and implements, whereas directors monitor to reduce the conflict of goals between management and shareholders. This is important because of the potential costs incurred when management pursues its own interests at the expense of shareholders' interests (Hillman and Dalziel, 2003). Moreover, under the resource provision role, which is supported by resource dependency theory, De Villiers et al (2011) suggest that directors facilitate access to resources because resource access represents a particular challenge for firms. Under this view, the resource rich directors can actively involve and positively influence strategy and programs, can bring more experience and knowledge and offer better advice, therefore influencing firm performance. As stated by Bathula (2008) an effective board is likely to help the firm achieve superior performance. Hence, the critical role a board plays in the success of a firm requires in-depth research on different factors that link a board to firm performance.

There are an extensive number of studies that relate to corporate governance and board characteristics and firm performance for developing and developed economies. However, the impact of board characteristics on firm performance are not conclusive in nature. Some studies have found a significant relationship between certain characteristics of the board and firm performance. For example, Daily and Dalton (1997), Roberts, McNulty and Stiles (2005), and Nicholson and Kiel (2004), have covered aspects such as independence of the board, CEO-chair separation, non-executive directors, director selection, director ownership and find a significant relationship with subsequent firm performance.

However, some other studies find little evidence to suggest that board characteristics affect firm performance. For instance, Weir and Laing (1999) using a UK sample studied the code of best practice promoted by the Cadbury Committee in year 1992, find little

evidence to suggest that board characteristics affect firm performance. However, the study only compares 2 groups of samples which are firms in year 1992 and year 1995, which may be insufficient to fully reflect the changes promoted by the code. Moreover, the study only applies the agency model when selecting related board characteristics (CEO-Chair duality, number of non-executive directors), and concentrating solely on the agency model may mean that other important influences on performance are being omitted, for example, resource based theory. Therefore, different explanations of the model may provide useful development of the debate. Another study by Dalton, Daily, Ellstrand and Johnson (1998) considered agency theory, stewardship theory and resource dependency theory together and perform a meta-analysis. It found no evidence of a substantive relationship between board composition and firm performance. Although the study is not optimistic that further research in the general areas of board characteristics and financial performance would be fruitful, the nature of the samples should be considered carefully. The meta-analysis used empirical studies from large corporations such as subsets of the Fortune 500, which are mostly from developed economies. Therefore it left a gap in the area of emerging economy studies, which requires to be further examined.

Regarding to the influence of Chinese corporate governance reforms, few studies have contributed to this research area. For example, the study of Chen, Firth, Gao and Rui (2006) examined the board characteristics of Chinese firms with regard to detecting fraud after the reforms in year 2002, the study select boardroom characteristics including outside directors, board size, number of board meetings in a year, chairman tenure and CEO-chair duality, they found boards with more independent directors and more board meetings in a year linked with higher probability of detecting fraud. Therefore Chen et al (2006) conclude that board characteristics are important factors in explaining fraud. Furthermore, Su and He (2012) selected sample firms between year 1999 and 2006 to examine whether Chinese firms' board characteristics before and after the Chinese corporate governance reform in year 2002 affect firms' productive efficiency. The board characteristics include board size, CEO-chair duality and outside-directors on board. Su and He (2012) found firms with more independent board are more productive and efficient, which provide evidence about the effectiveness of the corporate governance reform. Moreover, Liu, Miletkov, Wei and Yang (2015) collect 2057 sample firms from year 1999 to 2012 and examined whether board independence in China has influenced firm performance, in which the performance are measured by return on assets, return on

equity, Tobin's Q and stock return. They have found independent directors have an overall positive effect on firm operating performance in China. Therefore, the studies listed above show the changes in board characteristics due to Chinese corporate governance reform in year 2002 has not only improved firm financial performance, but also provide better protection to investors. Therefore, this study expects that corporate governance factors will influence performance stronger after the reforms than pre-reform periods.

### **2.3 Previous studies about measuring firm performance**

When measuring the effectiveness of board structure on firm performance, studies tend to use ratios as proxy for financial performance. One of the most famous ratio is return on assets, for instance: Chen (2014) examined the influence of the institutional environment on board characteristics and subsequent firm performance in China, and use ROA as proxy for firm performance, Sarkar and Sarkar (2008) examined the multi-directorships by independent directors under 'resource dependency hypothesis' of Indian firms, also use ROA to proxy firm performance, Bathula (2008) studies relationships between New Zealand firms' board characteristics and firm performance, and use ROA to proxy performance as well. According to Dalton et al (1998), accounting returns provide a more convenient benchmark for analysts to evaluate firm performance, however, relying on financial ratios have been frequently criticized, as ratios are subject to manipulation, may systematically undervalue assets and lack of standardization in the handling of international accounting conventions. Further, Smith (1990), and Feroz, Kim and Raab (2003) argue that the typical use of traditional ratio analysis has limitations since ratios are only one-dimensional (partial evaluation), therefore the result from one ratio analysis may conflict with the other. Hence, Smith (1990) has come up with the idea of applying Data Envelopment Analysis (DEA) approach to measure firms' economic performance through financial statement analysis. Rouse, Harrison and Chen (2010) defines DEA as a widely applied non-parametric mathematical optimization approach, used for comparing the efficiency of organisations with common inputs and outputs. According to Smith (1990), if selecting rational inputs and outputs variables and assigning the combination of those financial statement items of similar firms into the DEA model, it would reveal if the firms' production function decisions are efficient or need improvement. Also the measure of performance would be more comprehensive. Feroz et al (2003) further designed a DEA model for financial statement items and compared the resulting efficiency scores to 16 commonly ratios, and found the DEA efficiency score

had a statistically significant, positive relationship with all 16 of the ratios. Feroz et al (2003) then conclude that DEA can complement traditional ratios. As a composite tool for financial statement analysis, especially, it avoids the pitfalls of the one-ratio-at-a-time approach. Thus DEA can be regarded as a useful and potentially powerful technique to supplement traditional financial statement analysis, and to proxy firm performance.

In summary, by viewing previous literatures, this study identified that corporate governance reform is one of the most important research areas, especially for emerging economies. Since China is the fastest growing nation among emerging economies, also with its recent corporate governance reforms around investor protection, this study chooses to focus on how China's corporate governance reform in 2002 have changed the board characteristics of Chinese firms, therefore influence the subsequent firms' economic performance. Moreover, this study finds that the previous literature tends to select samples at specific points in time, which may be unable to reveal changes through time. Therefore this study choose to use an event study and divides the sample periods into four parts, which are year 1999 to 2001 the pre-reform periods; year 2002 to 2003 the reform periods; year 2004 to 2006 the post-reform periods and year 2007 onwards for further testing the reform in the post-reform continue periods. Further, this study find when measuring the effect of corporate governance on firm performance, previous studies tend to use ratios such as ROA as proxy, which is subject to several limitations. Therefore, this study has identified a newly developed DEA approach, which can complement traditional ratios and avoids the pitfalls of the one-ratio-at-a-time approach. Lastly, when selecting board characteristics, some studies only rely on one theory such as the agency theory, therefore the selection of firms' board characteristics would be biased. Hence, this study follows Hillman and Dalziel's (2003) framework that boards both monitor and provide resources, in other words, agency theory and resource dependency theory are relevant. Although selecting and examining board characteristics under these two theories may also not fully reflect a firms' board structure, it provide us a much less biased independent variable group than applying only one theory or model.

## **2.4 Theory**

As previously discussed, Hillman and Dalziel's (2003) framework argued that boards both monitor (agency theory) and provide resources (resource dependency theory), and De Villers et al (2011) further explained that under board monitoring role, management

initiates and implements, whereas directors monitor to reduce the conflict of goals between management and shareholders. It is important because of the potential costs incurred when management pursues its own interests at the expense of shareholders' interests. Therefore, under board monitoring role, De Villiers et al (2011) examined board independence, which have identified board characteristics of: independent directors on boards, CEO-Chair duality, concentration of directors appointed after the CEO and directors share ownership.

Under resource provision role, De Villiers et al (2011) suggest that directors facilitate access to resources because resource rich directors can actively involve and positively influence strategy and programs, and will better advise and consult management, therefore influence firms' performance. Hence, under the resource provision role, De Villiers et al (2011) examined the boards' knowledge contribution, have identified board characteristics of board size, multiple directorship of board members, law experts on boards and tenure of directors.

This study will consider the independent variables identified in the study of De Villiers et al (2011) as the basis for the hypothesis development, proper modification and additional independent variables will be selected and explained based on the Chinese unique characteristics.

## **2.5 Hypothesis development**

### 2.5.1 Changes in corporate governance factors

As discussed in previous sections, this study firstly focus on how China's corporate governance reform in year 2002 has changed the board characteristics of Chinese firms. This raise the first research question: Has there been changes in the corporate governance factors following the reform? Therefore, the first hypothesis is:

*Hypothesis 1: There will be change in corporate governance factors due to the Chinese corporate governance reform in year 2002*

### 2.5.2 Influence on firm performance

Because of the necessity of the reform (Rajagopalan and Zhang, 2008) discussed before, the second research question is raised, that is if the corporate governance reform in 2002 has changed the corporate governance factors, do this influence firm performance? Therefore the second hypothesis is:

*Hypothesis 2: The change in corporate governance reform will result in improved firm performance.*

To analyse hypothesis 2, this study has further developed 8 hypotheses (hypothesis 2.1 – 2.8) based on the theories of board monitoring role and resource provision role:

### *Board monitoring role*

#### 1. Independent directors on boards

De Villiers et al (2011) have argued independent boards are more likely to be effectively monitors, objectively questioning and evaluating management and firm performance. This suggests the higher the concentration of independent directors on the board, the higher the level of effective monitoring by the board. Also, Conyon and He (2011) have studied the relationship between firm performance and CEO compensation after China's 2002 corporate governance reform, and found the link is better connected when the companies have more independent directors on board. Thus, we form the hypothesis 2.1 as follows:

*Hypothesis 2.1: Firms are more likely to have better performance as the concentration of independent directors on boards increases.*

#### 2. CEO-Chair duality

According to De Villiers et al (2011), the independence of the board can be undermined when the CEO also serves as the board chairman. Also, Xie (2014) studies board characteristics and CEO tenure in Chinese listed firms, have found CEO-Chair duality grant CEO more managerial discretion and less likely to be constrained by the board of directors, therefore will be more likely to advance their personal preferences and less likely to consider the companies' benefits. This leads to hypothesis 2.2:

*Hypothesis 2.2: Firms are more likely to have better performance if they have a chairman who is not the CEO of the same firm.*

### 3. Concentration of directors appointed after the CEO

De Villiers et al (2011) argues directors appointed after the CEO on boards may feel a sense of divided loyalty as they attempt to fulfil their fiduciary duty to shareholders while maintaining a good relationship with the CEO, therefore the CEO is more likely to receive higher personal gains. However, directors appointed by a previous CEO are more likely to be socially independent of the incumbent CEO and tends to protect and promote their own reputation. According to Hsiung (2011) and Buckley, Clegg and Tan (2006), ‘Guanxi’ (relationship) and ‘Mianzi’ (face/reputation) are known to be an important features of Chinese society, not only in business activities, also among ordinary people. Therefore, in the case of China, directors appointed after the CEO took office may tend to work on the ‘Guanxi’ with the CEO, and directors appointed prior to the incumbent CEO’s appointment may focus more on the ‘Mianzi’, this lead to our third hypothesis:

