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**The Relationship between
Corporate Governance,
Environmental Disclosure, and
Firm Value in Chinese Listed
Companies**

BY

HAN LIU

**A thesis submitted in partial fulfillment of the requirement for
the degree of Doctor of Philosophy in Accounting and Finance**

Durham University Business School

University of Durham

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ABSTRACT

In the last three decades, the rapid economic growth of China has attracted increasing research on its corporate governance and disclosure practices. However, there is, in general, a lack of understanding from the outside world due to the specific knowledge needed of the unique situation of China. In addition, previous studies lack research on the relationship between corporate governance and environmental disclosure in developing countries.

In this thesis, the roles of ownership structure and board composition on the extent of environmental disclosure in the annual reports are examined through evidence from the Chinese market. The sample of this research is collected from both the Shenzhen Stock Exchange (SZSE) and Shanghai Stock Exchange (SHSE). In this study, the quantity of environmental disclosure (measured by the mechanistic content analysis approach) and the quality of environmental disclosure (measured by the interpretative approach) are employed to estimate environmental disclosure variables. The results indicate that both qualitative and quantitative environmental disclosures increase with state ownership, greater blockholder ownership, and with a larger supervisory board. Environmental disclosures are not significantly associated with the proportion of independent directors on the board of directors. Furthermore, this study denotes that much less environmental information is disclosed in the annual reports of most Chinese listed companies compared to those of developed countries and so China is in a budding stage of development in disclosure practice. It suggests that firms should reveal more environmental information in the future for a win-win situation between themselves and their stakeholders under the stakeholder-agency framework.

This thesis also examines how the market reacts to qualitative and quantitative environmental disclosures from annual reports during relatively long periods, compared with the event study. Using two sets of databases (CCER and CSMAR) and annual reports from two Stock Exchanges, financial data and environmental disclosure information are collected to test the regressions using Chinese observations between 2009 and 2011. Voluntary environmental disclosure in the annual report is expected to provide value relevant information in the Chinese market based on signalling theory and

the concept of information asymmetry. The findings indicate that quantitative environmental disclosure is positively value relevant in the market, and it also influences the firm value in the subsequent year; in contrast, qualitative environmental disclosure merely relates to the firm value in the same year, but it does not affect the subsequent year.

The uniqueness of China motivates the research on corporate governance in China, which would be a reference for countries processing similar mechanisms or attempting to advance their corporate governance. This research contributes to the existing literature on accounting about corporate governance, managerial structure, and disclosure practice in fast growing developing countries such as China. It enhances the understanding of influences from different corporate governance compositions on environmental disclosure. In addition, this research contributes to the knowledge about the association between market value and environmental information in fast developing countries such as China based on a large sample during consecutive years. Moreover, it is an up-to-date empirical research, which enhances the understanding in terms of qualitative and quantitative environmental disclosures and provides useful information for various stakeholders.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND AND OVERVIEW

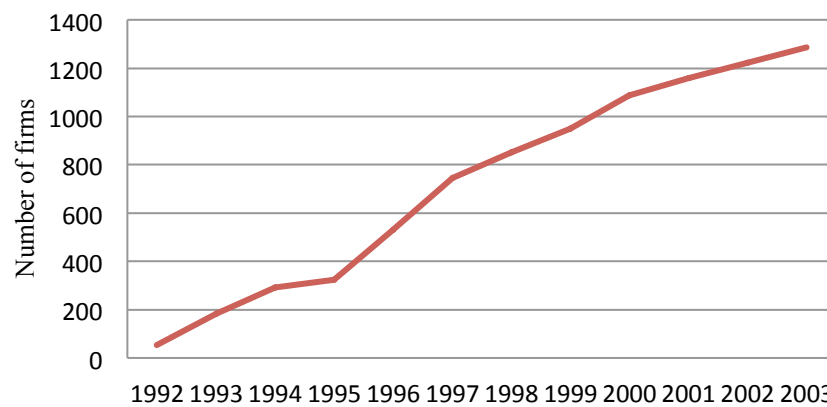
The People's Republic of China was founded on the 1st of October, 1949. At that time, the state had already taken over important enterprises such as electricity, railway, and banking. Thenceforth, the state started to nationalise the remaining private-ownership enterprises. By 1956, state-owned enterprises (SOEs) had successfully replaced all of the private-ownership businesses in China (Wei, 2003). The following Great Proletarian Cultural Revolution, from 1966 to 1976 (Mao's death), was a violent mass movement that spread to major social, political, and economic upheaval. During that decade, people's freedom of thought, action and expression was seriously inhibited and the economy was impacted seriously, which lead to nationwide upheaval and economic stagnation.

1978 was a turning point of economic reform. The Chinese government adopted an 'open-door' policy in order to improve its economy. There have been many successful cases of privatising SOEs in developed countries through share-issuing privatisation since the 1980s (Megginson and Netter, 2001). China also chose this way to reform its economic system. The early 1990s began to see a change. In December 1990, the first stock exchange started trading in Shanghai. Then Shenzhen Stock Exchange was set up in April 1991. Many businesses started to restructure from SOEs to companies listed on these two stock exchanges. Taken data from the China Securities Regulatory Commission (CSRC) and the China Securities and Futures Statistical Yearbook 2003,

figure 1.1 shows the trend of development of China's stock market between 1992 and 2003. It expresses a steady growing of Chinese listed companies from zero to 1200 firms during the first 12 years. By 6th March of 2015, the companies listed in Shanghai and Shenzhen Stock Exchanges had increased to 2,659 firms and the total market value amounted to RMB 40,520 billion.

Figure 1.1

The development of China's Stock market between 1992 and 2003



At present China is one of the fastest developing countries with large emerging market in the world. According to the World Bank by 2007 and an OECD survey in 2010, China had become the 3rd largest global economy. Over the last decade, Chinese corporate governance, both in practice and in theory, has been given much attention as a worldwide research topic (Zhao, 2014). The rapid economic growth in China has attracted increasing interest from scholars to explore what the framework, style and construction of China's corporate governance are; and how it advances the economic development?

Although Chinese corporate governance is relatively new compared with the US and the UK (Tam, 1999), in the last two decades, the government set up a number of regulatory bodies (e.g., People's Bank of China (The Central Bank of China), the Ministry of

Finance, the China Securities Regulatory Commission (CSRC), and the State Economic and Trade Commission) and passed a series legislations (e.g., Company Law (1994), Audit law (1994), Securities Law (1998), Accounting Law (1999), new Bankruptcy Law (2005), new Securities Law (2006) and new Company Law (2006)) to make sure of an appropriate corporate governance system. Thus, examining Chinese corporate governance during recent years is becoming more important.

In the last three decades, the Chinese economy has been growing rapidly. At the same time, pollution and other environmental issues are also growing rapidly in China. According to the BBC (2005) and the New York Times (2007), the industrial pollution (air and water) problems in China seriously threaten the health of the people. In the Environmental Performance Index 2012, China was ranked 116th out of 132 countries (Zhao, 2014). Recently, news of severe pollution in Beijing, the Chinese capital, frequently appeared in BBC News between 12 January, 2013 and 31 January, 2013. The news indicated that air pollution has soared to hazardous levels outlined by the World Health Organisation (WHO), that hospitals were overrun by the young and the old with respiratory problems, and that people were warned to stay indoors. Official Beijing city readings on 12 January, 2013 suggested that air pollution levels are over 400 microgrammes per cubic metre while an unofficial record from a monitor of the US embassy showed that the levels are over 800. However, average concentrations of the tiniest pollution particles should be no more than 25 microgrammes per cubic metre (PM2.5) as outlined by WHO guidelines. Air is unhealthy when levels are above 100 microgrammes. In other words, air pollution in Beijing is seriously impacting people's health. According to the data from the Ministry of Environmental Protection of the People's Republic of China on 15th January 2013, there were merely 2 out of 68 cities (2.95%) evaluated as having good air quality, but 36 cities were measured as having

minor or moderate pollution and 3 cities were estimated as having serious pollution. CCTV (China Central Television) news reported that serious air issues are resulting in an increase of respiratory diseases in hospital. Economic growth has left severe air problems in many cities in China.

China, as a country with a pivotal role in global environmental protection (Rowe *et al.*, 2009), is confronted with a series of environmental issues at present. The huge pressures to China come from increasing concerns of the residents and the public. Companies need to reveal voluntary environmental information in order to reduce the pressures for themselves and the government. Then, what are the determinant factors of environmental disclosure in annual report is an important research area in China. In previous studies, the role of firm performance (e.g. firm size, firm age, industry, profitability, and leverage) is always employed to investigate the association with disclosure practice. Based on Chinese evidence, this research will examine the relationship between two hotspots (corporate governance and environmental disclosure) in China, and firm performance is adopted as control variable to complete the regression test.

In 2001, Jinglian Wu, a famous Chinese economist, said: “China’s stock market is worse than a Casino. At least in a Casino there are rules.” In China, the lack of transparent and voluntary disclosure is the major problem to establishing an effective and mature stock market, because stakeholders and other market participants cannot get adequate information to make proper decisions (Lin and Chen, 2005). In recent years, there have been a series of corporate scandals by Chinese listed companies. The biggest scandal was Yinguangxia in 2002, which was a RMB745 million fraud (Singh and Gaur, 2009). These scandals reflect the fact that Chinese listed companies lack transparency and voluntary disclosure. Whether or not the ‘dominating state-owned share monopolises

under internal control' (Xu and Wang, 1997) is the main reason which leads to asymmetric information is yet to be determined. Whether or not the quality and quantity of environmental information in the annual report of Chinese listed company is value relevant which could assist an effective and mature stock market is yet to be determined. In this research, the answers would be found by examining the relationship between corporate governance and environmental disclosure, and by exploring value relevance of environmental disclosure in China.

1.2 MOTIVATION FOR THE STUDY

China is a socialist developing country with a large emerging market. Corporate governance has been developing very fast in China during the last three decades. Although China does not hold a fully effective corporate governance system or a well-developed market such as the UK and the US, yet the development of corporate governance in China cannot be overlooked. Since corporate governance was introduced in China in the 1980s, the Chinese government has been attempting to move from a centrally planned economy to a market-oriented system in a short period of time (Wei and Geng, 2008). Tricker (2010) mentioned that 'China has achieved in less than two decades what took the US and European countries over a century' (p.489). In addition, there has been 10 per cent of growth each year, on average, in the Chinese economy over the past twenty years and the trend is expected to continue in future (Cheung *et al.*, 2008; Jia and Tomasic, 2010). As a socialist developing country, at the beginning, China borrowed many experience of corporate governance development. For instance, Chinese company law was drawn up that was based on the existing corporate law in Western countries (Liu, 2009). This means that corporate governance in China and Western

countries are similar in some ways. On the other hand, divergences between China and Western countries also exist because of varied social, political, and economic environments. At present, China processes its own system of corporate governance to develop the Chinese economy. It reduced effectively the influence from the 2007 financial crisis and the worldwide slowdown, when many countries with mature corporate governance and market economies, such as the UK, the US, and Japan, were impacted seriously. These situations increase interest in the research on corporate governance in China. The uniqueness of China motivates this study, which would be a reference for countries processing similar mechanisms or attempting to advance their corporate governance.

Economic development is causing significant impact on life and health. In 2010, the listed company, Zijin Mining, discharged acidic waste water into a river containing excessive copper. Recently, news of severe air pollution in many cities of China was frequently appearing in BBC News (between January, 2013 and January, 2014). At the beginning of 2013, the China smog crisis mainly enveloped Beijing, the Chinese capital. The BBC news indicated that air pollution there had soared to hazardous levels outlined by the World Health Organisation (WHO). A BBC correspondent pointed out that coal dust and car fumes are the main sources of air pollution. These matters have attracted attention from the Chinese government. They started to curb coal use to combat China's air quality crisis. However, any effect of controlling air pollution is not immediately obvious. The China smog crisis remained in September 2014 and had expanded to Northern China. Economic growth has left a severe air problem in many cities in China. Therefore, corporate social responsibility, especially in its environmental aspect, is now under more attention and pressure from various circles, such as society, government, residents, shareholders, and managers. Environmental disclosure 'appears to reflect

public social priorities, responds to government pressure, accommodates environmental pressures and sectional interests, and protects corporate prerogatives and corporate images' (Guthrie and Parker, 1990, pp.171-172). Meng *et al.* (2013) indicated that environmental information disclosure is becoming a significant issue for companies to achieve ecological sustainability (p.217). The research on the relationship between corporate governance and environmental disclosure and its value relevance could help to further realise the effect of environmental disclosure in China, and thus to assist corporations ameliorate their environmental practice.

In previous studies on the association between corporate governance and disclosure practice, the mixed results of empirical research mainly occur in the impact to voluntary disclosure from two mechanisms of corporate governance: ownership structure and board composition. The inconsistent findings also appear in the value relevance studies. These problems are produced because of two broad reasons: differences in disclosure measurement and variation in valuation models used. In the measurement of environmental disclosure, this paper applies the method which integrates mechanistic content analysis approach (disclosure volumes and/or frequencies) (e.g., Ness and Mirza, 1991; Wilmshurst and Frost, 2000; Campbell, 2003) and interpretative approach (meaning and understanding of disclosure) (e.g., Buhr and Reiter, 2006; Coupland, 2006) to reduce errors of research results. In the valuation model, the Ohlson (1995) model is regarded as 'best-known conceptual model of value relevance analysis' (Carnevale *et al.*, 2009). According to experience of previous studies and the actual status of China, the regression in this research is developed based on a modified Ohlson (1995) model.