*Hypothesis 2.3: Firms are more likely to have better performance if the concentration of directors appointed after the CEO took office decreases.*

### 4. Share ownership

De Villiers et al (2011) argues stock ownership aligns the interests of the directors with those of shareholders, because CEOs with some equity stakes in their firms may, to some extent, converge their self-interests with those of firm owners or shareholders. Also, directors with higher share ownership are likely to increase the board monitoring role. De Villiers et al (2011) tested the holding of CEO-directors, insider directors and independent directors separately, because outside directors typically hold small ownership stakes, suggesting share ownership plays a more incentivising role for insiders. Therefore:

*Hypothesis 2.4a: Firms are more likely to have better performance if the share ownership of current CEO-directors increases.*

*Hypothesis 2.4b: Firms are more likely to have better performance if the share ownership of current insider directors increases.*

*Hypothesis 2.4c: Firms are more likely to have better performance if the share ownership of current independent directors increases.*

### *Resource provision role*

#### 1. Board size

De Villiers et al (2011) argues larger boards can include more prestigious directors, which is an important resource dependence-related factor that could bring more experience and knowledge and offer better advice. Therefore firms can derive greater value from larger boards. Consistent with this argument, Chen (2014) have found Chinese companies with larger board size perform better as measured by return on assets. Therefore:

*Hypothesis 2.5: Firms are more likely to have better performance as the number of directors on boards increases.*

#### 2. Multiple directorship of board members

According to De Villiers et al (2011), under the resource dependence theory, directors with multi-directorship can accumulate valuable expertise from their external experience, therefore better support the firms' performance. Consistent with this theory, Sarkar and Sarkar (2008) examines the multi-directorship in an emerging market – India, have found multiple directorships by independent directors is positively correlated with firm value, which support the resource dependency hypothesis, therefore:

*Hypothesis 2.6: Firms are more likely to have better performance as the multiple directorships of directors increase.*

#### 3. Director tenure

According to De Villiers et al (2011), longer director tenure can be regarded as a source of reputation and organisational knowledge, which can lead to the provision of better advice and better access to resources. Also, increased tenure is associated with fewer misleading financial disclosures. Thus:

*Hypothesis 2.7: Firms are more likely to have better performance as tenure of directors increases.*

#### 4. Frequency of supervision board meeting

According to Jiang and Kim (2014), in China, firms also have supervisory boards. The corporate governance reform in 2002 has put more duties and responsibilities of the supervisory board which they are accountable to all shareholders and oversees both directors and senior management. As stated in Jiang and Kim (2014), supervisors are supposed to have knowledge and experience in law and accounting, they also have significant oversight of firms' financial issues and policies. Moreover, the supervisory board shall meet periodically to discuss issues in the company. Therefore, the frequency of supervision board meetings may influence the amount of useful information and strategy provided that benefit the company, thus:

*Hypothesis 2.8: Firms are more likely to have better performance if they have higher frequency of supervisory board meetings.*

### **3.0 Method**

#### **3.1 Sample Selection**

The sample of this study consists of four groups of Fortune 200 largest listed Chinese companies, which was selected from four periods (1999-2001 the pre-reform periods; 2002-2003 the reform periods; 2004-2006 the post-reform periods and 2007 onwards the post continue periods). The Fortune ranking follows the study of Cheung et al (2008), which is based on the total revenue of all Chinese firms listed on the Shanghai and Shenzhen Stock Exchange.

Due to the time limitation of this research, it is difficult to hand collect data for all years. Therefore, for each period, this study takes a specific year to represent its period and collect the required data. This study chooses year 1999; 2003; 2005 and 2009 to represent each period and collect the required data for those years.

Company profile, financial statement data and board characteristics data are collected

from the Chinese Stock Market and Accounting Research database (CSMAR). CSMAR Database is the comprehensive database for Chinese business research, it covers data on the Chinese stock market, financial statements and Corporate Governance of Chinese Listed firms. The database has been widely used in the area of studying corporate governance in China, for example, You and Du (2012) gathered data for CEO turnover, financial information and corporate governance-related variables such as stock ownership from CSMAR and examines whether CEO turnover in China is influenced by political connections; Conyon and He (2011) studied the relationship between executive compensation and corporate governance in China, and obtained financial performance and accounting data from the CSMAR database; the study of Liu, Miletkov, Wei and Yang (2015) examined the board independence and firm performance in China, which also obtain data of financial statements, stock prices, board composition, and ownership structure from the CSMAR database. Therefore, it is reasonable and reliable for this study to collect variables from CSMAR database.

This study exclude financial companies when gathering samples, the reason is justified from Fama and French (1992), which they studied the cross-section of expected stock returns, stated that the sample excludes financial firms because the high leverage that is normal for these firms probably does not have the same meaning as for nonfinancial firms, where high leverage more likely indicates distress. Further, in the perspective of corporate governance, according to the study of Ghofar and Islam (2014), which studied corporate governance in Indonesia, samples of financial companies were excluded, as they have special regulations pertaining to corporate governance and are regulated by the Indonesian Central Bank (BI). Moreover, in the case of Chinese corporate governance reform, according to Jiang, Feng and Zhang (2012), the new corporate governance code was issued in year 2001 and applied in year 2002 by China Securities Regulatory Commission (CSRC). However, China focusing on optimizing bank ownership structure to improve corporate governance, strengthen internal control mechanisms and risk management systems was accelerated from year 2003, and the ten requirements for good corporate governance of banking section was issued by CBRC which is the China Banking Regulatory Commission (Jiang et al, 2012). Therefore, China's case in this study is similar to the case of Indonesia in the study of Ghofar and Islam (2014), and financial companies in China Fortune 200 lists are excluded.

The reason this study choose companies listed on Shanghai and Shenzhen Stock

Exchanges is because companies that only listed on other stock exchange may be affected by the corporate governance reform in those countries. For example, according to the study of Wong (2011), Hong Kong had its corporate governance reform in 2004, which is different to mainland China corporate governance reforms. Therefore, including Chinese firms that solely listed on foreign stock exchange will decrease the construct validity of the study.

Hence, the final sample with the requisite financial, board, and ownership data consists on average of 170 listed firms in each of those four periods.

### 3.2 Research Design

1999-2001	<b>2002-2003</b>	2004-2006	2007-2009
Pre-reform	<b>Reform</b>	Post-reform	Post-reform cont.

As mentioned in section 3.1, in order to study how China's corporate governance reform in year 2002 can influence firms' future economic performance, the research will conduct an event study and divides the sample periods into four parts, which are year 1999 to 2001 the pre-reform periods; year 2002 to 2003 the reform periods; year 2004 to 2006 the post-periods and year 2007 to 2009 for further testing the reform in the post-reform continue periods. This study firstly using descriptive statistical analysis and paired sample t-test to examine if there has been change in the corporate governance factors following the reforms, then employ multi-linear regression to model firms' economic efficiency as a function of board and other control characteristics.

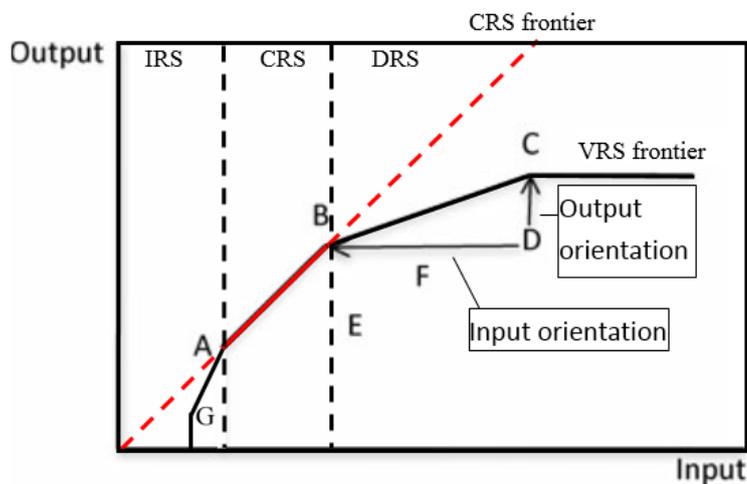
### 3.3 Measure of firm economic efficiency – Data Envelopment Analysis (DEA)

#### 3.3.1 Why the DEA approach

Rouse, Harrison and Chen (2010) defines Data Envelopment Analysis as a widely applied non-parametric mathematical optimization programming approach used for comparing the efficiency of organisations. It was firstly introduced by Charnes, Cooper and Rhodes in 1978, in which the 'organisation' mentioned by Rouse et al (2010) was broadly defined as a collection of decision making units (DMUs) with common inputs and outputs. As a purely data driven technique, DEA operates by fitting the tightest cone enveloping the

data, with the 100% efficiency units lying on the frontier (Margaritis and Psillaki, 2010). The efficiency scores generated by DEA can also be described as technical efficiency (TE) score (Farrell, 1957) in which the score is generated by DEA for a DMU comparing the 100% efficient DMU that locates on the efficient frontier. Therefore, a 100% technically efficient DMU has no evidence of inefficiency when compared with all other DMUs in the DEA model.

A simple graphical representation of this efficiency frontier by comparing seven DMUs (from A to G) with single input and single output is shown in Figure 1 below:



**Figure 1**

Rouse et al (2010) described two types of efficient frontier in DEA, which are constant returns to scale (CRS) and variable returns to scale (VRS). These two types of returns are assumed by two models, the CCR model and BCC model.

The CRS measured by CCR model is shown in Figure 1. Charnes et al (1978) interprets the model that any observed DMUs will be applied with similar ratios. In other words, any observed DMUs are proportionally scalable in inputs and outputs. Therefore, the 100% technically efficient DMUs are A and B, which are on the frontier.

Under the BCC model, which is represented by VRS in Figure 1, it measures technical efficiency as the convexity constraint, ensures that the composite unit is of similar scale size as the unit being measured (Banker, Charnes and Cooper, 1984). Because Banker et al (1984) assumed that strong theoretical underpinning in inputs and outputs are not available, therefore cannot form a constant return in overall selection, some results must

be satisfied with a measure of only relative efficiency based on the available observation. As shown in Figure 1, the BCC model (VRS) contains three components: increasing returns to scale (IRS); constant returns to scale (CRS) and decreasing returns to scale (DRS). Therefore, the VRS frontier envelops the DMUs more tightly than CRS frontier. Thus DMUs of A, B, C and G can be represented as the 100% technically efficient DMUs.

Further, the DEA method has provided two perspectives for interpreting the DMUs, which are input orientation and output orientation (Rouse et al, 2010). Take the DMU D in Figure 1 as an example, the output orientation indicates for the same level of inputs, DMU D should have increased its output to C in order to achieve 100% technical efficiency; and the input orientation indicates for the same level of outputs, DMU D should have reduced the level of input to B in order to be 100% technically efficient.

### 3.3.2 Recent applications of DEA

In recent years, DEA has been applied to a wide range of practical problems for benchmarking performance. For example, measuring the banking performance (Cook, Seiford and Zhu, 2004); competition and public high school student performance (Harrison and Rouse, 2014); even measuring sports players' performance (Halkos and Tzeremes, 2012). If selecting rational inputs and outputs variables, DEA can also be applied for measuring firms' economic performance through financial statement analysis. According to Smith (1990), which is the first study that proposed the idea, the typical use of traditional ratio analysis had limitations since ratios are only one-dimensional (partial evaluation), therefore one ratio may conflict with the other. By assigning the combination of financial statement items of similar firms into the DEA model, it would reveal if the firms' production function decisions are efficient or needs improvements, also the measure of performance would be more comprehensive (Smith, 1990).

Further, Feroz et al (2003) used a DEA model for financial statement items and compared the resulting efficiency scores to 16 commonly computed ratios, have found the DEA efficiency score had a statistically significant, positive relationship with all 16 of the ratios. Feroz et al (2003) conclude that DEA can complement traditional ratios and as a composite tool for financial statement analysis, especially since it avoids the pitfalls of the one-ratio-at-a-time approach. Thus, Feroz et al (2003) concluded that DEA was a useful and potentially powerful technique to supplement traditional financial statement

analysis.

### 3.3.3 Economic Performance (DEA)

When analysing Chinese firms' economic performance, firstly the nature of the Chinese firms need to be clarified. According to Rajagopalan and Zhang (2008), in the year 2002, China replaced the US as the most attractive investment destination in the world. Global investors see China as the world's leading manufacturer and the fastest growing consumer market, therefore the FDI in China tends to be primarily capital intensive, and the corporate governance reforms in Chinese firms seem to have been mainly driven by firms' aspiration for foreign capital. Therefore, when selecting inputs and outputs from financial statements, items are required to be better connected with the production function. Rouse, Van Staden and Tresadern (2014) measured firms' economic performance comprising two outputs (total revenue, net income) and two inputs (operating expenses, total assets) from firms' financial statements. Rouse et al (2014) justified that using total revenue and net income as output is because maximisation of revenue and net income are two archetypal organisational objectives. The two inputs, operating expenses and total assets, are the major common organisational resources employed to generate sales and net income. Consistent with Rajagopalan and Zhang (2008), due to the manufacturing nature of Chinese firms, therefore employing the inputs and outputs from Rouse et al (2014) for DEA to proxy Chinese firms' economic performance is rational and reasonable. Moreover, Su and He (2012) studies how Chinese firms' ownership structure and corporate governance influence productive efficiency, which the study also uses the DEA method, and construct the DEA model with outputs of sales revenue in a given year, inputs of labour and capital stock. Compared with the inputs and outputs selected in Rouse et al (2014), Su and He's (2012) model only reflects the production function, the model cannot present whether the cost is being effectively controlled. Therefore this study will apply the DEA inputs and outputs from Rouse et al (2014). Also, as mentioned by Bankers et al (1984), strong theoretical underpinning in inputs and outputs are not available, therefore cannot form a constant return in overall selection. Therefore, this study will use VRS under the BCC model rather than CRS under CCR model for DEA.

### **3.4 Control variables**

In order to control for variables that may also explain variability of a firm's economic

performance, this study employ certain control variables from the prior literatures. According to Rouse et al (2014), one important variable that have been found to have a significant impact on economic performance is firm size, which is measured by nature log of total assets, and other variables that also have been empirically shown to significantly affect economic performance are: leverage (ratio of long-term debt to assets); revenue growth (ratio of current year to previous year revenue). According to Rouse et al (2014), leverage is expected to have a negative relationship with firm performance, and revenue growth is expected to have a positive relationship with firm performance.

Additionally, Chen, Firth and Rui (2005) have found when the company's major shareholder is the government, the dominant shareholder would have no cash flow rights (dividends flow to another ministry or the state treasury), which they predict government control to have a negative association with firms' economic performance. Therefore, state-ownership can also be a control variable.

Moreover, some companies listed on the Chinese stock exchange offer two shares classes: A-shares and B-shares. B-shares are quoted in foreign currencies (such as the U.S dollar) and are open to both domestic and foreign investment, while A-shares are only quoted in Chinese currency (RMB). According to Tong and Yu (2012), the study have found B-share listed in China are traded at substantial discounts to their corresponding A-shares. Tong and Yu (2012) thus explained from a corporate governance perspective, stated that relative to domestic investors, foreign investors care more about firms' governance quality. Therefore, share type of Chinese listed companies is also an appropriate control variable.

Lastly, Su and He (2012) has examined ownership structure, corporate governance and productive efficiency in China, also use DEA to proxy Chinese firm performance, and find firm age is also an important control variable, that Chinese firms with higher firm age has a positive and significant relationship with firm efficiency. Therefore the age of Chinese firms will be a control variable in this study.

### **3.5 Additional tests**

This study also apply traditional ratios and conduct the same analysis to further consolidate the findings. Those ratios includes: return on asset, share return, and Tobin's

Q. Moreover, a test of changes between pre-reform and post-reform continue periods is performed to examine whether there is a relationship between changes in board characteristics due to the corporate governance reform and changes in firms' subsequent performance.

## **4.0 Results**

### **4.1 Changes in board characteristics and other variables**

#### *Descriptive statistics*

This section addresses the first research question of this study, which is whether there has been change in the corporate governance factors following the reforms.

Table 1 shows the means and standard deviations of the study variables, and a paired sample t-test between year 1999 and 2003 of the study variables is also shown in the table.

Recall that hypothesis 1 predicts that there will be changes in the corporate governance factors due to the Chinese corporate governance reform in year 2002. For board characteristics listed under monitoring and incentives, it shows that the number of independent directors in year 1999 were 0.27 which is 2% of total board members. This evidence is consistent with the findings in the study of Tricker (2009), which the study found in year 1999 among 257 companies listed on the Shanghai Stock Exchange, fewer than 5% of the companies' board had any degree of independence. However, the Chinese 2002 corporate governance code states that there must be at least two independent directors on or before June 30, 2002 and one-third of the board members must be independent directors on or before June 30, 2003 (Rajagopalan and Zhang, 2008). Consistent with this requirement, table 1 shows the mean value of board size across the four periods almost remain constant at 10 board members. However, the number of independent directors after the reform periods suddenly jumped to 3.5 (33%) in year 2003, and this number continues increasing in the future periods, with number of independent directors of 3.6 (35%) in year 2005 and 3.8 (38%) in year 2009. The variable of CEO-chair duality has decreased significantly from pre-reform period to reform period, which decreased from 22% in year 1999 to 8% in year 2003. Although this number has increased in the post-reform period (9%) and post-reform continue period (13%), the rate of CEO-

**Table 1 Descriptive Statistics & t-test**

Variable	1999		2003		2005		2009		Paired sample t-test 2009 & 1999	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	t	Sig.
<b>Dependent variables</b>										
DEA score	0.76	0.13	0.82	0.12	0.83	0.11	0.80	0.12	3.48	0.00
Share Return	0.17	0.35	0.14	0.39	-0.09	0.27	1.30	0.89	15.48	0.00
ROA	0.06	0.07	0.05	0.05	0.04	0.07	0.05	0.05	-2.14	0.03
Tobin's Q	1.70	1.07	1.08	0.57	0.61	0.41	1.35	1.08	-3.04	0.00
<b>Corporate governance independent variables</b>										
<i>Monitoring and Incentives</i>										
Number of Independent Directors	0.27	0.84	3.49	1.07	3.65	0.91	3.87	0.96	39.60	0.00
%Independent Directors	0.02	0.07	0.33	0.06	0.35	0.04	0.38	0.07	45.19	0.00
CEO-chair duality	0.22	0.41	0.08	0.28	0.09	0.29	0.13	0.33	-2.17	0.03
Concentration of directors appointed after CEO	0.05	0.14	0.13	0.21	0.05	0.12	0.09	0.15	2.17	0.03
CEO share ownership	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	1.41	0.16
Insider directors share ownership	0.00	0.00	0.00	0.00	0.01	0.04	0.00	0.02	1.27	0.21
Independent directors share ownership	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.54	0.13
<i>Resource provision</i>										
Board size	10.52	3.04	10.75	2.53	10.57	2.45	10.41	2.52	0.00	1.00
Multiple directorship of board members	0.89	0.79	0.88	0.73	0.75	0.20	0.80	0.17	2.24	0.03
Director tenure			3.49	1.60	1.01	0.81	1.27	0.95	3.10	0.00
Frequency of supervision board meeting			3.32	1.73	3.32	1.73	4.67	1.50	6.26	0.00
<b>Control variables</b>										
Firm size	21.74	0.79	22.50	0.86	22.76	0.92	24.03	1.11	29.31	0.00
Leverage	0.05	0.07	0.06	0.08	0.07	0.09	0.10	0.11	4.29	0.00
Capital intensity	1.42	0.74	1.23	0.78	1.06	0.75	1.50	1.48	0.84	0.40
Revenue growth	2.07	0.33	1.29	0.31	1.18	0.27	1.04	0.24	-30.75	0.00
State share ownership	0.43	0.27	0.46	0.25	0.43	0.25	0.25	0.27	-5.57	0.00
Share type	0.24	0.43	0.28	0.45	0.24	0.43	0.32	0.47	2.17	0.03
Firm age	5.01	3.00	8.48	3.66	10.11	3.60	11.83	4.61	16.93	0.00

Note: For paired sample t-test, due to the sample limitation, variable of 'multiple directorship of board members' are compared between year 2005 and year 2009; variable of 'frequency of supervision board meeting' are compared between year 2003 and year 2009.

chair duality still smaller compared with year 1999. This may indicate that after the reform, CEOs are more likely to be constrained by the board of directors and tend to consider the companies' benefits. The variable of concentration of directors appointed after CEO were fluctuating among the four periods, and share ownership for CEO directors, insider directors and independent directors remains almost constant at 0%, this evidence indicates that the reform in year 2002 may not have any influence on directors concentration and share ownership.

For corporate governance factors listed under resource provision role, firstly, board size remains constant around 10 board members, which not affected by the reform. Directors have gradually gain more experience, which the variable of director tenure has increased from 0.89 years in 1999 to 1.27 years in 2009. Although director tenure has slightly decreased from 0.89 to 0.88 between year 1999 to year 2003, one possible explanation could be because the newly appointed independent directors has decreased the average director tenure. Furthermore, the data of multiple directorship of board members only available from year 2005 onward, Table 1 shows a slightly increase from 0.75 in year 2005 to 0.80 in year 2009. Lastly, the data of frequency of supervision board meeting only available from year 2003 onward, Table 1 shows the frequency of supervision board meeting increased from 3.49 time per year in 2003 to 4.67 times per year in 2009.