Although several studies have investigated the relationship between the extent of voluntary disclosure and corporate governance in China (e.g., Qiao, 2003; Xiao and

Yuan, 2007; Li and Qi, 2008 ; Cheung *et al.*, 2010; Fu, 2010), most of them examined corporate disclosure or financial disclosure. They lack research on environmental disclosure that relates to the mechanisms of corporate governance in China. Liu and Anbumozhi (2009) tested the effect of pressure from blockholder ownership on the extent of VED, but they only touched on a few of the corporate governance mechanisms. It overlooked to examine the impact from other ownership structures and board components on the extent of VED. Moreover, Xiao and Yuan (2007) investigated the impact of ownership structure and board composition on voluntary disclosure based on 559 Chinese listed companies in 2002, and then suggested that a future researcher should examine a longitudinal study in this area. This research employs data from 1,230 Chinese listed companies during a 3-year period between 2009 and 2011.

Value relevance of disclosure practice has been widely studied in developed markets. In the developing market, there is a growing body of research on corporate social responsibility/ environmental disclosure and its value relevance. For example, Murcia and Santos (2010) observed corporate voluntary disclosure and its determinants in Brazil based on the top 100 largest non-financial listed companies between 2006 and 2008. A significantly positive effect on firm value (Tobin's Q) was found from social-environmental disclosure and total disclosure respectively. The reaction of the stock market to firms' corporate responsibility reporting (CRR) was investigated by de Klerk and de Villiers (2012) through the evidence of the top 100 South African companies between 2007 and 2008. The finding indicated that a higher level of CRR improves share prices. Iatridis (2013) examined whether or not environmental disclosures are value relevant and how they impact investor notions based on 529 Malaysian listed companies (looking at chemical, industrial metals and mining industry, food and drink producers, and forestry and paper companies) during the period of 2005-2011. These three countries

have in common that they were colonies of European countries, either the UK or Portugal. Their legal system, culture and economic development were influenced by European countries. In the same way, the corporate governance system in these three countries has vestiges of the UK or Portugal. China is a very fast growing developing socialist country. 'Relatively high levels of collectivism and power distance, and strong uncertainty avoidance' are exhibited in this socialist country (Ronnie Lo, 2009, p.7). This author asserted that 'societal values of high collectivism and large power distance suggest a tendency for the members of a society to adhere to rules and regulations, conform to peer norms, follow the guidance from leaders, and refrain from risk-taking due to uncertainties'. Based on the characteristics of this society, Chinese companies would tend to reduce transparency and reveal less voluntary information in the annual report compared with European countries and the US.

The Chinese stock market has been developing rapidly since the Shanghai and Shenzhen Stock Exchanges were set up in the early 1990s. According to Zeng (2012), the Chinese stock market experienced unprecedented development and had become the largest in developing countries by 2001; and by December 2010, market capitalisation of the Shanghai Stock Exchange had become the 5th largest in the world. However, in contrast with the UK and the US, the two Chinese stock markets are underdeveloped and are substantially affected by state policies (Liu, 2009). The main reason is that whilst China's economy is changing rapidly, the development of the Chinese legal and political system is still lagging behind. This is because the government need to protect the rights and status of Chinese Communism and guard communist ideology. Under this market circumstance, an information asymmetry exists between the state, controlling shareholders, minority shareholders, and the agencies. It leads to the Chinese stock markets being highly speculative and volatile (Morck *et al.*, 2000). Although China is

similar to most developing countries with a low level of report practices and information transparency, the uniqueness of China and its stock market environment under the nation's political, legal, and economic context points to the importance of research on the value relevance of its environmental disclosure.

In the beginning of China's economic reform, many codes and practices of corporate governance and reporting regulation were borrowed from developed countries. On 7th January, 2001, the "Code of corporate governance for Listed Companies in China" was issued by the China Securities Regulatory Commission (CSRC) and the State Economic and Trade Commission. In 2006, 38 Chinese accounting standards for Business Enterprises, which involve 22 newly-promulgated and 16 revised accounting standards, were issued under the assistance of Deloitte, one of the Big-4 international CPA firms (Liu, 2009). The new accounting standards cover all topics of International Financial Reporting Standards (IFRSs). This research will explore the development of environmental disclosure and its value relevance under the effects of the "Code of corporate governance for Listed Companies in China" and the new accounting standards.

Wu and Shen (2010) employed a sample from the Chinese stock market to explore the relationship between environmental disclosure and firm value. They mentioned that environmental disclosure would not necessarily add firm value when the firm merely reveals good news and hides bad news. In the study, the authors applied the Global Reporting Initiative sustainability reporting guidelines for environmental disclosure measurement and Tobin's Q for firm value measurement. They did not find evidence to prove that environmental disclosure significantly impacts firm value based on 145 listed chemical firms from Chinese stock markets in 2008. Their study merely focused on the chemical industry in a single year which lacks time-series analysis and cannot reflect a

holistic value relevance of VED in the Chinese market. Due to the limitations of research on the association studies of value relevance, this research examines data of 2,850 firm-year observations during the period 2009 to 2011 covering 12 different industries based in the Chinese market.

1.3 AIMS OF THE STUDY AND RESEARCH QUESTIONS

In the research, it is composed of three empirical chapters. In this part, the aims, objectives, research question and hypotheses of each empirical chapter is presented.

Empirical Chapter One

– The relationship between corporate governance and quantity of environmental disclosure: empirical evidence on Chinese firms

The main aim of the first empirical chapter is to examine the role of ownership structure and board composition on the quantity of environmental disclosure in the annual reports through evidence from the Chinese market between 2009 and 2011.

From the motivation and research aim of the empirical chapter one, the following main research questions that the first empirical chapter would explore are:

1. What is the extent and current status of quantitative environmental disclosure in the annual reports of Chinese listed companies? What is the percentage of Chinese listed companies which reveal environmental information at present? What is the trend in quantitative environmental disclosure in the research period?

2. To what extent does a relationship between different ownerships and quantitative environmental disclosure exist? Do increased numbers of independent directors (non-executives) enhance environmental disclosure in the annual reports? Does the size of a supervisory board have any impact on the extent of environmental disclosure?

3. What are the relationship between control variables (e.g., FSIZE, DEBT, ROE, AGE, and INDUSTRY) and the extent of environmental disclosure practice? Is there any conflict between corporate governance and quantity of environmental disclosure?

There are 7 research hypotheses of the empirical chapter one developed around the relationship of the extent of environmental disclosure practice in the annual reports with five different ownership structures (e.g., state ownership, blockholder ownership, managerial ownership, legal-person ownership, and foreign ownership) and two board composition (e.g., independent directors and supervisory board), respectively.

Empirical Chapter Two

– The relationship between corporate governance and quality of environmental disclosure: empirical evidence on Chinese firms

The main aim of the second empirical chapter is to examine the influence of ownership structure and board composition on the level of environmental disclosure in the annual reports through evidence from the Chinese market between 2009 and 2011.

The following research questions that the empirical chapter two would explore are:

1. What is the extent and status of qualitative environmental disclosure in the annual reports of Chinese listed companies at present? What is the trend of environmental disclosure quality in the research period?

2. To what extent does a relationship between different ownerships and the level of environmental disclosure exist? Is there any affect on environmental disclosure quality by the structure of board in Chinese listed companies?

3. What is the relationship between control variables (e.g., FSIZE, DEBT, ROE, AGE, and INDUSTRY) and qualitative environmental information in the annual reports in Chinese market? Is there any consistent and/or different findings compared with previous studies in the same research area?

In the second empirical chapter, there are also 7 research hypotheses developed around the association between the level of environmental disclosure practice in the annual reports and the mechanisms of corporate governance (e.g., state ownership, blockholder ownership, managerial ownership, legal-person ownership, foreign ownership, independent directors, and supervisory board), respectively.

Empirical Chapter Three

– The value relevance of environmental disclosures: some Chinese evidence

The aim of this empirical chapter is to explore the value relevance of voluntary environmental disclosure (both quantity and quality) in the annual report based on data from a fast growing developing country, China. The main objectives are to find the importance of environmental disclosure practice in Chinese market and the difference of function between quantity and quality of environmental information for various stakeholders.

The following research questions that the third empirical chapter would explore are:

Does voluntary environmental disclosure revealed by a company have an effect in relation to the value of the firm? Is it positive or negative? To what extent does the relationship between voluntary environmental disclosure and firm value exist? What are the different roles between qualitative and quantitative environmental disclosure on its value relevance?

The hypothesis in this empirical chapter includes four parts which are 1) the relationship between quantitative environmental disclosure and firm value in the same year; 2) the relationship between quantitative environmental disclosure and firm value in the following year; 3) the relationship between qualitative environmental disclosure and firm value in the same year; and 4) the relationship between qualitative environmental disclosure and firm value in the next year.

To sum up, in this thesis, the theoretical evidences and empirical findings will answer the above research questions. The uniqueness of Chinese case can be identified through the fit between theories and the findings as well as the distinction of the finding in this study.

1.4 RESEARCH METHODOLOGY

The research integrates mechanistic content analysis approach and interpretative approach to measure both quantity and quality of disclosure information. Beck *et al.* (2010) pointed out that there are some limitations if only a mechanistic content analysis instrument is employed, although it is commonly used in the prior research by many scholars (e.g., Ness and Mirza, 1991; Unerman, 2000; Wilmshurst and Frost, 2000; Hasseldine *et al.*, 2005). The mechanistic content analysis approach is regarded as form oriented which involves ‘routine counting of words or concrete references’, but it

overlooks meaning orientation which ‘focuses on the underlying themes in the texts under investigation’ (Smith and Taffler, 2000, p.627). The interpretative approach ‘attempt[s] to capture meaning by disaggregating narrative into its constituent parts and then describing the contents of each disaggregated component’ (Beck *et al.*, 2010, p.208). It aims to seek greater understanding of what communication the firms need to express by disclosing information in the annual report. To some extent, interpretative analysis effectively remedies the limitation of mechanistic studies in the research of environmental disclosure. In this empirical chapter, both the quantity of environmental disclosure measured by the mechanistic content analysis approach and the quality of environmental disclosure measured by the interpretative approach are adopted to estimate the environmental disclosure variable.

In the first and second empirical chapters, due to a limitation in OLS when the dependent variable is measured by content analysis to generate a part of the sample without any disclosure and hence be scored as a zero value (Salama *et al.*, 2012) and the other part is more than zero, TOBIT formulation supplies a powerful check on the model with the value of the dependent variable not less than zero. Therefore, OLS, TOBIT and ordered PROBIT regressions are employed to examine the relationship between the extent of voluntary environmental disclosure and characters of corporate governance in order to minimise any loophole in regressions.

In the third empirical chapter, the value relevance of environmental disclosure is explored. The Ohlson (1995) model, ‘best-known conceptual model of value relevance analysis’ (Carnevale *et al.*, 2009), supplies a framework which ‘is fully articulated in that it relates the value of the firm to the information provided in the income statement (earnings), the balance sheet (book value of equity), and other value-relevant information’

(Berry and Wright, 2001, p745). Carnevale *et al.* (2012) indicated that book value (per share) and earnings (per share) traditionally influence the market value (stock price). It is a very popular model applied in research on the value relevance of voluntary disclosure (e.g., Hassel *et al.*, 2005; Liu and Liu, 2007; Moneva and Cuellar, 2009; Semenova *et al.*, 2009; Schadewitz and Niskala, 2010; de Klerk and de Villiers, 2012; Iatridis, 2013). ‘In order to mitigate the problems that might result from the appearance of potential scale effects in the estimation of price models, the variables have been divided by the total assets of the firm at the beginning of period (TAt-1)’ (Moneva and Cuellar, 2009, p448). Similarly, Semenova *et al.* (2009) also deflate all accounting and market-based variables by TAt-1 for controlling size differences. In addition, De Klerk and de Villiers (2012) utilised variables divided by opening book value to control the size. Therefore, the Ohlson (1995) model in this empirical chapter is adjusted to all accounting and market-based variables divided by opening book value of the firm. Hassan *et al.* (2009) suggested that the ratio of market-to-book value of equity (MTBR) ‘shows whether securities are undervalued or overvalued ... if the ratio is greater than (less than) one then the firm is overvalued (undervalued)’ (p.91). In other words, once measured, dependent variables in this research could indicate whether (certain) Chinese listed companies are undervalued or overvalued. In accordance with previous studies and the actual status of China, firm size, leverage ratio, growth in sales and industry are employed as the control variables.

1.5 RESEARCH CONTRIBUTION TO KNOWLEDGE

This study expects to contribute to the research on the relationship between corporate governance, environmental disclosure, and firm value in five main areas.

First, it provides a more comprehensive understanding in terms of Chinese corporate governance and voluntary environmental disclosure. In detail, this study applied five aspects, which include corporate governance model, development of Corporate Governance Codes, ownership structure, board structure, and agency problem to look for the uniqueness of Chinese corporate governance compared with that of the UK and the US. In terms of voluntary environmental disclosure, quantitative and qualitative environmental information are collected through the mechanistic content analysis approach (number of sentence) and the interpretative approach (scale system). It enhances knowledge about the current situation of environmental disclosure revealed by Chinese listed companies.

Second, this research contributes to the existing literature on accounting about corporate governance, managerial structure, and disclosure practice in fast-growing developing countries such as China. It enhances the understanding of influences from different corporate governance characters on environmental disclosure.

Third, the research contributes to the knowledge about the relationship between market value and both qualitative and quantitative environmental information in annual reports in fast developing countries such as China based on a large sample during consecutive years.

Fourth, it is an up-to-date empirical research on quality and quantity of voluntary environmental disclosure and its value relevance under both cross-sectional and time-series data of the Chinese market in English.

Finally, the research provides useful information for various stakeholders. For the investors, this empirical study would add to their knowledge and understanding about the function of environmental disclosure in the annual report and assist their decision-making in the Chinese stock market. To the managers, it would help them to realise whether or not voluntary environmental disclosure increases a firm's market value and to decide on their company's disclosure practices. Scholars would further comprehend the Chinese stock market and disclosure development in China. In addition, this research would uncover some issues in environmental disclosure in the annual reports of Chinese listed companies, which would assist in the development of compliance regulations for disclosure practice in future. The author expects an efficient stock market built by the government in China.

1.6 STRUCTURE OF THE THESIS

This section outlines the structure and organisation of the thesis. Chapter one is an introductory chapter that gives the background and motivation of the study. The research aims and research questions are addressed after that. Then the chapter briefs the measurement of environmental disclosure and main methodologies employed in three empirical chapters. At the end, the importance of the study and research contribution to knowledge are highlighted.

Chapter two provides background information on the uniqueness of China in corporate governance. China's unique characteristics are found and measured by comparing them with the UK and the US. In this chapter, there are five aspects to analyse and evaluate the difference in corporate governance. They include corporate governance model, development of corporate governance code, ownership structure, board structure, and agency problem.

Chapter three examines the role of ownership structure and board composition on the extent of quantitative environmental disclosure in the annual reports through evidence from the Chinese market. In this chapter, the literature review includes a large number of previous studies on voluntary disclosure and its determinants. The relationship between corporate governance and the quantity of environmental disclosure is reviewed and evaluated in the next part to look for gaps in the previous research. After that, research hypotheses are provided based on the Stakeholder-agency theory. Then, data collection and methodology are designed and applied in order to test the research models. Finally, empirical findings are found and analysed.

Chapter four examines the influence from ownership structure and board composition on the quality of environmental disclosure using Chinese evidence. This empirical chapter focuses on the extent of qualitative environmental disclosure to design research hypotheses and evaluate empirical findings.

Chapter five explores the value relevance of environmental disclosure within the Chinese context. In contrast with the event study, this chapter employs the association study to examine how the market reacts to qualitative and quantitative environmental disclosures in the annual report during relatively long periods. Voluntary environmental disclosure in the annual report is expected to provide value relevant information in the Chinese market

based on signalling theory and the concept of information asymmetry. Empirical results are tested and analysed after data collection and research models are operated.

The conclusion and research limitations are provided in the last chapter. It summarises all the chapters of the current thesis and points out the limitations of this study, which would be to assist and advance future research.

CHAPTER TWO

BACKGROUND INFORMATION ON CORPORATE GOVERNANCE IN CHINA

2.1 INTRODUCTION

Corporate governance has attracted much attention from both analytical and empirical scholars, because it is generally recognised as a vital element in business. As Tricker (1984) pointed out, if management is the running of a company, corporate governance is ensuring that business is ran properly. In the last decade, there has been a rapid growth in corporate governance, particularly since the financial scandal of Enron in 2001 and some corporate collapses which have been experienced in various countries (Mallin 2007). However, the development of corporate governance has varied in different regions of the world depending on the stage of development of the country, its legal system, and cultural traditions. For many, corporate governance in the Asia-Pacific region (e.g., China) is viewed as weak compared to the UK and the US (e.g., Roche, 2005; Clarke, 2007; Singh and Gaur, 2009). Thus, most studies just focused on the UK and the US (e.g., Short and Keasey, 1997; Brown, 1997; Fox and Opong, 1999; Gamble and Kelly, 2001; Toms and Wright, 2005; Aguilera *et al.*, 2006).

Although China does not hold an effective corporate governance system or a well-developed market such as the UK and the US yet, the development of corporate governance in China cannot be overlooked. Since corporate governance was introduced in China in the 1980s, the Chinese government has been attempting to move from a centrally planned economy to a market-oriented system in a short period of time (Wei

and Geng, 2008). Tricker (2010) reviewed the study of Leng Jing's "Corporate Governance and Financial Reform in China's Transition Economy", and pointed out that 'China has achieved in less than two decades what took the US and European countries over a century' (p.489). In addition, there has been 10 per cent of growth each year, on average, in the Chinese economy over the past twenty years and the trend is expected to continue in future (Cheung *et al.*, 2008; Jia and Tomasic, 2010). In the recent financial crisis, many countries with a more mature corporate governance and market economy, such as the UK, the US, and Japan, were impacted seriously. In contrast, the Chinese economy was impacted less by the worldwide slowdown. That situation increases interest in research on corporate governance in China.

In the system of Chinese corporate governance, there are many similarities to the UK and the US. China is relatively new to corporate governance after a nationwide upheaval and the following economic stagnation of the Great Proletarian Cultural Revolution. At the beginning, the Chinese government mainly adopted corporate forms and practices of Western systems, such as the Anglo-American system and the German board structure. Chinese company law was drawn up that was based on the existing corporate law in Western countries (Liu, 2009). These factors have meant that corporate governance in China and Western countries have some similarities. On the other hand, divergences between China and Western countries also exist because of varied social, political, and economic environments. In this chapter, the development of corporate governance in China is examined and its uniqueness is analysed by comparing it with those in the Western countries (in particular, the UK and the US). The remainder of this chapter proceeds as follows. The definition of corporate governance is provided in both its board and narrow perspectives. Then, the uniqueness of China in terms of corporate governance is analysed and summarised through comparison between China and Western countries.

2.2 THE DEFINITION OF CORPORATE GOVERNANCE

Corporate governance is ‘... one key element in improving economic efficiency and growth as well as enhancing investor confidence. (It) involves a set of relationships between a company's management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined’ (OECD, 2004, p.11). According to the Cadbury Committee, corporate governance is defined as ‘the system by which companies are directed and controlled’ (Cadbury Report, 1992, para. 2.5). It sets out the basic role of the three significant groups in firms: ‘Boards of directors are responsible for the governance of their companies. The shareholders’ role in governance is to appoint the directors and the auditors and to satisfy themselves that an appropriate governance structure is in place (Cadbury Report, 1992, para. 2.5)’. ‘The role of the auditors is to provide the shareholders with an external and objective check on the directors’ financial statement (Cadbury Report, 1992, para. 2.7)’. The World Bank supplies a perspective from a public policy: ‘corporate governance is about nurturing enterprises while ensuring accountability in the exercise of power and patronage by firms. The role of public policy is to provide firms with the incentives and discipline to minimise the divergence between private and social returns and to protect the interests of stakeholders’ (Iskander and Chamlou, 2000, p.3). Demb and Neubauer (1992) defined corporate governance as ‘a process by which corporations are made responsive to the rights and wishes of stakeholders’ (p.187). The right and responsibilities of each group of stakeholders are effectively delineated in a corporation (Ho and Wong, 2001). Compared with the above definitions of corporate governance, there is a narrow view that states ‘corporate governance deals with the ways in which suppliers of finance to corporations assure

themselves of getting a return on their investment’ (Shleifer and Vishny, 1997, p.737). Bringing together many of the elements of the above varied definitions, Brickley and Zimmerman (2010) gives a comprehensive and broad definition: ‘corporate governance is the system of laws, regulations, institutions, markets, contracts, and corporate policies and procedures (such as the internal control system, policy manuals, and budgets) that direct and influence the actions of the top-level decision makers in the corporation (shareholders, boards, and executives). Of particular importance in this system are: (1) the allocation of top-level decision making rights among the three groups, and the comprehensive set of mechanisms that (2) measure their performance and (3) provide performance-based rewards and penalties’ (p.236). The aims of corporate governance are to maximise shareholders wealth and minimise the divergence of interests in stakeholders, corporations and society.

2.3 CORPORATE GOVERNANCE – UNIQUENESS OF CHINA

2.3.1 Model of corporate governance

A system of corporate governance in a country is influenced by both internal factors (corporate ownership structure, policies of government, and the legal system) and external factors (capital and investment from abroad, and the global economic climate) (Solomon & Solomon, 2004). The individual situation of a country decides its model of corporate governance.

The UK is a typical country using an Outsider-dominated system, which separates control from ownership. This system was commonly adopted by Britain’s colonies and many countries with the common law system. The US was one such British colony and it

inherited its common law system. The model of corporate governance in the US relates closely to that of the UK. Since the Second World War, the development of corporate governance in the US has expanded quickly and has been shaped by its own culture and history. By the 1960s, the US had already become a dominant country in the global economy (Toms and Wright, 2005). Sharing the same salient features (such as a unitary board) in corporate governance, the system in these countries is summarised as the 'Anglo-American' model.

Another model of corporate governance is the 'Continental European' model. There is a dual board system, which consists of an executive board of management and a supervisory board, generally in the countries with the civil law system. There is a clear separation between the functions of these two boards. The executive board of management 'makes key investment plans and the board of supervisors oversees the decision-making process and performance of senior management and directors' (Roche, 2005). It strictly separates control from management in companies. Germany and Japan are two typical countries using this model.

In China, the communist revolution began in 1927; since the communists took over the means of production and established its own regime in 1949, the private property and incorporated companies were prohibited (Tricker, 2012). At that time, the state was engaged in nationalising private-ownership enterprises. By 1956, state-owned enterprises (SOEs) had successfully replaced all of the private-ownership businesses in China (Wei, 2003). In 1958, the intention of making the country self-sufficient was put forward by Chairman Mao, and than millions city worker and educated youths are required to go and work in the countryside and mountain areas. The following Great Proletarian Cultural Revolution, from 1966 to 1976 (Mao's death), was a violent mass movement that spread

to major social, political, and economic upheaval. Many state-owned enterprises needed state subsidy.

1978 was a turning point of economic reform. The Chinese government adopted a form of market economy, but with a centralised, Communist-state orientation (Tricker, 2012). Since corporate governance was introduced in China in the 1980s, the Chinese government has been attempting to move from a centrally planned economy to a market-oriented system (Wei and Geng, 2008). China, a relatively new country in the development of corporate governance, combined the Anglo-American model and German board style (the Continental European model), to form a characteristic Chinese board structure. The dual board system in China includes a supervisory board and a board of directors. In terms of ownership, the state directly and indirectly owns more than half of the shareholdings in most firms. Compared with the UK and the US, China has a highly concentrated ownership structure. In short, the model of corporate governance in China is a mixed model of the Anglo-American and continental European model with Chinese characteristics.

2.3.2 Development of Corporate Governance Codes

The UK is a pioneer developing the concept of corporate governance. Its corporate governance relies heavily on self-regulation (Wei, 2003). A series of reports in the UK are regarded as the basic framework of company law and standards by many countries around the world. They are the Cadbury Report (1992), the Greenbury Report (1995), the Hampel Report (1998), the Combined Code (1998), Turnbull (1999), Myners (2001), Higgs (2003), Smith (2003), Tyson (2003), the Combined Code (2003), and the

Combined Code (2006) (Mallin, 2007; Tricker, 2009). Among them, the Cadbury Report (1992) is widely recognised as the foundation of the Best Practice system and some or all of its content has been incorporated into the corporate governance codes of many countries (Mallin, 2006). This report states that companies should have three independent directors (non-executive directors (NEDs)) who ‘should be independent of management and free from any business or other relationship which could materially interfere with the exercise of their independent judgement’ (Cadbury Report, 1992). Its content also sets out the code of Best Practice, and looks at the functions of the board, auditing, and the shareholders. The Cadbury Report’s drafter believed that a voluntary self-regulatory approach rather than a legislative approach is preferred, because the latter one would bring a negative outcome. The principle of Combined Code (2006) also accords with the self-regulation system: the ‘comply or explain’ basis means that the ‘company has either to confirm that it complies with the Code’s provisions or – where it does not – to provide an explanation’.

Compared with the UK’s permissive approach, the US takes a ‘rule based’ model. Tricker (2009) mentioned that corporate governance in the US is regulated by many mandatory rules and legal statutes. The US has the largest number of corporate governance codes and corporate laws in the world, because there are many states in the US and each of them possesses its own corporate code and law. These multiplicities increased the disparity of economic development in different states in the US. For example, the Delaware Law has fewer procedures than other states. Thus, Delaware became a more attractive state in which to register companies. The 2002 Sarbanes-Oxley Act attempted to mitigate this problem and strengthened corporate governance under the penalty of law. However, its stringent and numerous provisions not only increased expenses and burdens to US-firms, but also conflicted with the items in law of some

states. As a result some companies are delisting from the NYSE and the Act is deterring other potential non-US firms from investing in the US (Mallin, 2007).

The development of corporate governance code in China borrowed many legal rules and experiences from the UK and the US (Wu *et al.*, 2009). Compared with the UK's 'principles based' model, China is closer to the US's 'rule based' model. In detail, Chinese listed companies have less voluntary self-regulation than in the UK. China developed the code of corporate governance in line with the Sarbanes-Oxley Act (Singh and Gour, 2009), although the provisions are not as rigorous as the US. The Chinese government has been attempting to enhance the effectiveness of corporate governance from the aspect of corporate code development, particularly since China's entry into the World Trade Organisation (WTO) in 2001. In the same year, "Guidelines for Introducing Independent Directors to the Board of Directors of Listed Companies" was released. Furthermore, the "Code of Corporate Governance for Listed Companies in China" was issued by the China Securities Regulatory Commission (CSRC) and the State Economic and Trade Commission on 7th January, 2001. The code of corporate governance is produced in accordance with the Company Law, the Securities Law and other relevant regulations. It sets out the rights of shareholders and stakeholders, and behaviour rules for controlling shareholders. It states the rules, duties, and responsibilities for directors, supervisors, and managers. In the board of directors, it requires that the listed company establish an audit committee, a nomination committee, a corporate strategy committee, and a remuneration and appraisal committee, and it describes the main duties of each committee. Lastly, information disclosure and transparency of the listed company are required. This code was amended twice respectively on 30th June, 2002 and 30th June, 2003. The last amendment requires that a company's independent directors (IND) should not be less than a third of the board. To sum up, the government in China has paid

particular attention to putting in place a code of corporate governance with the aim of creating a strong corporate governance structure.