Therefore, the evidence discussed above indicates China's corporate governance reforms in year 2002 have caused the most obvious changes regarding to the amount of independent directors on board, CEO-chair duality, director tenure and frequency of supervision board meetings. However, the reform do not have an obvious influence on concentration of directors appointed after CEO, director share ownership and board size. Hence, the prediction of hypothesis 1 is supported, that there will be changes in corporate governance factors due to the year 2002 corporate governance reforms.

Table 1 also shows the descriptive statistics for dependent variables, which includes DEA scores, share return, return on assets and Tobin's Q. According to Table 1, the average DEA score for Chinese fortune 200 companies in year 1999 was 0.76, this score has jumped to 0.82 in the reform periods (2003), and remains above 0.80 in the post-reform and post-reform continue periods. This evidence may indicate that the reforms in year 2002 have improved the firms' economic efficiency. Moreover, share returns and Tobin's Q were fluctuating during the four periods, while return on assets remains constant around

0.05. This may indicate those three firm performance measurements did not improve after the reform.

For control variables, Table 1 shows firms gradually grew larger, with more leverage, tend to be multi-listed on foreign stock exchange and with larger firm age. However, the revenue growth has decrease from 2.07 in year 1999 to 1.04 in 2009, which raise concerns of whether the corporate governance reform has truly benefit Chinese listed firms. One interesting finding is from the percentage of state share ownership. According to Chen, Firth and Rui (2006), Chinese state owned enterprises first time to choose to privatise was during year 1991 to year 2000. The reason is for governments raising cash, reducing state subsidies and the desire to increase the competitiveness, performance and technological growth of the enterprises. However, the early time SOEs privatisation is partial, government still wants to control the enterprises and holds most of the shares. Table 1 of this study shows there are on average of 43% and 46% of state-owned share in year 1999 and year 2003 respectively. This result has also provided further evidence to the study of (Tricker, 2009) that the early stage of Chinese listed companies corporate governance were affected by the majority internal shareholders such as state, provincial or local government. Furthermore, the study of Liao, Liu and Wang (2014) found in year 2005, China has initiated the secondary privatization – the split share structure reform. The reform granted legitimate trading rights to the state-owned share of listed SOEs, which allows company raise more funds from the financial market. As Table 1 shows, the percentage of state-owned shares has dropped from 43% in year 2005 to 25% in year 2009.

#### *Paired sample t-test*

To consolidate the result and provide further evidence for supporting hypothesis 1, Table 1 also shows the results of paired sample t-tests between the post-reform continue periods (year 2009) and pre-reform periods (year 1999) to examine whether the corporate governance factors before and after the reforms significantly different between each other. Due to sample limitation, this study compares variable of multiple directorship of board members between year 2005 and year 2009, and variable of frequency of supervision board meeting is compared between year 2003 and year 2009.

As Table 1 shows, there is a significant difference between year 2009 and year 1999 for

the independent directors on board, which shows  $t = 39.60$  and  $p = 0.00$  for number of independent directors on board, and  $t = 45.19$  and  $p = 0.00$  for percentage of independent directors on board. This evidence indicates the independent directors on board has increased after the reform, and the change is statistically significant. The t-test also shows CEO-chair duality has decreased after the reform with significant differences between the two samples ( $t = -2.17$ ,  $p = 0.03$ ). Although the t-tests reveals a significant increase of concentration of directors appointed after CEO ( $t = 2.17$ ,  $p = 0.03$ ), the descriptive statistics shows this variables was fluctuating across the four periods, thus the study conclude the reforms did not impact this variable significantly. Moreover, the t-test results also show that the difference of share ownership for all three types of directors and the board size between year 1999 and 2009 are insignificant, these results are consistent with the evidence showed in the descriptive statistics above, that the reforms in year 2002 do not have impact on director share ownership and board size. Furthermore, director tenure has increased after the reform with significant differences between year 2009 and year 1999, which  $t = 3.10$  and  $p = 0.00$ . Lastly, there is a significant difference of frequency of supervision board meeting ( $t = 6.26$  and  $p = 0.00$ ) between year 2009 and year 1999, which indicates the frequency of supervision board meeting has increased after the reform.

Therefore, consistent with the evidence discussed in the descriptive statistics section, the results of paired sample t-tests of corporate governance independent variables also shows that China's corporate governance reforms in year 2002 has caused the most obvious changes of corporate governance factors regarding to the amount of independent directors on board, CEO-chair duality, director tenure and frequency of supervision board meeting, and those changes were towards to improve investor protection and firm performance. Furthermore, the t-test also shows the reform does not have an obvious influence on concentration of directors appointed after CEO, director share ownership and board size. Overall, from Table 1, this study find China's corporate governance reform in year 2002 has certain level of influence over corporate governance factors under both board monitoring and resource provision role regarding to improve investor protection and firm performance, thus the prediction of hypothesis 1 is supported, that there will be changes in corporate governance factors due to the year 2002 corporate governance reforms.

Table 1 also shows the paired sample t-test for control variables. Consistent with the evidence in the descriptive section above, the t-tests results indicate that after the reform, Chinese listed firms tend to become larger, less state controlled and multi-listed.

Furthermore, the t-test also shows a negative and significant result for revenue growth between post-reform continue periods and pre-reform periods, which  $t = -30.75$  and  $p = 0.00$ . This result raise concerns about whether the reform truly benefits firm performance.

## **4.2 Pearson correlation and multi-linear regression analysis**

### *Pearson correlation*

Table 2 from panel A to panel D present the Pearson correlation of the study variables. The largest correlation coefficient observed across all variables is between firm size and leverage, with correlation coefficient around  $0.45^{**}$  across four periods. Firm size also has a large correlation coefficient with capital intensity, which around  $0.40^{**}$  across four periods. These two evidence suggest that large Chinese fortune 200 firms have more debt and tend to require large amount of money and financial resources to produce a good or service, which provide evidence of the manufacturing nature of Chinese firms.

The descriptive statistics and t-tests in Table 1 shows the issuing of the governance code has increased the amount of independent directors on board. However, the Pearson correlations from Table 2 shows another interesting finding. According to Table 2, panel A shows in year 1999 the pre-reform period, there is a positive however insignificant correlation of  $0.129$  between board size and percentage of independent directors. In year 2003 the reform period, this correlation has become negative and significant ( $-0.198^*$ ), and the correlation continue to be negative and significant in the future periods. Table 2 panel C shows the correlation coefficient between board size and percentage of independent directors in year 2005 (post-reform period) was  $-0.165^*$  and Table 2 panel D shows the correlation coefficient was  $-0.345^*$  in year 2009 the post-reform continue period. Those correlations indicates that, after the Chinese corporate governance reform, Chinese firms want to keep the number of independent directors at a certain level. This implies that Chinese firms simply obeying the governance code and keep the number of independent directors no less than a minimum level as required by the code, which raise further concern about the effectiveness of the governance reforms.

### *Multi-linear regression*

Table 3 presents the results through year 1999 to year 2009 from the multi-linear

**Table 2 Panel A Year 1999 Pearson Correlations**

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1.DEA score	1																			
2.Share returns	0.067	1																		
3.ROA	.360**	.282**	1																	
4.Tobin's Q	.186*	.474**	.405**	1																
5.Independent Directors	0.107	0.026	-0.043	-0.037	1															
6.CEO-chair duality	0.112	0.038	0.008	0.067	0.025	1														
7.Concentration of directors appointed after the CEO	0.031	0.057	-0.057	-0.114	-0.036	0.099	1													
8.CEO share ownership	0.034	.241**	0.024	.222**	-0.070	.166*	0.059	1												
9.Insider directors share ownership	-0.097	.266**	0.028	0.075	-0.061	-0.005	-0.053	0.377**	1											
10.Independent directors share ownership	-0.124	-0.103	-0.111	-0.051	-0.041	-0.041	-0.027	-0.022	-0.019	1										
11. Board size	-.156*	-0.041	-.177*	-0.137	0.129	0.018	0.069	-.154*	0.052	0.063	1									
12. Director tenure	0.115	-0.096	-0.041	-0.052	-0.035	-0.035	0.143	-0.041	-0.074	0.012	-0.024	1								
13. Firm size	0.143	-0.045	-0.028	-.330**	-.346**	-.169*	0.104	-0.076	-0.117	0.042	-.178*	0.074	1							
14. Leverage	-0.072	0.105	-0.054	-0.048	-0.065	0.104	-0.076	-0.043	0.082	0.082	-.156*	-.244**	-.244**	1						
15. Capital intensity	-.515**	-0.034	-0.115	-.154*	.183*	-0.092	0.070	-.164*	0.004	.163*	.175*	-.252**	.424**	.394**	1					
16. Revenue growth	0.035	0.064	-0.006	-0.102	0.021	-0.111	-0.067	0.041	0.044	0.033	.151*	0.138	.249**	0.083	0.083	1				
17. State share ownership	-0.074	-0.058	-0.038	-0.108	0.000	0.049	0.122	-.179*	-0.208**	0.025	0.121	0.101	0.143	0.119	0.096	-0.129	1			
18. Share type	0.004	0.023	-.183*	-.184*	.500**	-0.024	0.154	-0.120	0.054	0.139	0.120	-.185*	.367**	0.090	.298**	-0.052	-0.077	1		
19. Firm age	-.188*	-0.019	-.335**	-0.083	0.065	0.051	0.029	0.081	0.008	0.026	-0.036	-0.095	-0.108	-0.125	0.088	0.006	-0.290**	.157*	1	

\*. Correlation is significant at the 0.05 level (2-tailed).  
 \*\*. Correlation is significant at the 0.01 level (2-tailed).

b. Cannot be computed because at least one of the variables is constant.