It is worth mentioning that there is an issue in the corporate code development in China. The state holds two important roles in corporate governance: the controlling shareholder “player” and the political power holder “judge”. In a good way, the state’s dual role could increase monitoring and protect its own rights by its political power. However, where there are conflicts of interest between the controlling shareholder (the state) and minority shareholders, the state with its political power has the difficulty of deciding whose interest is protected: either its own interest or the fair interest of all shareholders. Thus, Wu *et al.* (2009) suggested that the state’s dual role should be separated, which would advance the development of corporate governance code in future. However, Chen *et al.*, (2010) pointed out a likely disconcerting phenomenon of managers abusing their power, if the state withdraws its control from corporations currently and there is no mechanism in place of this control. He (1998) noted that many managers in listed companies tend to use their new independence and power to engage in their own self-interest. It implies that the state should separate its dual role for an effective development of corporate governance, but that this process should happen over a long time during which a mechanism should be established to control managers’ actions.

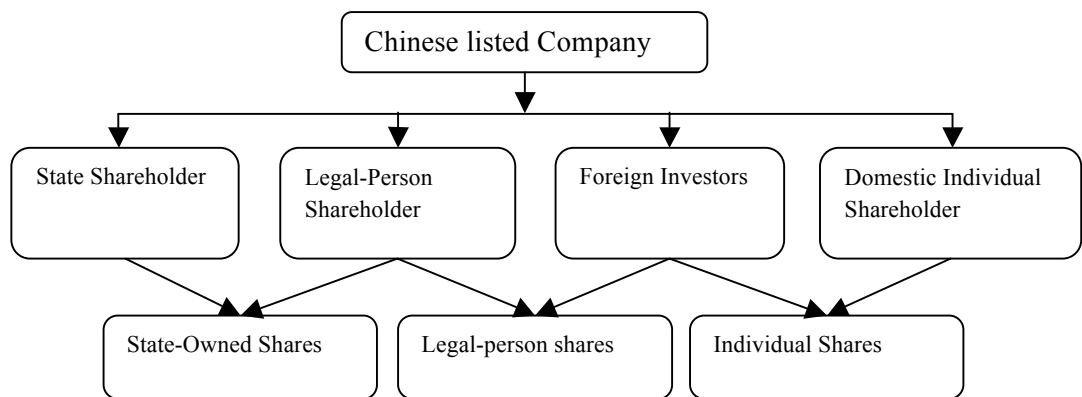
2.3.3 Ownership structure

China is a socialist country, which means that the state is at the core of both political and economic development. Although the Chinese government is attempting to restructure state-owned enterprises (SOEs) to listed companies in order to establish an effective

stock market and improve the market economy, the state still owns most listed companies in China. According to Roche (2005), the government has more than 50 per cent of the shares in many firms, and in some of them up to 80 per cent. If the state is the dominant shareholder in most listed companies, it increases the difficulty in governing these companies in a rigorous manner (Mallin, 2006). Therefore, the state appointed a legal-person to control the shares, which are the investment of SOEs, to mitigate this problem. In China, empirical researchers of corporate governance generally divided the categories of ownership into blocker ownership, managerial ownership, state ownership, legal-person ownership and foreign listing/share ownership (e.g., Xiao and Yuan, 2007). From the view of shareholders, the typical ownership structure in Chinese listed companies is shown as Figure 2.1.

Figure 2.1

Typical ownership structure in China



This figure also indicates three classes of ownership shares: state-owned shares, legal-person shares, and individual shares. State-owned shares were converted from the SOEs' net assets or investment when SOEs became listed companies. They are held by the government and prohibited to trade publicly. Legal-person shares can only be traded

between legal entities with the approval of the government (Xiao and Yuan, 2007). Only individual shares (such as, A-Shares and B-Shares) are allowed to issue and trade on Stock Exchanges. In detail, A-shares are tradable shares which issued and traded in RMB (Chinese currency) on the Shenzhen and Shanghai Stock Exchanges. B-Shares are also issued by these two Stock Exchanges, but traded in foreign currency (such as US dollars).

Ma *et al.* (2010) pointed that both the state-owned and legal-person shares are about two-thirds of all shares, on average, in Chinese listed companies in the domestic market. The remaining shares are held by a large number of individuals and some institutional investors. It reflects the unique characteristics of ownership in Chinese listed companies with ‘a high level of ownership concentration and a low level of marketability’ (Ma *et al.*, 2010). Table 2.1 proves the viewpoint of Ma *et al.* (2010).

Table 2.1

Shareholding structure from 2001 to 2010 in Chinese listed companies

	2001 (%)	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)	2008 (%)	2009 (%)	2010 (%)	Average (%)
(1) Non-tradable shares	65.25	65.33	64.47	63.54	61.80	62.16	53.91	55.84	30.89	24.02	54.72
State-owned shares	38.05	41.08	41.85	40.23	39.75	25.87	29.45	49.37	25.47	17.94	34.91
Domestic legal person-owned shares	26.49	23.48	22.21	23.03	19.06	9.96	7.14	3.72	2.81	3.01	14.09
Employee shares	0.46	0.27	0.17	0.13	0.05	0.02	0.00	0.00	0.00	0.00	0.11
Other shares	0.26	0.51	0.24	0.16	2.93	26.31	17.32	2.74	2.62	3.06	5.62
(2) Tradable shares	34.75	34.67	35.53	36.46	38.20	37.84	46.09	44.16	69.11	75.98	45.28
A shares	25.26	25.68	26.67	27.87	29.90	22.16	21.58	27.47	53.14	57.73	31.75
B and H shares	9.49	8.98	8.86	8.59	8.30	15.69	24.50	16.69	15.97	18.25	13.53
(3) Total	100	100	100	100	100	100	100	100	100	100	100

(Source from Wei and Geng, 2008, p.940; the CSMAR database)

In Table 2.1, the proportion of non-tradable shares on average is 54.72%, which is more than tradable shares of 45.28% from 2001 to 2010. In particular, the percentage of non-

negotiable shares is about twice as much as negotiable shares between 2001 and 2006. Moreover, shareholdings of Chinese listed companies are heavily concentrated in the hand of the state. In contrast to other owners, the state is the largest shareholder who controls absolutely the most listed companies in China. Zhao (2014) pointed out that state ownership is the biggest factor that impacts corporate governance in China. It is worth mentioning that 2009 was a turning point in the share market. The proportion of negotiable shares is 69.11%, which is more than twice of non-negotiable shares (30.89%). In 2010, the proportion of negotiable shares (75.98%) is more than triple of non-negotiable shares (24.02%). A large number of non-tradable shares were transferred to tradable shares. It means more and more stocks into the market, which reduces the companies' control by state ownership, although the state still hold the dominant right in the most Chinese listed companies at present.

According to Wei and Geng (2008), the five largest shareholders, on average, own 56.46 per cent of the total issued shares in China in 2007, compared with less than 25 per cent in the US. Li *et al.* (2010) put forward some advantages and disadvantages of a high level of ownership concentration in China: to some extent it mitigates the conflicts between the principal and the agent, because ownership concentration is recognised as “an effective internal monitoring mechanism”. As noted by Singh and Gaur (2009), ‘a higher ownership concentration minimises the agency problem and enables the decision makers to make quick decisions’ (p.419). However, concentrated ownership, especially in the hand of the state, increases the power of large shareholders to set up a relationship of collusion between managers and themselves to control decision-making and achieve their aims by appointing directors and managers. It leads to a negative effect on the protection of minority shareholders and foreign investors.

In contrast with China, the ownership is quite dispersed among a large number of individuals and institutional investors in the UK and the US (Shleifer and Vishny, 1997; Chew and Gillan, 2005). Aguilera *et al.* (2006) mentioned that institutional investors own the most shares, exceeding the proportion of individual investors (as shown in Table 2.2). The institutional investors in the UK are mainly insurance companies and pension funds who have 15 per cent of the shares on average; the government has the least ownership holding less than 1 per cent (Liu, 2005). As a large shareholder in most companies, with professional expertise, both the Cadbury report (1992) and the Hampel Report (1998) expected the institutional investors to take on the role of monitoring management on behalf of other shareholders and to take a long-term view of their shareholding positions (Short and Keasey, 2005). Currently, although many institutions participate passively in corporate governance, they have yet to increase their enthusiasm in the corporate affairs for their investment return. Most of the institutional investors in listed companies in the US are investment companies. They held 28 per cent of total shares in 2002 which increased from 6 per cent in 1990 (Binay, 2005). In contrast with the passive UK institutions, more and more American institutional investors actively participate in corporate affairs, such as attending corporate governance meetings of the companies.

Table 2.2

Summary of ownership in the UK, 1963-2004 and the US, 1981-2002

The UK			The US			
	1963	1981	2002		1981	2002
	%	%	%		%	%
Pension funds	6	27	16	Investment companies	8	28
Insurance companies	10	21	20	Insurance companies	10	7
Individuals	54	28	14	Independent investment advisors	26	37

(Source: Binay, 2005; Short and Keasey, 2005)

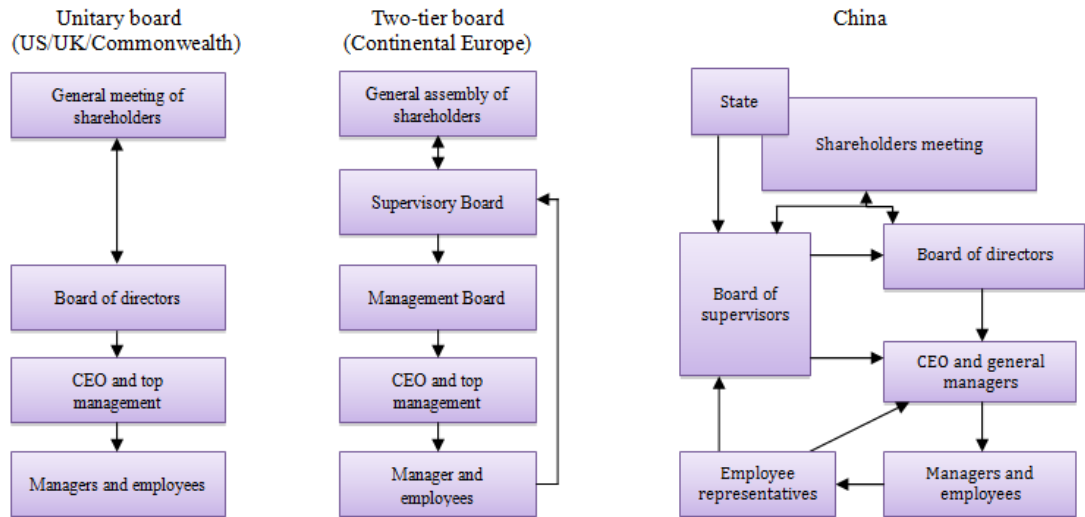
Another difference in the ownership structure between the US and China is the duties and the power of the shareholders. In terms of duties, the US listed companies just demand that their shareholders vote on major business decisions such as merger or sale. Other business decisions are dealt with by the board of directors. In China, the company law requires all shareholders to be included in a shareholder committee for their listed companies, which except private business. Like the shareholders in US companies, Chinese shareholders are required to vote on the major business decisions. Moreover, they need to make other business decisions (such as issuing bonds, increasing or decreasing registered capital, and so on) (Liu, 2009). In terms of the balance of power, the American Corporate Law gives much power to the board of directors, but less authority to the meeting of shareholders (Wei, 2003). This reflects the characteristic of the US's corporate governance: "strong managers and weak shareholders". That is why the amount of shareholder litigation is high in the US. Shareholder litigation is a useful way to solve problems between them and to help shareholders monitor management. Aguilera *et al.* (2006) pointed out that the levels of litigation are high in the US and low in the UK. In China, the appointment of managers and directors is influenced by the government (large shareholder). Some of them have political motivation. Moreover, a lot of former government officials are appointed as managers in listed companies by the government (Chen *et al.*, 2010). Therefore, the large shareholder (state-owned ownership) has enough power to control managers and directors. Xue (2001) ironically states that the large shareholder dominates the board of directors and makes the independent non-executive directors window dressing. In short, the duties and the power of shareholders are much more extensive in the listed companies in China than in the US.

2.3.4 Board structure

Companies structure the boards in accordance with the legal system in their countries (Gul and Tsui, 2004). Generally, a unitary board structure is used in a country under the common law system; a dual (2-tier) board is the norm under the civil law system. Brian (2006) mentioned that most countries have a unitary board system (e.g. the UK, the US, and the majority of EU Member States). Companies in these countries just have one board, which comprises executive and non-executive directors, responsible to the shareholders. The board of directors, an important part of the corporate structure, makes the link between the shareholders and the managers (Monks and Minow, 2004). In the dual board system, corporate governance consists of an executive board of management and a supervisory board (e.g. Germany, Austria, and Japan). This system clearly separates the functions of supervision and management. Where the UK and the US listed companies have a single board (mixed board), Japan its insider-dominated boards, and Germany its two-tier supervisory and management boards (Charkham, 1994), the listed companies in China combined the Anglo-American model and German board style to form a mixed model containing Chinese characteristics which has dual boards: the supervisory board and the board of directors (see Figure 2.2). This figure shows that China has a more complex board structure, compared with UK/US and Continental European system. In particular, board of supervisors in Chinese listed companies need to deal with more relationships with various stakeholders who involve the state, shareholders, board of directors, CEO and general managers, and employee representation.

Figure 2.2

Differentiation of Board structure



(Source: Tricker, 2012, p.446)

2.3.4.1 The supervisory board

The listed companies in China are required to have a board of supervisors, who are elected by shareholders. Their responsibilities include ‘overseeing the decision-making process and performance of senior management and directors’ (Roche, 2005). Liu (2009) found that the duties of the Chinese supervisory board are similar to the functions of outside counsel in US corporate governance. Numerous scholars have deemed that the supervisory board in Chinese companies just looks like an ineffective ornament. Chinese supervisory boards do not have the right to appoint or dismiss executive board directors (Mallin, 2006). Dahya *et al.* (2003) pointed out five important items lacking in the Chinese supervisory board: legal power, independence, technical expertise, information, and incentives. Wei and Geng (2008) satirised that they are merely holding a rubber

stamp without virtual right. However, Ding *et al.* (2010) mentioned that the rights of the supervisory board were significantly improved via the amendment of Corporation Law in 2005. The supervisory board now has the power to propose dismissal of directors and top management, sue managements who commit frauds, raise questions and make suggestions at the board meeting, and curb executive compensation (Xi, 2006; Ding *et al.*, 2010). In Chinese Company Law 2006, it set that ‘a limited liability company shall have a supervisory board composed of no less than three members. Where a limited liability company has a small number of shareholders or is comparatively small in scale, it may have one or two supervisors instead of a supervisory board’ (Act. 52). The supervisory board should monitor ‘the acts of the directors and senior executives performing their functions’ (Act. 54(2)). The function and power of board members include ‘to bring the proposal to dismiss those directors and senior executives violating the law, administrative regulations, the articles of association of the company or the resolutions of the shareholders meetings’ (Act. 54(2)) and to ‘demand directors and senior executive to make corrections if any of their acts are found to have damaged the interests of the company’ (Act. 54(3)). In addition, the board member can ‘bring a lawsuit against the directors or senior executives in accordance with the provisions of Article 152 of Company Law 2006’ (Act. 54(6)). These articles give the supervisory board clear function and right to do its jobs. The supervisory board should be ‘accountable to all shareholders’ (Zhao, 2014).

2.3.4.2 The board of directors

The responsibility of the board of directors is setting objectives and monitoring and controlling the firm’s activities (Brown *et al.*, 2011). In a firm, it is central to the making

of decisions (Fama and Jensen, 1983). Compared with the UK and the US, the board of directors in Chinese listed companies has less power. In China, concentrated shareholdings are owned by the state in most companies. As a result, the board of directors is in the hand of the state. Moreover, Zhen (2014) indicated that the largest shareholder (state ownership) has strong control over the decisions of the board of directors, because most listed companies in China are former SOEs. The state's interest is the principal aim of the directors' actions. The other shareholders' rights are always overlooked.

The development of independent directors is already mature in the UK and the US. A 1999 survey of Economic Cooperation and Development shows that independent directors make up 62 per cent of the board in the US and 34 per cent in the UK (Wei and Geng, 2008). It reflects the significance of independent directors in these two countries in particular in the former. In China, the development of independent directors is relatively new and immature in the listed companies. It was not a compulsory requirement to appoint independent non-executive directors in the Corporate Law of 1994. Attention was given to their role in the following years by the regulatory bodies of corporate governance with regard to their number and functions. In 2001, the CSRC produced "Guidelines for Introducing Independent Directors to the Board of Directors of listed Companies". On 30th June 2003, the "Code of Corporate Governance for Listed Companies in China" states that at least one-third of the board should be made up of independent directors. Now, the Corporate Law (2006 version) compulsorily requires a board of directors to have independent directors. However, Zhang (1999) and Wei (2002) argued that many independent directors in China are too busy to care about the companies or they lack the knowledge and experience to exert any substantial influence on the board. Moreover, Zhao (2014) mentioned that 'the roles of independent directors

are easy to overlook due to the existence of the supervisory board. The allocation of power and how to reconcile the relationship between the independent directors and supervisory board are important problems in the development of the Chinese corporate governance model.’ (p.99)

In respect of motivation, the UK and the US adopted an equity-based incentive as a means of remuneration (Liu and Fong, 2010). As the standpoint of Minow and Bingham (1995) shows, ‘nothing makes directors think like shareholders more than being shareholders’ (p.497). In China, this system is still in its infancy. Equities are just offered to the insider directors. For independent directors, they are not allowed to hold more than 1 per cent of total share directly or indirectly under the CSRC provisions (Li *et al.*, 2008).

As an overview, compared with executive directors and independent directors who play a vital role in corporate governance in the UK and the US, the dual boards in Chinese listed companies are not effective enough. There are still some issues with the board of supervisors, with executive directors, and with independent non-executive directors. For example, the roles of the supervisory board and the independent directors overlap to a great extent that is an important problem in the development of the Chinese corporate governance model (Zhao, 2014). However, the government has been making some efforts to improve the Chinese characteristic mixed model through using the experience of other countries, reducing the state-owned shareholdings, and amending company law and the corporate governance code. It means Chinese characteristic dual boards will be more mature and effective in the future.

2.3.4.3 Chairman/CEO duality

In the study of Aguilera *et al.* (2006), chairman/CEO duality was found as a divergence between the UK and the US. Higgs (2003) mentioned that approximately 80 per cent of CEOs hold the position of the chairman in the US listed companies. In the UK, the Combined Code (2003) requires ‘a clear division of responsibilities at the head of the company between the running of the board and the executive responsibility for the running of the company’s business.’ There, there are just 10 per cent of CEOs serving as the chairman.

In contrast, the chairman/CEO duality in Chinese listed companies is less than the US, but much more than the UK. According to Zhong (2002), there were 60.9 per cent of CEOs who also are the chairmen of the same companies. In 2010, the proportion of chairman/CEO duality reduced to 18.5 per cent (GTA database, 2011). Dalton *et al.* (2005) pointed out that stewardship and organisation theories suggest that centralisation of authority, such as CEO duality, is conducive to good firm performance. However, many scholars deem its disadvantages much more significant than its merits. Fama and Jensen (1983) and Jensen (1993) noted that if the CEO and the chairman is one individual, it reduces the effectiveness of the board’s key function. With a similar viewpoint, Chahine and Tohmé (2009) and Lin and Liu (2009) found that chairman/CEO duality significantly impacts board independence and transparency of the CEO’s activities. Thus, the China Securities Regulatory Committee (CSRC) (2001 a, b) requires that the CEO can only serve as the chairman in Chinese listed company, if at least half of the directors’ board is made up of independent directors to improve monitoring.

2.3.4.4 Board committees

Board committees are very common in the listed companies in the US and the UK. Wei (2003) noticed that more than 80 per cent of boards have two committees and more than half of them have three in the US. By now, all of the listed companies there should have at least three committees: audit, compensation, and nomination committees, in compliance with the mandatory requirements of the stock exchange regulations and the SOX (Liu and Fong, 2010). In the UK between 1995 and 1996, 96 per cent of companies had an audit committee, 95 per cent had a remuneration committee, and 50 per cent had a nomination committee (McKnight and Weir, 2009). In China, it is not mandatory for board committees to be established. A survey of the larger Chinese listed companies between 2004 and 2006 shows: 47 per cent of them had an audit committee; 51 per cent a remuneration committee; and 38 per cent a nomination committee (Liu and Fong, 2010). These results clearly reflect fewer committees in China compared to the UK and the US. However, there is an outstanding development in recent years. Based on the data in 2010 from the CCER database, there are 99.86 per cent of Chinese listed companies had an audit committee; 99.05 per cent a remuneration committee; 71.69 per cent a stratagem committee; and 71.21 per cent a nomination committee.

Under the Chinese political and economical environment, Chinese limited companies have to establish a Chinese Communist Party organisation (Liu, 2009). It helps the state to monitor the process of companies. This organisation is a special committee only seen in China. The Chinese Communist Party is very vital in the People's Republic of China. It plays a significant role in the development of corporate governance. 'Every major corporate governance plan had first to be endorsed by the Chinese Communist Party before it could be drafted in to law by the National People's Congress or a Standing

Committee’ and ‘the natural choice of any market economy, and the establishment of corporate governance is the result of adopting and borrowing from Western models that are enforceable in China until they are explicitly banned by the controlling communist Party’ (Zhao, 2014, p.91). It means that the Chinese Communist Party committee hold enormous right which can influence the decision-making process in Chinese listed companies. However, Chang and Wong (2002) found that ‘the existing level of party control is excessive and reducing decision-making power of the local party committees tends to improve the performance of China’s listed firms’ (p.2).

2.3.5 Agency Problem

Agency problems arise due to a separation of shareholders (the principal) and the directors and managers (the agent) (Brealey and Myers, 1996). This problem arises when the directors misuse corporate assets and lack effective control (Mallin, 2007). In the UK, the principle of corporate governance is maximising the shareholders’ wealth. There are some disciplines and incentives imposed on the agent who has to operate in the best interest of the principal. In particular, corporate governance is the internal control system that ensures that the company can impose its own discipline on achieving the aim of the firm. In addition, Jensen and Meckling (1976) mentioned that shareholders can deal with the problems by monitoring the actions of management, such as employing independent auditors to audit financial statements, introducing external analysts, and voting at the annual general meeting. The improvement of corporate governance is achieved through increased transparency and the credibility of accounts. In other words, ‘transparency’ and ‘credibility’ are crucial to strengthen and ameliorate the relationship between managers and shareholders.

At present, in China, the state still owns the large shareholdings in many companies, and therefore, the minority shareholders' right is usually ignored. Agency problems arise at a new level in the relationship between the strong controlling shareholders (the principal) and the weak minority shareholders (the principal) (Yao *et al.*, 2010); another is between the directors (the agent) and the minority shareholders (the principal). For the second problem, the directors are in the hand of state-owned ownership. In addition, many managers, who are former government officials, are appointed in listed companies by the government. They have a close relationship with the government. Hence, they just respond to the controlling shareholders and overlook the interest of the minority. In some firms, the board and managers are empowered too much to make decisions, which impairs the voting right of the minority shareholders. As noted by Wu *et al.* (2009), only the large shareholders can expect a return of their investment. The new agency problem of the principal and the principal (P&P) is shown in the different aims of shareholders. The state as the controlling shareholder focuses on wealth distribution, political aim, and social goals (Shen and Lin, 2009). But the minority shareholders' primary objective is enhancing the value of their own investment. The controlling shareholders easily expropriate the assets and interests from the minority shareholders via the greater voting power of the large shareholding. These phenomena are called "wealth tunnelling" (Xu *et al.*, 2011). Li *et al.*, (2010) pointed out that the P&P problem has become increasingly apparent, and thus protecting the minority shareholders' right raises the public voice. In 2002, the CSRC initiated a classified voting system (CVS) to protect the minority shareholders (Yao *et al.*, 2010). In detail, companies need to give 50 per cent of the votes to the tradable investors (such as, minority shareholders). Whether this system could really protect the minority shareholders' right is questionable. According to Stalin noted, 'it is important not how people vote, but who counts the votes' (Wei and Geng, 2008). In

China, the votes are counted by the large shareholder (state-owned ownership). It means that if the state will not relinquish its shareholdings to the public, the lack of rights of minority shareholders remains a concern.

2.3.6 Chinese corporatism

Neo-corporatism refers to a social mechanism which involved strong labour unions, employers' unions, and governments that cooperated as “social partners” to negotiate and manage a national economy (Barry Jones, 2001:243). Such an agreement is for a more “equitable” division of economic production profits to members of society.

Regard to Chinese corporatism, Unger and Chan (1994) described that “at the national level the state recognises one and only one organisation (say, a national labour union, a business association, a farmers' association) as the sole representative of the sectoral interests of the individuals, enterprises or institutions that comprise that organisation's assigned constituency. The state determines which organisations will be recognised as legitimate and forms an unequal partnership of sorts with such organisations. The associations sometimes even get channelled into the policy-making processes and often help implement state policy on the government's behalf.” (p.30)

By establishing itself as the arbitrator of legitimacy, the state assigns one sole organisation to take responsibility for a particular constituency, it effectively reduces and controls the number of the challengers and players with which it have to negotiate its policies. In addition, the state even appointed the leadership of organisations into policing their own members. It reflects that neo-corporatism is generated to achieve an agreement for a more “equitable” division of economic production profits to members of

society, but the Chinese government utilises the corporatism to consolidate its own status and power. It means that the development of Chinese corporatism and the original intention of neo-corporatism are totally in the different ways. In China, this arrangement is in effect for economic organisations, social organisations, and business groups.

2.4 CONCLUSION

This chapter described the uniqueness of China in corporate governance through analysing the background of China and comparing corporate governance between China and Western countries. In comparison with the UK and the US, the differences of China's characteristic corporate governance were found in five aspects: corporate governance model, development of Corporate Governance Codes, ownership structure, board structure, and agency problem (see Table 2.3).

To sum up, China combined the Anglo-American and continental European models to form a mixed model with Chinese characteristic dual boards, which are controlled by a highly concentrated state-owned ownership structure. A large proportion of shares in the hand of the state are untradeable which leads to 'a high level of ownership concentration and a low level of marketability' (Ma *et al.*, 2010). The corporate governance model in Chinese listed companies is described as a control-based model (Zhao, 2014), in which the controlling shareholders 'tightly control the listed companies through concentrated ownership and management friendly boards' (Liu, 2006). In the term of board composition, ineffective dual boards and overlapped role between supervisory board and independent directors are big issues in the development of the Chinese corporate governance. At present, the conflict between minority shareholders and controlling

shareholders is the most significant agency problem in China. Due to the privileges of the controlling shareholders (state ownership), the right of the minority shareholders are always overlooked.