**Table 2 Panel B Year 2003 Pearson Correlations**

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1.DEA score	1																			
2.Share returns	.261**	1																		
3.ROA	.532**	.561**	1																	
4.Tobin's Q	.390**	.408**	.506**	1																
5.Independent Directors	0.038	0.104	0.098	0.104	1															
6.CEO-chair duality	.152*	0.066	0.013	0.013	-0.059	1														
7.Concentration of directors appointed after the CEO	-0.043	0.028	-0.047	-0.142	.179*	-0.084	1													
8.CEO share ownership	0.048	-0.089	0.018	0.021	0.129	-0.004	0.237**	1												
9.Insider directors share ownership	-0.014	-0.127	-0.035	-0.124	0.055	-0.039	2.14**	1												
10.Independent directors share ownership	-0.024	0.032	0.097	0.051	-0.084	0.003	-0.050	0.027	0.661**	1										
11. Board size	-0.137	0.042	-0.128	-0.061	-0.107	-0.107	-0.102	0.078	0.043	0.048	1									
12. Director tenure	-0.101	0.003	0.037	0.013	-.168*	0.013	.366**	0.019	-0.064	-0.081	0.014	1								
13.Frequency of supervision board meeting	.161*	0.055	0.093	0.060	0.109	-0.066	0.057	0.033	0.043	-0.081	-0.030	-0.026	1							
14.Firm size	0.019	.463**	0.152	0.010	-0.040	0.083	0.002	-0.123	-.176*	0.042	-.160*	0.063	0.089	1						
15.Leverage	-.156*	.395**	0.015	-0.053	0.142	-0.002	0.101	-0.129	-.157*	0.027	0.054	-0.091	-0.089	.459**	1					
16.Capital intensity	-.393**	0.116	-0.054	0.047	-0.059	-0.067	0.104	-0.142	-.191*	.191*	0.056	-0.041	-0.097	.425**	.454**	1				
17.Revenue growth	.213**	.323**	.287**	-0.041	0.101	.261**	0.035	0.040	-0.001	0.047	-0.042	-0.023	0.042	.182*	0.053	0.053	1			
18.State share ownership	0.117	.249**	0.146	.284**	-0.170*	-.170*	-0.085	-0.049	-.169*	0.071	0.147	-0.107	0.039	.232**	0.131	0.141	0.141	1		
19.Share type	-0.143	0.071	-0.109	0.004	0.086	-0.091	0.005	-0.130	-.206**	0.077	0.073	0.029	0.009	.320**	.180*	.180*	0.016	0.143	1	
20.Firm age	-.219**	-.217**	-.242**	-.208**	-0.149	-0.074	0.115	0.090	-.157*	-0.062	-0.062	0.134	0.029	-.205**	-0.083	0.035	-0.107	-.444**	.157*	1

\*. Correlation is significant at the 0.05 level (2-tailed).  
 \*\*. Correlation is significant at the 0.01 level (2-tailed).  
 b. Cannot be computed because at least one of the variables is constant.

**Table 2 Panel C Year 2005 Pearson Correlations**

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1.DEA score	1																				
2.Share returns	.280**	1																			
3.ROA	.435**	.444**	1																		
4.Tobin's Q	.470**	.448**	.534**	1																	
5.Independent Directors	-.165*	-.003	0.019	-.068	1																
6.CEO-chair duality	0.098	-0.020	-0.067	0.007	-.167*	1															
7.Concentration of directors appointed after the CEO	-0.051	-0.118	-.258**	-0.103	0.023	0.101	1														
8.CEO share ownership	0.055	-0.045	-0.097	-0.098	0.01775	.197**	-.041	1													
9.Insider directors share ownership	0.033	.195*	0.028	0.101	0.006	-0.051	-.051	-.552**	1												
10.Independent directors share ownership	-0.042	0.107	0.046	0.047	0.049	-0.023	.375**	-0.008	-.011	1											
11.Board size	-0.055	-0.114	-0.037	-0.003	-0.025	-0.037	0.003	-0.107	-0.107	-0.007	1										
12.Multiple directorship of board members	-0.064	-0.040	0.021	-0.129	-0.032	.287**	-0.084	-0.019	-0.019	-.208**	0.072	1									
13.Director tenure	.153*	0.019	0.077	-0.009	0.036	0.010	0.019	0.066	-0.008	0.067	-0.083	-0.010	1								
14.Frequency of supervision board meeting	-0.026	-0.035	.162*	0.073	0.107	0.067	0.064	0.078	-0.035	0.089	.236**	-0.104	0.065	1							
15.Firm size	-.295**	0.055	-0.090	-0.190*	0.020	-0.090	-0.097	-0.080	-0.090	-0.026	.158*	0.032	-0.030	-0.133	0.003	0.037	0.037	1			
16.Leverage	-.411**	-0.036	0.019	-0.008	0.020	-0.042	0.009	-0.057	-0.077	0.106	0.119	0.048	-0.133	0.003	0.003	-.014	-0.014	-0.014	1		
17.Capital intensity	.178*	.238**	.336**	.099	.143	-0.054	-0.098	0.024	0.104	0.047	-0.020	-0.049	0.005	0.045	.254**	.166*	0.089	-.102	-.102	1	
18.Revenue growth	0.011	-0.050	.258**	0.072	0.126	-0.120	-.231**	-0.121	-.196*	-0.125	0.060	0.017	0.020	-0.055	.247**	.187*	0.089	0.085	0.085	1	
19.State share ownership	-0.089	-0.051	-0.078	0.018	0.145	-0.031	0.082	-0.061	-0.068	0.126	0.016	0.016	-0.004	.158*	.336**	.187*	.168*	0.018	0.018	0.018	1
20.Share type	-.250**	-0.051	-.219**	-0.740	0.137	-0.094	.153*	-.162*	-.154*	.236**	-.192*	0.035	-0.049	.203**	-.163*	-0.082	0.015	-0.127	-0.091	-.091	1
21.Firm age																					-.196*

**Table 2 Panel D Year 2009 Pearson Correlations**

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1.DEA score	1																				
2.Share returns	.261**	1																			
3.ROA	.538**	.314**	1																		
4.Tobin's Q	.388**	.321**	.581**	1																	
5.Independent Directors	-.159*	-0.156	-0.077	-0.110	1																
6.CEO-chair duality	0.075	0.093	0.004	0.019	-0.001	1															
7.Concentration of directors appointed after the CEO	0.041	-0.041	0.084	0.082	-0.123	0.018	1														
8.CEO share ownership	0.075	0.000	0.000	-0.060	-0.038	.269**	0.008	1													
9.Insider directors share ownership	0.117	-0.050	0.098	0.089	-0.057	0.027	-0.048	-.205**	1												
10.Independent directors share ownership	-0.112	-0.032	0.015	0.079	-0.001	-0.053	-0.062	-0.017	-0.015	1											
11.Board size	0.007	0.081	-0.026	0.021	-.345**	0.079	0.082	0.069	-0.026	0.098	1										
12.Multiple directorship of board members	-0.118	0.036	-0.019	-.207**	0.013	-0.096	-0.029	0.018	-0.011	-0.045	-0.090	1									
13.Director tenure	0.123	-0.024	0.110	.172*	0.093	0.073	.373**	0.090	0.072	-0.034	0.082	0.016	1								
14.Frequency of supervision board meeting	-0.039	-0.123	-0.096	-0.070	-0.028	0.064	0.048	0.007	-0.037	-0.047	-0.092	-0.021	-0.092	1							
15.Firm size	-.217**	-0.112	-.277**	-.289**	.289**	0.082	0.007	0.022	-0.047	-.164*	-0.021	-0.021	-.168*	-0.075	1						
16.Leverage	-.394**	-0.127	-.223**	-.225**	-0.001	-0.118	0.039	-0.042	-0.079	-0.057	-0.057	-0.057	-.179*	0.122	0.056	1					
17.Capital intensity	-.265**	-.300**	-0.081	-1.80*	-0.039	-0.137	0.095	-0.054	-0.055	-0.002	0.144	0.012	.157*	0.038	0.028	.376**	1				
18.Revenue growth	.200**	0.088	.381**	0.082	0.120	-0.045	-0.149	0.039	0.054	0.006	-0.027	0.031	0.023	0.040	0.059	.533**	0.059	1			
19.State share ownership	-0.111	-0.021	-0.106	-0.011	.253**	.163*	0.010	-0.089	-0.095	-0.018	0.012	0.012	.154*	-.195*	.256**	.187*	0.078	0.078	1		
20.Share type	-.162*	-.228**	-0.150	-0.064	0.025	-0.102	0.003	-0.038	-0.060	-0.095	0.070	-0.012	0.066	0.047	.323**	.187*	0.150	0.115	0.115	1	
21.Firm age	-0.021	-0.074	-0.056	-0.079	-.360**	-0.097	-0.042	-0.073	-0.075	0.081	0.002	0.053	-.207**	.320**	-.307**	-0.098	-0.032	-0.076	-.377**	0.070	1

\*. Correlation is significant at the 0.05 level (2-tailed).  
 \*\*. Correlation is significant at the 0.01 level (2-tailed).  
 b. Cannot be computed because at least one of the variables is constant.

\*. Correlation is significant at the 0.05 level (2-tailed).  
 \*\*. Correlation is significant at the 0.01 level (2-tailed).  
 b. Cannot be computed because at least one of the variables is constant.



regression of the firms' economic efficiency on the test variables, with and without controlling for the effects of the control variables.

Hypothesis 2 predicts the change in corporate governance reform will result in improved firm performance, and this hypothesis is further divided into two set. Recall that the first set of hypotheses 2 this study focuses on is how Chinese firms' economic efficiency is affected by the board monitoring role. Variables including director independence (Hypothesis 2.1), which predicts to be positively correlated with economic efficiency score; CEO-chair duality (Hypothesis 2.2) and concentration of directors appointed after CEO (Hypothesis 2.3) are expected to be negatively correlated with economic efficiency score; CEO share ownership (Hypothesis 2.4a), insider-directors share ownership (Hypothesis 2.4b), independent-directors share ownership (Hypothesis 2.4c) are expected to have a positive association with economic efficiency score.

Under the board monitoring role, Table 3 shows that in the pre-reform period (year 1999). Consistent with the prediction of Hypothesis 2.1, there is a positive and significant relationship between director independence and firms' economic efficiency, which  $\beta = 0.21$ ,  $p = 0.02$  without controlling factors. However, this relationship became insignificant after adding in the control variables. Moreover, in year 2005 (post-reform period) and year 2009 (post-reform continue period), the relationship between firms' economic efficiency and directors independence were negative and insignificant. It shows  $\beta = -0.16$ ,  $p = 0.04$  without controlling factors and  $\beta = 0.16$ ,  $p = 0.03$  with controlling factors in year 2005, and  $\beta = -0.19$ ,  $p = 0.02$  without controlling factors and  $\beta = -0.20$ ,  $p = 0.03$  with controlling factors in year 2009. This evidence suggests board characteristics before and after the reform do not improve firm economic efficiency. Therefore, this result is consistent with the evidence in Table 1 and Table 2 discussed above, that there is a high possibility that Chinese firms simply obeying the governance code and keep the number of independent directors no less than a minimum level as required by the code, rather than truly utilise the role of independent directors. Hence, this result is inconsistent with the prediction of Hypothesis 2.1. Although there is a positive relationship between CEO-chair duality and DEA score with  $\beta = 0.16$ ,  $p = 0.05$  in year 2003 (reform periods) without controlling factors, this result is inconsistent with the prediction of Hypothesis 2.2. Besides, CEO-chair duality does not have any influence over firm performance among other periods either. Moreover, consistent with the prediction of Hypothesis 2.3, for the reform period onwards, there is a negative relationship between firm economic efficiency

and the variable of concentration of directors appointed after the CEO, however, the relationship is insignificant, thus Hypothesis 2.3 is not supported by the result. Furthermore, inconsistent with the prediction of Hypotheses 2.4a and 2.4b, the result in Table 3 find an insignificant relationship between firms' economic efficiency and CEO/insider-director share ownership. Although there was a significant relationship between economic efficiency scores and independent directors share ownership in year 1999 and year 2009, the sign was negative, which is inconsistent with the prediction of Hypothesis 2.4c. The evidence of influence of share ownership also provide further support to the evidence shown in Table 1, that director share ownership do not have significant changes before and after the reform.

Therefore, the result from directorial monitoring variables shows that the Chinese corporate governance reforms in year 2002 were ineffective regarding to improving firm economic efficiency.