Therefore, in the empirical parts, ownership structure and board composition, which are two main characteristic mechanisms in the Chinese corporate governance, will be employed as representatives of the unique corporate governance to explore the relationship with environmental disclosure. The research will find the role of controlling shareholder (state ownership) and Chinese dual board on disclosure practice, and find problems of these two characteristic mechanisms in the development of Chinese corporate governance model.

Although Chinese corporate governance has immature mechanisms and many problems at the moment, the government has been making efforts to develop a more effective corporate governance system and a mature market. It is deemed that Chinese corporate governance will be better in the future.

Table 2.3

Differences of Corporate Governance in Three countries: China, the UK, and the US

	China	The UK	The US
CG model	A mixed model with Chinese characteristics	Anglo-American model	Anglo-American model
CG achieved Period	Less than two decades	Over a century	Over a century
CG Code	Close to rule 'based' model e.g. "Code of corporate governance for Listed Companies in China" by CSRC	Self-regulation - 'principles based' model e.g. Cadbury Report, Combined Code, and so on	A legislative approach - 'rule based' model e.g. The 2002 Sarbanes-Oxley Act
Ownership			
Character	Highly concentrated	Quite dispersed	Quite dispersed
Main Ownership	State-owned ownership	Institutional investors - insurance companies and funds	Institutional investors - investment companies
Power & Duties of shareholders	Higher than US and with police power Shareholders play a passive role	Higher than the US Institutional investors play a passive role	Lower than China and the UK Institutional investors play a active role
Board Structure			
Board type	Chinese characteristic dual boards	A single board	A single board
Supervisory Board	Yes, but immature	No	No
Board of Directors	Ineffective, just focus on interest of state-owned	Effective	Effective with extensive power
Independent Directors	Relatively new and immature	Effective	Effective
Others - Litigation	Low	Low	High
Agency Problem	Between strong controlling shareholders (the principal) and weak minority shareholders (the principal) Between minority shareholders (the principal) and the directors and managers (the agent)	Between shareholders (the principal) and the directors and managers (the agent)	Between shareholders (the principal) and the directors and managers (the agent)
Characteristic	A high level of ownership concentration and a low level of marketability	The principle of corporate governance is maximising shareholders' wealth	Strong managers and weak shareholders

CHAPTER THREE

THE RELATIONSHIP BETWEEN CORPORATE GOVERNANCE AND QUANTITY OF ENVIRONMENTAL DISCLOSURE: EMPIRICAL EVIDENCE ON CHINESE FIRMS

3.1 INTRODUCTION

Environmental issues in China are attracting increasing attention from scholars. Tansey *et al.* (2004) investigated environmental disclosure in the emerging market and concluded that increasing environmental disclosure would help to reduce concern about organisational environmental issues. In China, the development of corporate environmental reporting (CER) is still at an initial level and ‘any form of CER to the public is predominantly non-mandatory’ (Rowe *et al.*, 2009). Although there has been a series of regulations and standards on environmental disclosure published by the Chinese government recently, Chen (2013) asserts that Chinese companies are still in the early stages of revealing voluntary disclosure because of the large costs of implementation and the difficulty of supervision. Rowe *et al.* (2009) researched public CER in China focusing on Shanghai. The study investigated the perception of senior managers and executives on the value of CER in corporations and their attitude on the development of CER in their companies through interviews in fifteen Shanghai enterprises between 2001 and 2005. They pointed out that empirical studies in English on CER in China are lacking. In addition, they asserted that China’s CER is still at its embryonic stage. Some studies in Chinese (e.g., Li and Zou, 2001; Zhang and Su, 2002) similarly claimed that China is short of voluntary environmental disclosure (VED). However, there is an

increase in Chinese listed companies with CER from 34 per cent in 2002 (Li and Xiao, 2002) to approximately 60 per cent in 2006 (Liu and Anbumozhi, 2009). These studies indicated that CER in Chinese listed companies is still lacking to date, but that it has an expectant increasing tendency.

In previous studies of investigating what factors could impact on environmental disclosure, the almost consistent finding as noted by Gray *et al.* (2001, p.328), is that larger firms 'in more 'socially-' and 'environmentally-sensitive' industries can be expected to make greater use of the disclosure of information about their social and environmental activities'. It accords with the finding of Beck *et al.* (2010), that size and industry are known to impact significantly on disclosure behaviours. Liu and Anbumozhi (2009) similarly found that firms' environmental sensitivity and size have a significant correlation with corporate environmental information disclosure. In their paper, the impact of government pressure, level of shareholder concentration, and creditor pressure on environmental disclosure was tested by the annual reports from 175 Chinese listed companies in 2006. The result indicated that the pressures from shareholder concentration and creditor are still weak at present, but that government pressure is among the determinant factors of environmental disclosure. The research on the effect of corporate governance on corporate social responsibility / environmental disclosure were mainly focused on developed countries: the UK (e.g., Aguilera *et al.*, 2006; Brammer and Pavelin, 2008), the US (e.g., Aguilera *et al.*, 2006; Arora and Dharwadkar, 2011; Cong and Freedman, 2011), Australia (e.g., Gibson and O'Donovan, 2007; Rao *et al.*, 2012) and European countries (e.g., Dam and Scholtens, 2012). Gibson and O'Donovan (2007) indicated that an increase in environmental information could be obtained by effective corporate governance, because it contains environmental information provision for legitimate stakeholders. Arora and Dharwadkar (2011) tested the effect of corporate

governance on corporate social responsibility (CSR) in a developed country and found that strong corporate governance has a symmetric influence on CSR and that it decreases both positive and negative CSR. Rao *et al.* (2012) proved that strong corporate governance mechanisms have an effect on the quantitative environmental disclosure in the annual reports through the evidence of 100 Australian listed companies. However, these studies examined less the impacts from the characteristics of corporate governance on voluntary environmental disclosure in developing countries. This research would contribute to this area. First, it explores the current status of environmental disclosure in the annual reports during recent years through a manual data process. Then, the monitoring role played by corporate governance mechanisms (ownership structure and board composition) on the quantity of voluntary environmental disclosure is examined by evidence from Chinese listed companies. At the same time, the relationship between firm performance and environmental disclosure is investigated. Finally, in this chapter, the uniqueness of Chinese case would be identified.

The remainder of this chapter proceeds as follows. In the next section, it presents the literature review that includes the voluntary disclosure part: environmental disclosure is the main object. The relationship between corporate governance and disclosure is reviewed and evaluated in the next part to look for gaps in the previous research. Particularly, the relevant previous studies on the effect of corporate governance on CSR / environmental disclosure are reviewed in this part. Section 3.3 discusses correlative theories about corporate governance and environmental disclosure. After that, research hypotheses of the relationship are discussed and put forward. Section 3.4 explains samples, variables and methodology. The empirical results are provided in Section 3.5. The final section concludes with the findings and contribution of this research.

3.2 LITERATURE REVIEW

3.2.1 Voluntary Disclosure

Kanda (1999) mentioned that disclosure is conducive to enhanced transparency, helps stakeholders of the firm and other market participants to act properly and might prevent fraud. There are two theories of disclosures: voluntary disclosure and mandatory disclosure. The former and its determinants have been identified as an important research area which has attracted many scholars in accounting and finance since the 1970s (Ho and Wong, 2001). Li and Qi (2008) stated the effect of voluntary disclosure: it ‘replenishes and deepens (mandatory) disclosure, and it has an important impact on improving the quality of disclosed information and demonstrates the prospective and truthful value of (a) company’. It decreases the information asymmetry between insiders (managers and directors) and outsiders (shareholders and investors) of the company (Lo, 2009) and increases the investors’ awareness of the firm. The development of voluntary disclosure is influenced by many factors. Einhorn (2005) noted that voluntary disclosure would increase when regulation regarding disclosures increases. In the US, SOX is a stringent act which strengthens corporate governance under the penalty of law. It could improve voluntary disclosure in US companies, directly or indirectly. Compared with mandatory disclosure, voluntary disclosure is commonly chosen to investigate its relationship with firm-specific characteristics (e.g., Firth, 1979; Chow and Wong-Boren, 1987; Hossain *et al.*, 1994), culture (e.g., Gray, 1988; Haniffa and Cooke, 2002), and corporate governance (e.g., Ho and Wong, 2001; Eng and Mak, 2003).

3.2.1.1 Categories of Voluntary Disclosure

Within voluntary disclosure, non-mandatory accounting and non-accounting information (Haniffa and Cooke, 2002, p.318), are divided into different types under their content and functions in the annual report. Four categories of them are generally selected to examine its relationship with corporate governance. They are general disclosure, financial disclosure, corporate governance disclosure, and social and environmental disclosure. The rest are market disclosure, risk management disclosure, human resources disclosure, and research and development disclosure (Iskander, 2008).

3.2.1.1.1 General Disclosure

General disclosure mainly shows general and strategic information of a firm in the annual report. Barako *et al.*, (2006) listed some items in this category: brief history of the firm, organisational structure, major goods and/or services, current business strategy, and the company's contribution to the national economy. In short, general disclosure could assist the users of an annual report to know the basic information and situation of the company.

3.2.1.1.2 Financial Disclosure

Financial disclosure is defined by Gibbins *et al.* (1990) as ‘any deliberate release of financial information, whether numerical or qualitative, required or voluntary, or via formal or informal channels’ (p.122). Mandatory financial disclosure is dictated to show financial statements and other financial information under the array of laws, regulations, and standards (such as International Financial Reporting Standards (IFRSs) and International Accounting Standards (IASs)). Voluntary financial disclosure gives more financial data than mandatory disclosure. For example, a historical summary of financial

data for last 6 years or more, a supplementary inflation adjusted financial statement, or some financial ratios (Barako *et al.*, 2006). Iskander (2008) noticed that it discloses a more comprehensive presentation of the financial information and about the performance of the corporations.

3.2.1.1.3 Corporate Governance Disclosure

Corporate governance issues are very important for a corporation. They continue to get a high level of attention (United Nations, 2006). Thus, it is important to disclose corporate governance information in order to improve corporate transparency. The United Nations (2006) issued “Guidance on Good Practices in Corporate Governance Disclosure” to help ‘the preparers of enterprise reporting in producing disclosures on corporate governance which will address the major concerns of investors and other stakeholders’.

3.2.1.1.4 Social and Environmental Disclosure

Voluntary social and environmental disclosure (VSED) is defined as a category of disclosure which reflects how the corporation deals with its social responsibility and environmental influence (Iskander, 2008). Its contents include information about employees’ safety and morale; a statement of corporate social responsibility; a statement of environmental policy; and information about environmental projects (Barako *et al.*, 2006). Companies, especially in environmentally sensitive industries, disclose environmental information which could add information content to investors and trigger their reactions (Freedman and Jaggi, 1982; 1988). Deegan and Rankin (1999) stated that ‘environmental information could be used for determining a number of issues such as whether to invest or lend funds to an organisation; whether to consume an organisation’s products; whether to use an organisation’s products in the production process; and

whether to supply labour or other resources to the entity'. The Statement of Financial Accounting Concepts (SFAC) No.1: Objectives of Financial Reporting by Business Enterprises (FASB, 1978) points out there are a variety of potential users of environmental disclosure, comprising 'owners, lenders, suppliers, potential investors and creditors, employees, management, directors, customers, financial analysts and advisors, brokers, underwriters, stock exchanges, lawyers, economists, taxing authorities, regulatory authorities, legislators, financial press and reporting agencies, labour unions, trade associations, business researchers, teachers and students, and the public' (p.11, paragraph 24). In this research, it mainly focuses on environmental disclosure.

3.2.1.2 Prior research of voluntary disclosure

As mentioned above, voluntary disclosure and its determinants have attracted much attention from both analytical and empirical researchers since the 1970s. In analytical research, Jensen and Meckling (1976) and Hughes (1986) analysed the importance of (voluntary) disclosure based on agency theory and signalling theory respectively. In empirical research, research has mainly focused on the US and the UK (e.g., Firth, 1979; Leftwich *et al.*, 1981; Meek and Gray, 1989; Gray *et al.*, 1990; Cooke, 1992). In the 1990s, researchers started to examine the relationship between voluntary disclosure and corporate governance (e.g. McKinnon and Dalimunthe, 1993; Raffournier, 1995; Chen and Jaggi, 2000; Ho and Wong, 2001; Haniffa and Cooke, 2002; Eng and Mak, 2003; Barako *et al.*, 2006; Xiao and Yuan, 2007; Li and Qi, 2008; Akhtaruddin *et al.*, 2009; Liu and Sun, 2010). There are generally five elements of corporate governance to be examined in reference to the impact on voluntary disclosure. They are ownership structure, board composition, family control, auditing committee, and Chairman/CEO

duality. To sum up, the previous empirical research received almost consistent results from family control, auditing committee, and Chairman/CEO duality related to voluntary disclosure. However, there are mixed empirical results in two mechanisms of corporate governance, which are ownership structure (especially, managerial ownership and blockholder ownership) and board composition.

3.2.1.3 Research on voluntary environmental disclosure

There has already been a large amount of research due to increasing concerns about environmental issues over the last two decades. The research mainly focuses on developed countries: the UK (e.g., Harte and Owen, 1991; Gray *et al.*, 1995; Toms, 2002), the US (e.g., Rockness, 1985; Hughes *et al.*, 2000), New Zealand (e.g., Hackston and Milne, 1996), and Australia (e.g., Deegan and Rankin, 1999; Wilmshurst and Frost, 2000). In recent years, scholars have started to explore the development of environmental disclosure in developing countries (e.g., Hossain *et al.*, 2006; Murcia and Santos, 2010; Sen *et al.*, 2010).