The second set of Hypothesis 2 focus on how firm economic efficiency score is influence by variables capturing the provision of directorial resources. Hypothesis 2.5 suggests a positive and significant relationship between firms' economic efficiency and board size. However, inconsistent with this prediction, Table 3 shows that in year 1999, the relationship between board size and firms' economic efficiency is negative and significantly associated, which  $\beta = -0.16$ ,  $p = 0.06$  without control variables. After adding the controlling factors, this relationship became insignificant and the association still remains to be negative. The relationship between firm size and firm economic efficiency continues to be negative in the next three period, which contrary to the prediction of Hypothesis 2.5. Moreover, Hypothesis 2.6 predicts a positive relationship between firms' economic efficiency and multiple directorship. Due to sample limitation, the study can only examine periods from year 2005 onwards. Contrary to the prediction of Hypothesis 2.6, Table 3 shows multiple directorship of board members has a negative and insignificant relationship with firm economic efficiency, thus Hypothesis 2.6 is not supported by the evidence. Next, Hypothesis 2.7 predicts a positive relationship between director tenure and firms' economic efficiency. The study find the association between firms' economic efficiency and director tenures are positive and significant during pre-reform and reform period without control variables, which  $\beta = 0.16$ ,  $p = 0.06$  in year 1999 and  $\beta = 0.16$ ,  $p = 0.07$  in year 2003. However, after adding control variables, this relationship has become insignificant, which indicates director tenure do not has a strong

influence over firms' economic efficiency score in the pre-reform and reform period. In year 2005 the post-reform period, the relationship between director tenure became negative and insignificant with control variables ( $\beta = -0.11$ ,  $p = 0.16$ ). Although in the post-reform period (year 2009), this relationship became positive and significant after adding control variables ( $\beta = 0.17$ ,  $p = 0.04$ ), the fluctuation of this relationship among the four periods cannot provide strong evidence to support Hypothesis 2.7, therefore Hypothesis 2.7 is rejected. Lastly, Hypothesis 2.8 predicts a positive and significant relationship between firms' economic efficiency and frequency of supervision board meetings. Consistent with the prediction, table 3 shows a positive and significant relationship in year 2003, which  $\beta = 0.17$ ,  $p = 0.03$  without controlling factors. This relationship continues to be positive and significant in the post reform period (year 2005), which  $\beta = 0.16$ ,  $p = 0.05$  without control variables and  $\beta = 0.16$ ,  $p = 0.03$  with control variables. However, in year 2009, this relationship became insignificant. According to the study of Tricker (2009), one possible explanation to this insignificant result is because the supervisory system in China is increasingly seen as rather ineffective. However, due to sample limitations, this study only examines year 2003 to 2009, which reduces the internal validity of the results. Therefore how the impact of changes in the frequency of supervisory board meeting on changes in firms' performance needs to be further examined in the future.

Therefore, the result under the resource provision role shows that the Chinese corporate governance reform may have certain influence on firms' economic efficiency over frequency of supervision board meeting during the reform and post-reform period. However, whether the meeting remains to be effective in the future periods needs to be further examined. Hence, the second set of Hypothesis two is not supported.

Overall, this study find both sets of Hypothesis 2 under board monitoring role and resource provision role are contrary with the result in Table 3, therefore the prediction of Hypothesis 2 is not supported.

The study predicts the relationship of control variables with firms' economic efficiency as follows: firm size (positive), leverage (negative), capital intensity (negative), revenue growth (positive), state-share ownership (negative), share type (positive) and firm age (positive).

According to Table 3, consistent with the prediction, the result shows a positive and significant relationship between firm size and firms' economic efficiency across all four periods except for year 2009, in which  $\beta = -0.02$ ,  $p = 0.80$ , this negative and insignificant relationship might be caused by the global financial crisis in that year. Leverage also has a negative relationship with firms' economic efficiency across the four periods, and the relationship became significant in the post-reform and post-reform continue periods, which  $\beta = -0.25$ ,  $p = 0.00$  in year 2005, and  $\beta = -0.31$ ,  $p = 0.00$  in year 2009. One possible explanation about the result of leverage is because of the corporate governance reform in year 2002 has reduced the level of state-control over firms, therefore firm level characteristics have been emphasised and come into play (Tricker, 2009). Furthermore, consistent with the prediction, the result in Table 3 shows there is a negative correlation between capital intensity and firms' economic efficiency, and except year 2009, this relationship is significant across all other periods. Although the relationship between revenue growth and economic efficiency is negative and significant in the pre-reform period, this relationship has become positive in the reform periods. This relationship continues to be positive and became significant in the post-reform continue periods, which  $\beta = 0.19$ ,  $p = 0.01$  in year 2009. Another interesting finding is state share ownership has no significant relationship with firms' subsequent economic efficiency across the whole five years. This result provide statistical evidence that contradicts to the findings in the study of Guo, Smallman and Radford (2013), in which the study argues the reason for some governance mechanisms that are effective in Western countries have no significant or negative impact on firm performance in China is because of the strong relationship between state-owned enterprises and the government. Lastly, the result in Table 3 shows no strong support for the prediction of share type and firm age.

#### **4.3 Test of additional dependent variables**

As discussed above, although in the reform and post-reform periods the supervision board meeting has certain level of influence on improving firms' economic efficiency, the research find the Chinese corporate governance reform in year 2002 has almost no or even negative influence on improving firms' economic efficiency.

In order to consolidate the result and enhance the internal validity of the result, this study also conduct three additional tests, by using three traditional performance measurement

**Table 4 Multi-Linear Regression: FimnShare return**

Variable	1999			2003			2005			2009		
	Beta	Sig.	N	Beta	Sig.	N	Beta	Sig.	N	Beta	Sig.	N
<b>Monitoring and Incentives</b>												
Director independence	0.08	0.39	171	0.16	0.09*	168	0.03	0.67	171	-0.03	0.67	171
CEO-chair duality	-0.01	0.95	171	0.12	0.17	168	0.04	0.65	171	0.03	0.71	171
Directors appointed after the CEO	0.09	0.28	171	0.04	0.70	168	-0.17	0.04**	171	-0.16	0.07*	171
CEO share ownership	0.16	0.08*	171	-0.04	0.71	168	-0.26	0.01**	171	-0.25	0.01**	171
Insider-directors share ownership	0.21	0.02**	171	0.20	0.01	168	0.32	0.00***	171	0.27	0.00***	171
Independent-directors share ownership	-0.11	0.19	171	0.05	0.52	168	0.18	0.03**	171	0.17	0.05*	171
<b>Resource provision</b>												
Board size	-0.04	0.66	171	-0.06	0.39	168	0.02	0.82	171	0.03	0.68	171
Multiple directorship of board members	-0.07	0.41	171	-0.04	0.80	168	-0.12	0.13	171	-0.11	0.16	171
Director tenure				0.02	0.80	168	-0.05	0.57	171	0.00	0.60	171
Frequency of supervision board meeting				0.06	0.48	168	0.01	0.88	171	-0.02	0.84	171
<b>Control variables</b>												
Firm size												
Leverage	-0.16	0.18	171	0.30	0.00***	168	-0.04	0.74	171	-0.04	0.74	171
Capital intensity	0.02	0.87	171	0.26	0.00***	168	-0.10	0.34	171	0.05	0.60	171
Revenue growth	0.10	0.28	171	-0.08	0.36	168	0.05	0.60	171	-0.26	0.01**	171
State share ownership	0.00	0.99	171	0.23	0.00***	168	0.22	0.01**	171	0.10	0.21	171
Share type	0.02	0.82	171	0.15	0.07*	168	-0.05	0.59	171	-0.01	0.94	171
Firm age	-0.05	0.58	171	-0.04	0.67	168	-0.03	0.69	171	-0.12	0.14	171
Adjusted R-Square	0.12		171	0.05		168	0.13		171	0.06		165
N			171			168			171			165

\*sig<.10. \*\*sig<.05 \*\*\*sig<.001

**Table 5 Multi-Linear Regression: Firm ROA**

Variable	1999			2003			2005			2009		
	Beta	Sig.	N	Beta	Sig.	N	Beta	Sig.	N	Beta	Sig.	N
<b>Monitoring and Incentives</b>												
Director independence	0.00	1.00	171	0.11	0.21	168	0.02	0.81	171	-0.02	0.81	171
CEO-chair duality	0.02	0.86	171	0.03	0.76	168	0.01	0.89	171	0.00	0.96	171
Directors appointed after the CEO	-0.04	0.61	171	-0.10	0.27	168	-0.35	0.00***	171	-0.28	0.00***	171
CEO share ownership	-0.03	0.77	171	0.05	0.63	168	-0.18	0.06*	171	-0.20	0.02**	171
Insider-directors share ownership	0.04	0.65	171	-0.07	0.50	168	0.11	0.22	171	0.10	0.28	171
Independent-directors share ownership	-0.10	0.26	171	0.12	0.13	168	0.14	0.08*	171	0.16	0.05**	171
<b>Resource provision</b>												
Board size	-0.17	0.04**	171	-0.11	0.19	168	0.05	0.50	171	0.02	0.82	171
Multiple directorship of board members				0.04**	0.04**	168	-0.04	0.58	171	-0.02	0.79	171
Director tenure	-0.04	0.68	171	0.10	0.25	168	0.11	0.18	171	0.08	0.31	171
Frequency of supervision board meeting				0.10	0.22	168	0.13	0.12	171	0.15	0.06*	171
<b>Control variables</b>												
Firm size	0.04	0.72	171	0.12	0.25	168	0.12	0.23	171	-0.03	0.77	171
Leverage	-0.08	0.36	171	-0.04	0.69	168	-0.11	0.25	171	-0.11	0.25	171
Capital intensity	-0.01	0.91	171	0.02	0.84	168	0.05	0.61	171	0.05	0.80	171
Revenue growth	0.03	0.71	171	0.27	0.00***	168	0.25	0.00***	171	0.38	0.00***	171
State share ownership	-0.12	0.15	171	0.03	0.72	168	0.12	0.15	171	-0.06	0.50	171
Share type	-0.18	0.08*	171	-0.12	0.16	168	-0.10	0.23	171	-0.09	0.27	171
Firm age	-0.37	0.00***	171	-0.17	0.07*	168	-0.15	0.08*	171	-0.06	0.50	171
Adjusted R-Square	0.05		171	0.06		168	0.13		171	0.04		165
N			171			168			171			165

\*sig<.10. \*\*sig<.05 \*\*\*sig<.001

**Table 6 Multi-Linear Regression: Firm Tobin's Q**

Variable	1999		2003		2005		2009									
	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig								
<b>Monitoring and Incentives</b>																
Director independence	-0.01	0.90	0.14	0.18	0.01	0.95	-0.02	0.81	-0.08	0.30	-0.10	0.22	-0.15	0.09*	-0.11	0.24
CEO-chair duality	0.04	0.60	0.01	0.94	-0.08	0.31	-0.04	0.65	0.04	0.64	0.02	0.82	0.02	0.83	0.01	0.87
Directors appointed after the CEO	-0.10	0.24	0.01	0.94	-0.18	0.05**	-0.17	0.06*	-0.11	0.21	-0.09	0.30	0.01	0.88	0.03	0.69
CEO share ownership	0.19	0.04**	0.18	0.04**	0.20	0.06*	0.18	0.09*	-0.20	0.04**	-0.21	0.03**	-0.09	0.26	-0.11	0.15
Insider-directors share ownership	0.00	1.00	-0.04	0.65	-0.24	0.03**	-0.16	0.13	0.15	0.12	0.12	0.22	0.08	0.30	0.08	0.30
Independent-directors share ownership	-0.04	0.66	-0.05	0.57	0.06	0.44	0.02	0.77	0.13	0.13	0.13	0.12	0.09	0.28	0.07	0.32
<b>Resource provision</b>																
Board size	-0.10	0.25	-0.04	0.60	-0.07	0.39	-0.10	0.24	-0.03	0.74	-0.05	0.56	-0.07	0.42	0.02	0.78
Multiple directorship of board members									-0.03	0.73	-0.03	0.73	-0.19	0.01**	-0.18	0.02**
Director tenure	-0.03	0.70	-0.09	0.29	0.08	0.36	0.12	0.17	-0.16	0.08*	-0.16	0.07*	0.17	0.05*	0.19	0.03**
Frequency of supervision board meeting					0.07	0.36	0.09	0.29	-0.05	0.52	-0.04	0.60	-0.06	0.49	0.00	0.98
<b>Control variables</b>																
Firm size	-0.29	0.01**	-0.29	0.01**	-0.14	0.20	-0.14	0.20	-0.04	0.71	-0.04	0.71	-0.32	0.00***	-0.32	0.00***
Leverage	-0.17	0.07*	-0.17	0.07*	-0.07	0.45	-0.07	0.45	-0.31	0.00***	-0.31	0.00***	-0.07	0.44	-0.07	0.44
Capital intensity	0.07	0.47	0.07	0.47	0.14	0.18	0.14	0.18	0.13	0.17	0.13	0.17	0.53	0.06	0.10	0.53
Revenue growth	0.00	0.96	0.00	0.96	0.02	0.79	0.02	0.79	0.12	0.15	0.07	0.40	0.10	0.18	0.10	0.18
State share ownership	-0.08	0.38	-0.08	0.38	0.23	0.01**	0.23	0.01**	0.07	0.40	0.07	0.40	0.03	0.76	0.03	0.76
Share type	-0.11	0.26	-0.11	0.26	0.09	0.32	0.09	0.32	0.12	0.15	0.12	0.15	0.07	0.42	0.07	0.42
Firm age	-0.18	0.04**	-0.18	0.04**	-0.16	0.09*	-0.16	0.09*	-0.18	0.04**	-0.18	0.04**	-0.16	0.08*	-0.16	0.08*
Adjusted R-Square	0.07		0.21		0.08		0.17		0.07		0.18		0.11		0.23	
N	171	171	171	171	168	168	168	168	171	171	171	171	165	165	165	165

\*sig<.10, \*\*sig<.05, \*\*\*sig<.001

as dependent variable. Those variables are: firm's total share returns, return on assets (ROA) and Tobin's q. The result are shown in Table 4 to Table 6.

Table 4 shows the relationship between firms' total share return and variables from board monitoring role and resource provision role. Under the board monitoring role, the study find board characteristics were most effective in the post-reform period. In other words, in year 2005, there was a negative and significant relationship between directors appointed after the CEO and firms' share return ( $\beta = -0.16$ ,  $p = 0.07$ ), which is consistent with the prediction of Hypothesis 2.3. The result in year 2005 is also consistent with the prediction of Hypotheses 2.4b and 2.4c, that firms' share return is positively associated with insider/independent directors' share ownership, which  $\beta = 0.27$ ,  $p = 0.00$  and  $\beta = 0.17$ ,  $p = 0.05$  with control variables. However, CEO share ownership has a negative and significant relationship with firms share returns ( $\beta = -0.25$ ,  $p = 0.01$ ), which inconsistent with the prediction of Hypothesis 2.4a. Further, the board monitoring variables in other periods were insignificant or have an opposite sign with the prediction, for example, director independence have a negative and insignificant relationship with firms' share return in the post-reform continue periods, and CEO-chair duality has a positive relationship across all period. Lastly, for variables under resource provision role, none of them have significant relationships with firm share returns. This may indicate Chinese corporate governance reform could not enhance firms' share return under the board resource provision role, and directors could not fully utilise their knowledge to help improve firms' share returns.

Table 5 shows how the board characteristics affect firms' ROA before and after the reform. Similar to the result in Table 4, both monitoring and resource provision variables do not have an overall significant relationship with firms' ROA. The study also find board characteristics were most effective in year 2005 (post-reform period), there was a negative and significant relationship between directors appointed after CEO and firms' ROA ( $\beta = -0.28$ ,  $p = 0.00$ ), a positive and significant relationship between independent directors share ownership and firms' ROA ( $\beta = 0.16$ ,  $p = 0.05$ ), thus Hypothesis 2.3 and 2.4c are supported in year 2005. However, similar with the result in Table 4, there was also a negative and significant relationship between CEO-directors share ownership and firms' ROA, thus the prediction of Hypothesis 2.4a is not supported.

Similar with the result in Table 5, Table 6 shows that the Chinese corporate governance

reform in 2002 do not effectively improve firms' Tobin's Q through changes in corporate governance factors. For example, the result in Table 6 shows the positive and significant relationship between CEO share ownership and Tobin's Q in the pre-reform ( $\beta = 0.18$ ,  $p = 0.04$ ) and reform ( $\beta = 0.18$ ,  $p = 0.09$ ) periods has become negative and significant in the post-reform periods ( $\beta = -0.21$ ,  $p = 0.03$ ). This variable is also insignificant in the post-reform continue periods, which contradict with the prediction of Hypothesis 2.4a. Multiple directorship has a negative relationship with firm Tobin's Q in the post-reform and post-reform continue period, and this relationship became significant in year 2009, which  $\beta = -0.18$ ,  $p = 0.02$  with controlling factors, thus Hypothesis 2.6 is not supported. Lastly, the relationship between director tenure and firm Tobin's Q is fluctuation during the four period. The negative and insignificant relationship in the pre-reform period became positive and insignificant in the reform period. In year 2005, this relationship became negative and significant with  $\beta = -0.16$ ,  $p = 0.07$ , and in year 2009, it became positive and significant ( $\beta = 0.19$ ,  $p = 0.03$ ). Therefore, the result cannot conclude that whether director tenure has improved firm Tobin's Q after the reform, Hypothesis 7 is not supported.

Overall, the result from Table 4 to Table 6 suggests that the Chinese corporate governance reform in year 2002 have little influence in improving firm performance regarding to firm share returns, return on assets and Tobin's Q. Therefore, those results provide further evidence that contradict to the prediction of Hypothesis 2.

#### **4.4 Change analysis**

The above sections examine the influence of corporate governance reform on firm performance in each period, and the results showing that the reform is ineffective. In this section, the study examines the influence of the corporate governance reform using changes, which is to test whether there is an association between the change in board characteristics due to the reform and the change in firm performance. The study examines the changes between pre-reform period (year 1999) and post-reform period (year 2009). Two methods have been used in this section, the first one examines firms that are available in both year 1999 and year 2009, the results are shown in Table 7. The second method examines changes using rankings, and the results are shown in Table 8.

According to Table 7, the result shows almost none of the changes in board characteristics

Table 7 Multi-Linear Regression: Changes-same firms

Variable	DEA Score			Share returns			ROA			Tobin's q				
	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig		
<b>Monitoring and Incentives</b>														
Director independence	-0.07	0.64	-0.16	0.27	-0.02	0.88	-0.17	0.29	-0.03	0.85	-0.07	0.69	-0.28	0.07*
CEO-chair duality	0.13	0.36	0.11	0.41	0.04	0.81	-0.04	0.78	0.13	0.40	0.12	0.46	0.06	0.68
Directors appointed after the CEO	0.15	0.32	0.14	0.35	-0.03	0.83	-0.01	0.97	-0.01	0.96	0.07	0.68	0.07	0.65
CEO share ownership	0.00	0.98	0.02	0.89	0.12	0.44	0.10	0.51	0.03	0.82	0.00	1.00	-0.01	0.95
Insider-directors share ownership	0.31	0.03*	0.28	0.05**	-0.08	0.61	-0.21	0.21	0.12	0.42	0.10	0.55	0.23	0.11
Independently-connected CEOs	-0.03	0.81	-0.08	0.53	0.09	0.55	0.02	0.91	-0.06	0.71	-0.08	0.62	0.01	0.93
<b>Resource provision</b>														
Board size	-0.06	0.69	-0.17	0.24	0.13	0.40	0.00	0.98	-0.05	0.74	-0.11	0.53	-0.13	0.36
Multiple directorship of board members														
Director tenure	-0.04	0.78	0.07	0.65	0.05	0.76	0.17	0.33	0.22	0.17	0.23	0.21	-0.08	0.60
Frequency of supervision board meeting														
<b>Control variables</b>														
Firm size			-0.37	0.03**			0.28	0.14			-0.01	0.96		0.15
Leverage			0.14	0.53			0.01	0.98			-0.23	0.40		0.09
Capital intensity			-0.11	0.60			-0.35	0.16			0.18	0.48		0.03
Revenue growth			0.24	0.09*			0.23	0.15			0.23	0.18		0.00
State share ownership			-0.19	0.23			-0.19	0.30			-0.03	0.89		-0.19
Share type			-0.23	0.11			-0.33	0.06**			-0.08	0.65		0.03
Firm age			-0.02	0.90			-0.06	0.77			0.05	0.82		-0.04
<b>Adjusted R-Square</b>	<b>0.14</b>	<b>64</b>	<b>0.43</b>	<b>64</b>	<b>0.05</b>	<b>64</b>	<b>0.30</b>	<b>64</b>	<b>0.08</b>	<b>64</b>	<b>0.18</b>	<b>64</b>	<b>0.13</b>	<b>64</b>