The research of environmental disclosure is divided into four categories. The first type is to investigate the quality and/or quantity of environmental disclosure (e.g., Gray *et al.*, 1995a; Hasseldine *et al.*, 2005; Brammer and Pavelin, 2008; Rowe *et al.*, 2009; Moroney *et al.*, 2011). The study of Gray *et al.* (1995a) is recognised as a significant paper in this area. The paper reviewed the literature and a longitudinal study of the UK's corporate social and environmental disclosure. It collected the data from the annual reports of UK companies over a 13-year period from 1979 to 1991 and found that environmental disclosure in the UK rose significantly from 1982. Tansey *et al.*, (2004) investigated

environmental disclosure in the emerging market and concluded that increasing environmental disclosure would reduce the concern about organisational environmental issues. Rowe *et al.* (2009) researched public corporate environmental reporting (CER) in China focusing on Shanghai. The study investigated the perception of senior managers and executives on the value of CER in corporations and their attitude on the development of CER in their companies through interviewing senior managers and executives in fifteen Shanghai enterprises between 2001 and 2005. They pointed out that empirical studies in English on CER in China are lacking. In addition, they asserted that China's CER is still at its embryonic stage.

The second type is to examine the relationship between environmental disclosure and environmental performance (e.g., Ingram and Frazier, 1980; Wiseman, 1982; Freedman and Jaggi, 1996; Neu *et al.*, 1998; Magness, 2006; Dragomir, 2010; Kimbro and Melendy, 2010). Wiseman (1982) measured the relationship between corporate environmental disclosure and the firm's actual environmental performance through 26 environmentally sensitive firms. The result indicated that there is no relationship between them. It is consistent with the findings of Ingram and Frazier (1980) and Freedman and Jaggi (1982). In the paper of Neu *et al.* (1998), the role and function of environmental disclosure were found by examining the impact of external pressure and other "social" disclosures on environmental disclosure and the relationship between environmental disclosure and actual performance.

The impact of environmental disclosure on firm value is the third type (e.g., Plumlee *et al.*, 2008; 2010). In the study of Plumlee *et al.*, (2008), they examined the relationship between VED quality and firm value (the cost of capital and the expected cash flow) through a sample of firms in both environmentally sensitive and non-sensitive industries.

They concluded that firms' VED positively relates to the cash flow component in environmentally non-sensitive industries and negatively associates with the cost of capital component in environmentally sensitive industries. The study was expanded in both the number of samples and the length of the research period in the paper of Plumlee *et al.* (2010). They found the additional result as: there are both positive and negative relationships between some aspects of VED and the cost of equity capital component.

The last one is to investigate what factors could affect environmental disclosure (e.g., Hackston and Milne, 1996; Gray *et al.*, 2001; García-Ayuso and Larrinaga, 2003; Kent and Chan, 2003; Elijido-Ten, 2004; Hossian *et al.*, 2006; Brammer and Pavelin, 2008; Liu and Anbumozhi, 2009; da Silva Monteiro and Aibar-Guzmán, 2010; Murcia and Santos, 2010; Mahadeo *et al.*, 2011; Moroney *et al.*, 2011; Salama *et al.*, 2012; Zeng *et al.*, 2012). In previous studies, they focused on the relationship between firm size and VED (e.g., Adams *et al.*, 1995; Cormier and Gordon, 2001), profit and VED (e.g., Freedman and Jaggi, 1988; Gray *et al.*, 2001), and industry and VED (e.g., Halme and Huse, 1997). As noted by Gray *et al.* (2001), 'larger, more profitable firms, and those in more 'socially-' and 'environmentally-sensitive' industries can be expected to make greater use of the disclosure of information about their social and environmental activities' (p.328). It accords with the view of Beck *et al.* (2010), that size and industry are known to significantly impact on disclosure behaviours.

Wilmshurst and Frost (2000) summarised 11 specific factors that influence or motivate the decision to reveal environmental information based on previous studies. Combined with legitimacy theory, they investigated the importance of these factors on corporate environmental reporting practices through the survey process and the regression test. They adopted content analysis approach to collect and measure environmental

information from the annual reports of 62 sample companies in 1995 to test the relationship between these factors and actual disclosure practice by the regression model. This research provides limited support for the applicability of legitimacy theory as an explanation for the decision to reveal environmental information. The empirical findings showed that the perceived importance of a number of factors (e.g., “to provide a ‘true and fair’ view”, “community concern with operations”, “shareholder/investor rights to information”, “customer concerns”, “supplier concerns”, and “financial institution concerns”) play a significant and positive role on environmental disclosure in the annual reports. These results reflected that the influence of concerns from customers, suppliers, and financial institutions on environmental reporting is much more effective than it is considered in the mind of CFOs.

Gray *et al.* (2001) tested empirically the association between social and environmental disclosure (SED) and corporate characteristics using OLS regression. The Centre for Social and Environmental Accounting Research (CSEAR) Database was adopted to collect disclosures in the annual reports of the top 100 UK companies, which were selected from the *Times 1000*, between 1988 and 1995. Statistics of turnover, capital employed, profit, and number of employees were engaged from corporate characteristics to test their influence on SED. They concluded that the results provide evidence which supports size, profit, and industry being determinant factors of corporate social and environmental disclosure, at least in the UK. However, they were ‘unable to claim that there is any unique and/or stable relationship between any measure of disclosure and any corporate characteristic’ based on the detailed functional models (p.349).

García-Ayuso and Larrinaga (2003) examined the relationship between the amount of environmental information disclosed by firms and a number of corporate characteristics

(size, risk, profitability, environmental sensitivity, media exposure), based on a sample of 560 firm-year observations from the Madrid Stock Market in Spain excluding financial firms between 1991 and 1995. Two measurements in the level of environmental disclosure were designed and employed in the research, which are LINE (as measured by the total number of lines of environmental disclosure) and SPACE (as measured by the number of lines of environmental disclosure relative to the total information disclosed in the annual report). They found that the development of the environmental reports was very fast in the early 1990s. In addition, they concluded that larger firms with higher systematic risk and which operated in more sensitive industries have a higher level of environmental disclosure. The potential environmental impact of the industry and the extent of media coverage of the firms are directly associated with environmental disclosure.

Based on the stakeholder theory, Eljido-Ten (2004) adopted Ullmann's (1985) three-dimensional framework (stakeholder power, strategic posture and economic performance) to investigate the associations between voluntary environmental disclosure and its determinant factors in developing countries. Due to there being no compulsory environmental requirement in Malaysia, environmental disclosures provided by companies are their own voluntary activities, according to the Environmental Quality Act of 1974 and the Malaysian Companies Act of 1965. In this article, the content analysis approach was used to measure quality environmental information while the units of measurement (number of sentences) were applied for quantity, based on a sample of 40 Malay companies from the Kuala Lumpur Stock Exchange (KLSE) between 2000 and 2001. Stakeholder power, the first dimension in Ullmann's model, was measured by shareholder power (shareholder concentration), creditor power (debt/equity ratio), and Government power (environmentally sensitive industries); Strategic posture, the second

dimension, was measured by environmental concern and ISO 14001 Certification; and economic performance, the third dimension, was measured by ROA and change in firm value, which were employed as independent variables to test the effect on both the quality and quantity of environmental disclosure. Firm size and corporation age were engaged as the control variables in the study. The research found that the level of environmental concern and government power are the main factors affecting voluntary environmental disclosure. There was no evidence found to confirm the influence of economic performance on the level of environmental information. In addition, the author pointed out that general or vague descriptions are the main forms of environmental information disclosed by most Malay companies and quality environmental disclosure is expected to increase in the future.

Hossian *et al.*, (2006) also empirically tested environmental disclosure in a developing country. The authors pointed out that most environmental disclosure studies focused on developed countries (e.g., the US, the UK, and other European countries), with just a few papers about developing countries (e.g. Korea, India), and no such research in Bangladesh. Therefore, 107 companies from the Dhaka Stock Exchange excluding financial firms between 2002 and 2003 were chosen to examine the impacts of several corporate factors (size, profitability, subsidiaries of multinational companies, audit firm, industry type) on corporate social and environmental disclosure. The results indicated that industry type, presence of debentures in the annual report, and net profit margin significantly and positively relate to corporate social and environmental disclosure. In addition, manufacturing firms with higher profitability and debentures issued were found to disclose more social and environmental information. In the research, the time of observation is a single year between 2002 and 2003 which is a limitation. The authors suggested that future scholars could extend the period of observation. Furthermore,

future research could concentrate on a particular industry type to see if that industry differed from the results of the study.

Brammer and Pavelin (2008) examined the factors related to the quality of corporate environmental disclosure (CED). The variables included environmental fines, as measured by the fines companies received for environmental transgressions; size, as measured by the natural logarithm of the value of total assets; media exposure, as measured by the incidence of news media coverage of the company; ownership concentration, as measured by the total share of any ownership who owns in excess of 3% of shareholdings; profitability, as measured by return on total assets; firm leverage, as measured by the ratio of total debt to total assets; and non-executive directors, as measured by proportion of independent non-executive directors to the number of directors on the board. Logistic regression was employed in the study to test a sample of 447 large UK firms in 2000. It found that a firm's size and its business activities are determinants of CED; that large firms operating in an industry which is environmentally sensitive have high CED; but that media exposure does not relate to CED.

Branco and Rodrigues (2008) employed two mediums of social responsibility disclosure (SRD), the Internet (corporate Website) in 2004 and 2003 annual reports, to compare and analyse the factors impacting SRD. Although the annual reports are commonly adopted to collect information in most of the empirical studies on disclosure practise, the increasing importance of communication with stakeholders via the Internet, which has started to attract the attention of scholars, cannot be overlooked. In this article, SRD was divided into five categories for each medium: total SRD, environmental disclosure, human resources disclosure, products and customers disclosure, and community involvement disclosure. In other words, there were ten models, which integrated ten

different dependent variables with the same determinant factors (independent variables) respectively. Combined with legitimacy theory and a resource-based perspective, they developed a series of hypotheses to test the influence of international experience, company size, industry affiliation, consumer proximity, environmental sensitivity, and media exposure on SRD and its categories, both on the Internet and in the annual reports. Profitability and leverage were engaged as control variables to support multiple linear regression models. In regard to total SRD, they found that firm size and media exposure play a positive role in driving the revelation of more SRD in the annual reports. Moreover, SRD on the Internet was found to have a significant and positive relationship with firm size whereas it had a negative link with leverage. Furthermore, they suggested that firms with 'higher visibility exhibit greater concern' to advance their image through SRD by these two mediums (p.699).

Alarussi *et al.* (2009) developed six hypotheses and used a multiple regression analysis to explore whether or not the six variables (namely ethnicity of executive officer (CEO), leverage, level of technology, listing status, profitability, and firm size) play an effective role on Internet financial and environmental disclosure by Malaysian companies. Three levels of financial disclosure was utilised to measure the extent of financial information from the websites of listed companies whereas a dummy variable was adopted for environmental disclosure. Based on 189 companies' websites in 2006, they found 18 firms without financial disclosure, 50 firms with disclosure of 1-2 financial items, and 121 firms with disclosure of more than 2 items. In contrast, there were 108 companies that revealed environmental information in their websites whilst 81 companies did not. The empirical results indicated that large firms with high-level technology more likely disclose both financial and environmental information on the Internet. Moreover, it

observed that listing status and ethnicity of CED were significantly related to financial disclosure while profitability merely linked to environmental disclosure.

Liu and Anbumozhi (2009) examined a number of determinant factors of corporate environmental information disclosure, based on the evidence from 127 Chinese listed companies in 2006. In the paper, they developed three hypotheses to examine the impact of government pressure, the level of shareholder concentration, and creditor pressure on environmental disclosure. In detail, government pressure was measured by a dummy variable representing whether a firm belongs to an environmentally sensitive industry, which includes 'mining, thermal power, construction materials, pulp and paper products, metallurgy, petroleum, brewery, ferment, textile, pharmacy, tanning and chemical industries' (p597); level of shareholder concentration was measured by the percentage of floating shares held by the top ten shareholders; and they applied the asset liability ratio as the proxy of the creditor pressure. For the measurement of the dependent variable, the authors used an index based upon the Global Reporting Initiative (GRI) and the 'Environmental Information Disclosure Measurement' issued by China's SEPA. Size of firms, location, age of listed companies, return of equity, and learning capacity were employed as control variables to support their multiple regression models. The authors found that firms' environmental sensitivity and size have a significant association with corporate environmental disclosure. Regarding firms' environmental sensitivity, as noted by Polonsky and Zeffane (1992), firms with large environmental problems would show the highest level of attention to the environment. The result of the study indicated that pressure from shareholder concentration and creditors is still weak at present, but that government pressure is a significant factor which influences environmental information disclosure. In addition, the authors pointed out an interesting finding that these sampled

Chinese firms are selectively revealing environmental information, based on their potential beneficial outcomes and favour.

Buniamin (2010) examined the quantity and quality of environmental reporting in the annual reports of Malay companies and its determinant factors based on legitimacy theory, using a sample of 243 firms listed on the Main Board of Bursa Malaysia in 2005. Content analysis approach was adopted to determine the level of environmental information in the annual report. The quantity of information was measured by the number of sentences whereas the quality information was based on the disclosure index, which had 100 disclosure items and was grouped into 14 categories. A score of one is given when any item was reported, while a score of zero was assigned for non-disclosure. The findings indicated that just 28% of the companies reveal such information and 3.24% is the average quality of environmental reporting disclosed per firm. Using linear regression, the empirical results revealed that firm size and environmental sensitive industry play an effective role in encouraging both the extent and the level of environmental disclosure. Additionally, the study found that firms with a large volume of environmental reporting also have a high level of environmental reporting quality.

da Silva Monteiro and Aibar-Guzmán (2010) investigated the development of VED in Portugal and the extent of impact from the determinants of VED. In the study, the authors indicated that the legitimacy theory and the stakeholder theory are the major theories in most studies to explain the differences in VED among companies. They used the annual reports of 109 large companies between 2002 and 2004 to test the influence of corporate characteristics (firm size, industry member, profitability, quotation on the stock market, foreign ownership, environmental certification) to VED. This research adopted the content analysis approach to measure environmental information and the multiple

regressions to examine the relationship between VED (dependent variable) and its determinant factors (independent variables). They found that VED were still low in Portuguese companies between 2002 and 2004, but that it has increased. Unsurprisingly, firm size positively relates to VED.