\*sig&lt;10, \*\*sig&lt;05, \*\*\*sig&lt;001

Table 8 Multi-Linear Regression: Changes - Rank

Variable	DEA Score			Share returns			ROA			Tobin's q				
	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig		
<b>Monitoring and Incentives</b>														
Director independence	-0.07	0.39	-0.06	0.38	-0.03	0.75	-0.05	0.59	-0.10	0.24	-0.12	0.17	-0.06	0.51
CEO-chair duality	0.01	0.91	0.00	0.99	0.14	0.15	0.16	0.07*	0.01	0.87	0.02	0.84	0.09	0.30
Directors appointed after the CEO	0.01	0.90	0.03	0.72	0.02	0.84	0.00	0.99	-0.05	0.56	-0.06	0.47	-0.07	0.41
CEO share ownership	-0.10	0.61	0.01	0.96	-0.29	0.16	-0.26	0.18	0.04	0.85	0.06	0.75	-0.21	0.28
Insider-directors share ownership	0.15	0.42	0.00	0.98	0.26	0.18	0.20	0.30	0.00	0.99	-0.05	0.79	0.25	0.18
Independently-connected CEOs	0.00	0.96	0.03	0.71	0.07	0.44	0.09	0.29	-0.05	0.54	-0.06	0.52	0.06	0.50
<b>Resource provision</b>														
Board size	-0.10	0.25	-0.10	0.19	-0.03	0.72	-0.05	0.54	-0.16	0.06*	-0.17	0.05**	-0.09	0.28
Multiple directorship of board members														
Director tenure	0.06	0.47	0.06	0.42	0.02	0.81	0.00	0.99	0.15	0.07*	0.13	0.14	-0.03	0.77
Frequency of supervision board meeting														
<b>Control variables</b>														
Firm size			-0.34	0.00***			-0.19	0.08**			-0.12	0.27		0.05
Leverage			-0.08	0.40			-0.14	0.18			-0.15	0.16		-0.08
Capital intensity			-0.22	0.03**			0.07	0.56			0.09	0.45		-0.05
Revenue growth			0.11	0.12			0.24	0.01**			-0.01	0.92		-0.09
State share ownership			-0.02	0.74			-0.14	0.11			-0.04	0.61		0.02
Share type			-0.03	0.74			0.10	0.29			0.04	0.66		0.13
Firm age			0.02	0.77			0.07	0.43			-0.09	0.32		-0.02
<b>Adjusted R-Square</b>	<b>0.02</b>	<b>168</b>	<b>0.36</b>	<b>168</b>	<b>0.03</b>	<b>168</b>	<b>0.20</b>	<b>168</b>	<b>0.06</b>	<b>168</b>	<b>0.09</b>	<b>168</b>	<b>0.04</b>	<b>168</b>

\*sig&lt;10, \*\*sig&lt;05, \*\*\*sig&lt;001

has a significant relationship with changes in firm performance. Changes in insider-directors share ownership has a positive and significant relationship with changes in firm economic efficiency ( $\beta = 0.28$ ,  $p = 0.05$ ), however, Table 1 argued the changes in director share ownership was not obvious between year 1999 and 2009, which raise concern about the statistical validity of this result. Although there is a significant relationship between changes in director tenure and changes in firms' Tobin's Q, the relationship is negative, which is inconsistent with the prediction. Hence, the result indicates changes in board characteristics due to the reform have an overall insignificant influence on changes in firm performance.

Furthermore, Table 8 shows comparison between rank firms has a similar result to Table 7. This further enhance the result that changes in board characterises due to the corporate governance reform have an insignificant influence on changes in firms' subsequent performance.

To sum up, the study China's corporate governance reform in year 2002 did have influence on changes in corporate governance factors. For instance, the amount of independent directors on board has increase significantly, which Hypothesis 1 is supported. Moreover, firm economic efficiency also improved after the reform, which the DEA scores has increased after the reform period and remains above 0.80. However, the influence of the reform on improving firm performance is not revealed via multi-linear regression, neither from the test of changes, thus Hypothesis 2 is not supported.

## **5.0 Discussion and Conclusion**

Prior research highlights that firms in emerging economies have weaker corporate governance due to the poor legal enforcement and investor protection, and therefore those firms are discounted in the financial markets (La porta et al, 2000). Further, since the late 1990s, more than 20 developed and emerging countries have undertaken corporate governance reform (Kim and Lu, 2013), and among those countries, China's corporate governance reform in year 2002 can be regarded as one of the most important. One reason is because of China's significant historical context of strong central control, which makes board and share ownership not the obvious basis for governance power(Tricker, 2009), and the reforms in the year 2002 follows the US regulatory system (Rajagopalan and Zhang, 2008), thus the effectiveness of the reform should be examined. The other reason

is because China nowadays rapidly has become the focus of foreign investment, investors willing to pay a high premiums for well-governed Chinese firms (Barton et al 2004). Therefore, China's corporate governance reforms in 2002 can be regarded as the one that needs to draw most attention and to be analysed further.

Although the effect of corporate governance reforms have been widely investigated, evidence of their effects on firm performance is not conclusive in nature (Daily and Dalton, 1997; Weir and Laing, 1999). Moreover, previous research has applied several performance indicators to investigate some of the corporate governance initiatives that can affect Chinese firm performance (e.g., linking CEO pay with firms' return on assets, as in Conyon and He, 2011; link corporate governance factors with detecting fraud, as in Chen et al, 2006), there has been a paucity of studies on how board characteristics before and after the corporate governance reform affect firm performance. This study has identified agency theory and resource dependence theory to predict links between board governance and the areas of management and performance that are of interest to shareholders. Moreover, regarding to performance measurement, prior studies tends to use ratios as proxy such as ROA and ROE (Chen, 2013; Sarkar Sarkar, 2008). This study argued using those ratios as performance measurement are subject to several limitations (Smith, 1990, Feroz et al , 2003), thus incorporate Data Envelopment Analysis to examine firms' economic efficiency instead.

Therefore, this study investigate the relationship between corporate economic efficiency and several board characteristics linked to the monitoring role of directors, as suggested by agency theory, and to the resource provision role, as suggested by resource dependence theory. This study test the hypotheses based on two research questions: The first one is has there been a change in the corporate governance factors following the reform? And the second one is if the corporate governance reforms in year 2002 have changed the corporate governance factors, does this influence firm performance? An event study has been conducted, using listed firms in China in four periods, which includes pre-reform period, reform period, post-reform period and post reform continue period. Furthermore, in order to consolidate the results, the study also applies traditional measurements of firm performance to conduct the same experiment. Lastly, a study of examining overall changes has also been conducted to enhance the result.

The evidence from descriptive statistics shows China's corporate governance reform in

year 2002 changes in corporate governance factors, in which the amount of independent directors on board has increased, CEO-chair duality has decreased and frequency of supervision board meetings has increased, etc. Moreover, the paired sample t-test shows those changes were significantly different from the corporate governance factors in the pre-reform period with p value less than 0.05. This provide evidence consistent with the prediction of Hypothesis 1 of this study, that the corporate governance reforms have changed the corporate governance factors of Chinese listed firms.

Furthermore, the results from multi-linear regression shows the effect of corporate governance factors on firm economic efficiency and other performance measurements over the four period. However, the results shows that the influence of China's corporate governance reforms on improving firm performance are not revealed via single period tests, neither from the test of changes through the whole periods, therefore provides evidence inconsistent with the prediction of second Hypothesis. Specifically, when testing the influence of changes in board characteristics due to the reform on firm economic efficiency, under the agency theory-driven predictions, almost none of the tested independent variables has a significant relationship with the dependent variable, for those variables that are significant, the sign is opposite to the prediction (e.g., variable of independent directors on board has a negative and significant with firms' economic efficiency during post-reform and post-reform continue periods). Moreover, inconsistent with the prediction under resource dependency theory, the results show that board size, multiple directorship of board members and director tenures do not have significant relationship with firm economic efficiency. Supervision board meeting has a positive and significant relationship with firm economic efficiency in the early periods of the reform and became negative and insignificant in the post-reform continue period. The study of Tricker (2009) provides one possible explanation that the supervisory system in China is increasingly seen as rather ineffective, thus the influence of supervision board meeting due to the reform may become ineffective in the long run. Moreover, under the test of additional dependent variables, the study also find corporate governance variables have an insignificant or even opposite relationship with firm performance. Therefore, the prediction of Hypothesis 2 is not supported.

Therefore, the findings from descriptive statistics and multi-linear regression provide evidence that China's corporate governance reform in year 2002 did influence some corporate governance factors. However, for Chinese firms listed on the Shanghai and

Shenzhen stock exchange, changes in board characteristics after the reform do not play a significant role in improving firm economic efficiency and other financial performance measurements. Moreover, some governance mechanisms that are effective in Western countries have no significant effect or negative impact on firm performance in China (e.g., independent directors on board have a negative and significant relationship with firms' performance after the corporate governance reforms). Therefore, the findings suggest that Chinese listed companies simply obey the governance code promoted after the reform, rather than fully utilise it, which firms' performance could not be improved and even decreased from those changes.

The findings that the corporate governance reform has no influence on firm performance is important, since the reform has significant influence on other factors such as detecting fraud, improve productive efficiency, and this study expect it should have a positive and significant relationship with firm performance(Chen et al,2006; Liu et al, 2015; Su and He, 2006). One possible explanation is China has a relatively underdeveloped legal environment when compared to the U.S and so the role and impact of regulation and corporate governance differs across the two countries (Chen et al, 2006). The other explanation relates to the sample this study selects, that most of the Chinese Fortune 200 listed companies are state-owned, which are unlikely to fail, which board characteristics may not be an important factor for determining firm performance.

Overall, this study find the corporate governance reforms have caused the subsequent changes in corporate governance factors. The board characteristics do not matter before and after the corporate governance reform with respect to firm economic efficiency, share returns, return on assets and Tobin's Q. Therefore, this study suggest China should not simply imitating corporate governance code in developed countries, and should develop an effective corporate governance code by their own.

## **5.1 Contribution**

This study contributes to the extant academic literature by using a combined perspective of agency and resource dependence theories to examine how board characteristics before and after the Chinese corporate governance reforms in the year 2002 influence Chinese listed firms' performance, which also contributes to the research area of emerging economies. The study also goes beyond the traditional performance measurement, and

uses a newly developed DEA approach, which can complement traditional ratios and avoids the pitfalls of the one-ratio-at-a-time approach.

The practical implication of the study is that listed firms in China should not simply obey the corporate governance code, rather should fully utilise it. For example, the percentage of independent directors on board could be increased rather than keep it at the minimum requirement level, and supervision boards should be granted more power. Further, the corporate governance code itself may be further modified and improved, since Chinese companies do not see the essence of the code. One possible suggestion is China could develop its own corporate governance code based on China's unique characteristics rather than following the U.S and other developed countries' regulatory system.

## **5.2 Limitations and Future Research**

Future research should address several limitation of this study. First, variables of multiple directorship of board members and frequency of supervision board meetings were difficult to collect from the CSMAR database. Due to time limitations, this study was unable to hand collect those data from the companies' website either. Future research could complete those missing samples to find whether those variables have influence on firm's performance before and after the corporate governance reform.

Second, this study selected sample firms from Chinese fortune 200 lists, which most of them are large and state owned enterprises. It is possible that state-control has a larger influence on firm's performance than board characteristics among those firms. Future research could select medium size Chinese listed firms and conduct the study again, and to find whether the corporate governance reform benefits those companies.

Lastly, this study select variables based on studies that conducted in developed economies. It is possible the variables applied in developed economies do not fit into the studies of emerging markets. Future research could use a mixed method to conduct the research, by firstly using qualitative method and interviewing board members and CEOs in Chinese listed firms, and identify what are the key board characteristics that drives the firm's performance, then gather the sample based on those identified characteristics and conduct quantitative study to examine whether those characteristics have influence on firm performance.

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