Based on previous environmental disclosure studies, Huang and Kung (2010) summarised that firms need to fulfil their social responsibility and meet the demands of stakeholders (p.437). Drawing on stakeholder theory, they examined the influence of external stakeholders (e.g., government, creditors, suppliers and customers, and competitors), internal stakeholders (e.g., shareholders and employees), and intermediary stakeholders (environmental protection organisations and accounting firms) on the quality of environmental disclosure, using data from 759 firms listed on the Taiwan Stock Exchange between 2003 and 2005. In this study, the authors indicated that most of the data are hand-collected and that the content analysis approach (a disclosure-scoring technique) was employed to measure qualitative disclosure. A score of 1 was given if a company's disclosure referred to one of 36 environmental information items provided by the auditors whereas a score of 0 was given for non-disclosure. The score range of dependent variables (environmental disclosure) was 0 – 36 for each firm. The results showed that stakeholder groups' demands are proved to be effective drivers in improving levels of environmental disclosure. In detail, external stakeholder groups 'exert a strong influence over management intentions regarding the extent of environmental disclosure'; internal stakeholder groups 'impose additional pressures on firms to disclose environmental information'; and intermediate stakeholder groups 'can greatly influence managerial choices regarding their environmental disclosure strategies' (p.437). According to the results of this study, Huang and Kung (2010) concluded that transparent environmental disclosures provided by firms would not only satisfy the needs of various

stakeholder groups, but that they will also increase companies' image, obtain added value, and achieve more sustainable development.

Murcia and Santos (2010) employed Panel data model to examine the associations between social-environmental disclosure (SED) (49 voluntary items), economic disclosure (43 voluntary items), their total disclosure (92 voluntary items) and their determinants based on 100 Brazilian companies from the largest non-financial sector during 2006-2008. The discretionary-based disclosure (Verrecchia, 2001) was employed as the theory underpinning the study. The main empirical results relating to social-environmental disclosure indicated that (1) Tobin's Q, sector, and origin of control are statistically significant in SED; (2) in contrast, size, governance, stock issuing, growth opportunities and concentration of control are not statistically significant in SED.

Mahadeo *et al.* (2011) did a longitudinal study on corporate social disclosures (CSD) in an African developing economy. This research explored the development of CSD and its determinant factors (size, profitability, leverage, and industry differences), using a total of 165 annual reports of companies listed on the Stock Exchange of Mauritius (SEM) during a three-year period between 2004-2007, based on legitimacy theory. As most prior studies, content analysis was engaged to measure CSD, which is divided into five classes as dependent variables in this article: Ethics information, Social information, Environmental information, Health and Safety information, and total CSD. The importance of this research was given as follows: first, many previous studies have depended on a short window of observation (normally, 1 year data), which may have resulted in a biased conclusion on the effect of determinant factors of CSD; second, in contrast with developed countries, especially Western, 'the context of developing countries reflects a multitude of social, political, economic and cultural factors which

translate into different ‘arrangements’ such as, for instance, the patterns of corporate ownership, business law and regulation, state intervention in commercial activities, the influence of religious or ethnic considerations, the degree of public concern about the environment, the prominence of civil society and attitudes to philanthropy or social responsibility’ (pp545-546), which motivate the investigation on the CSD and its determinant factors in a developing economy. In this article, a significant enhancement in both volume and variety of CSD was found, which supported well their first hypothesis based on analysis of the changing political and economic context. According to a pooled regression, the findings indicated that size positively impacts on overall CSD and social disclosures, whilst leverage is positively related to particular CSD (environmental and health and safety); there is no evidence to prove the relationship between profitability and CSD; the effects of industry affiliation on CSD are different depending on the category of CSD and Industry.

According to the stakeholder-agency theoretical perspective, Moroney *et al.* (2011) examined whether assurance (as measured by a dummy variable, coded 1 if a company has environmental assurance and 0 otherwise) enhances the quality of VED through surveying 74 Australian companies from the top 500 firms between 2003 and 2007. It also measured the difference in VED when companies are assured by either professional accountant assurers or private consultants. Stock price volatility, Tobin's Q, J-F coefficient, return of assets, leverage ratio, asset newness, and capital intensity were employed as the control variables in the study to support a linear regression model. An index based upon the GRI as a measurement of the dependent variable was applied in the content analysis. The result indicated that the quality of VED significantly and positively relates to assured companies compared to non-assured companies; the quality of VED is

no different in assured companies by professional accountant assurers or private consultants; and experience improves the quality of VED.

Salama *et al.* (2012) employed stakeholder-agency theory to observe the determinant factors of environmental disclosures in annual reports, based on 169 UK firms using a single year (1999). In the paper, they engaged both TOBIT and LOGIT formulation as supplements to OLS regressions in order to minimise the limitation of OLS regression testing dependent variables that are not less than zero. Environmental disclosure, measured by content analysis, is employed as the dependent variable while (high-profile and low-profile) industry, profitability, and firm size are utilised as independent variables. The findings indicated that firm size and industry influence environmental disclosures significantly and positively. However, this paper did not find any evidence to support a relationship between profitability and environmental disclosure.

Zeng *et al.* (2012) examined factors that drive Chinese listed companies in voluntary environmental information disclosure based on institutional theory. This theory ‘considers the processes by which structures, rules, norms, and routines become established as authoritative guidelines for social behaviour’ (Scott, 2007, p.460). It provided a useful framework to estimate how environmental disclosure ‘could become a dominant practice among firms’ (Zeng *et al.*, 2012, p.310). The sample companies, from the manufacturing industry, were selected from those listed on the Shanghai and Shenzhen Stock Exchanges between 2006 and 2008. There were 792 firms, 785 firms, and 784 firms in 2006, 2007, and 2008, respectively. The data of environmental disclosure and the financial data were collected from the annual reports and the CSMAR database (2009). In this article, the measurement of environmental information employed the score ranges between 0 and 3 to denote the level of disclosure, which was based on

the empirical study of Wiseman (1982). The findings indicated that the factors of being a state-owned enterprise and the greater size of the firm played an active role in driving environmental reporting practice in the annual report. Moreover, firms belonging to environmentally sensitive industries and firms with a better reputation also motivate other companies to reveal more environmental information.

Juhamni (2014) investigated the determinants of corporate social and environmental disclosure on Websites through the case of Bahrain. Content analysis by word count was employed to measure the level of social and environmental disclosure on Websites of Bahraini listed companies. Then, they used multiple regression analysis to examine the effect of firm size, profitability, financial leverage, firm age and audit firm size on the level of social and environmental information based on legitimacy theory. The valid data included 33 Bahraini companies covering sectors of commercial banks, investment, insurance, services, hotels and tourism, industrial. The finding indicated that the level of social and environmental disclosure is significantly and positively impacted by financial leverage and audit firm size. However, they did not find any evidence to support the influence of firm size, profitability, and firm age on the level of social and environmental disclosure on Websites.

Table 3.1

Empirical studies on determinant factors of environmental disclosures

Author(s) & Date	Dependent Variable	Independent Variable	Sample Size & Type, Time of Observation	Environmental Disclosure Measure	Analysis & General Results
Wilmshurst and Frost (2000)	Corporate Environmental Reporting	11 specific factors that influence or motivate the decision to reveal environmental disclosure	62 Australian companies in 1995	<u><i>Content analysis approach</i></u>	<u><i>Regression model</i></u> RESULT: to provide a 'true and fair' view, community concern with operations, shareholder/investor rights to information, customer concerns, supplier concerns, and financial institution concerns play a significant and positive role on environmental disclosure in the annual reports.
Gray <i>et al.</i> (2001)	Social and Environmental Disclosure (SED)	Turnover, Capital employed, Profit, and Number of employees	The top 100 UK companies, which were selected from the Times 1000, between 1988 and 1995	<u><i>Content analysis approach</i></u>	<u><i>OLS regression</i></u> RESULT: size, profit, and industry are determinant factors of corporate social and environmental disclosure, at least, in the UK.
García-Ayuso and Larrinaga (2003)	Environmental Disclosure	Size, Risk, Profitability, Environmental Sensitivity, Media exposure	112 Spanish companies from the Madrid Stock Market excluding financial firms between 1991 and 1995	<u><i>Content analysis approach</i></u>	<u><i>Regression model</i></u> RESULT: firms with higher systematic risk and which operate in more sensitive industries have higher environmental disclosure (ED); The potential environmental impact of the industry and the extent of media coverage of the firms associate with ED.

Elijido-Ten (2004)	The quality and quantity of Voluntary Environmental Disclosure (VED)	Shareholder power, Creditor power, Government power, Environmental concern, ISO 14001 certification, Average return on assets, Change in firm value, Average sales revenue of firm, and Age	40 Malaysian companies from the Kuala Lumpur Stock Exchange (KLSE) in the year 2000 (40 observations) and 2001 (39 observations-one company was delisted)	<u>Content analysis approach</u>	<u>Regression model</u> RESULT: the level of environmental concern and government power are the main determinants of VED; economic performance does not impact on the level of environmental disclosure significantly.
Hossian <i>et al.</i> (2006)	Corporate Social and Environmental Disclosure (CSED)	Size, Profitability, Subsidiaries of multinational company, Audit firm, Industry type, Age	107 Bangladeshi companies from the Dhaka Stock Exchange excluding financial firms between 2002 and 2003	<u>Content analysis approach</u>	<u>Multiple linear regression</u> RESULT: industry type, presence of debentures in the annual report, and net profit margin significantly and positively related to CSED.
Brammer and Pavelin (2008)	The quality of Corporate Environmental Disclosure (CED)	Environmental fines, Size, Media exposure, Ownership concentration, Profitability, Firm leverage, Non-executive directors	447 UK companies from large firms in 2000	<u>Content analysis approach</u>	<u>Logistic regression analyses</u> RESULT: firm's size and its business activities are determinants of CED; Large firms with environmental sensitivity have high CED; media exposure does not relate to CED.
Branco and Rodrigues (2008)	Social Responsibility Disclosure (SRD)	International experience, Company size, Industry affiliation, Consumer proximity, Environmental sensitivity, Media exposure, Profitability and Leverage	49 Portuguese companies in 2003 and 2004	<u>Content analysis approach</u>	<u>Multiple linear regression models</u> RESULT: firm size and media exposure play a positive role to drive revealing more SRD. Moreover, SRD on the Internet was found to have a significant and positive relationship with firm size but a negative link with leverage.

Alarussi <i>et al.</i> (2009)	Internet Financial Disclosure, Internet Environmental Disclosure	Ethnicity of executive officer (CEO), Leverage, Level of technology, Listing status, Profitability, and Firm size	189 Malaysian companies in 2006	<u>The scoring index</u>	<u>Multiple regression</u> RESULT: large firms with high-level technology are more likely to disclose both financial and environmental information on the Internet. Moreover, it observed that listing status and ethnicity of CEO were significantly related with financial disclosure while profitability merely linked to environmental disclosure.
Liu and Anbumozhi (2009)	Corporate Environmental Information (CEI)	Government Pressure, Shareholder Pressure, and Creditor Pressure, Size, Location, Age of listed companies, Economic performance, Learning capacity	175 Chinese companies excluding special treatment firms in 2006	<u>Content analysis approach</u> An index based upon the Global Reporting Initiative (GRI) and the 'Environmental Information Disclosure Measurement' issued by China's SEPA	<u>Multiple regression</u> RESULT: firms' environmental sensitivity and size have a significant association with CEI; The economic performance does not significantly associate to CEI; the pressure from shareholder concentration and creditors are still weak at present, but government pressure among the determinant factors of CEI.
Buniamin (2010)	Quantity and Quality of Environmental Reporting	Firm size and Environmental sensitive industry	243 firms listed on the Main Board of Bursa Malaysia in 2005	<u>Content analysis approach</u>	<u>Linear regression</u> RESULT: firm size and environmentally sensitive industry play an effective role to encourage both the extent and the level of environmental disclosure. Additionally, the study found that firms with a large volume of environmental reporting also have a high level of environmental reporting quality.

da Silva Monteiro and Aibar-Guzmán (2010)	Voluntary Environmental Disclosure (VED)	Firm size, Industry member, Profitability, Quotation on the stock market, Foreign ownership, Environmental Certification	109 Portuguese companies from large firms between 2002 and 2004	<u>Content analysis approach</u>	<u>Multiple regression</u> RESULT: VED was low in Portugal between 2002 and 2004, but it has increased; Firm size positively relates to VED.
Huang and Kung (2010)	Quality of Environmental Disclosure	Fines, Size, Leverage, Advertising fees, Inventory turnover, Market share, Blockholder ownership, Number of employees, Environmental sensitivity of the industry, and Type of auditing firm, ROA	759 firms listed on the Taiwan Stock Exchange from 2003 and 2005	<u>Content analysis approach</u>	<u>Regression model</u> RESULT: stakeholder groups' demands are proved as effective drivers to improve level of environmental disclosure.
Murcia and Santos (2010)	Social-Environmental Disclosure (SED), Economic Disclosure	Auditing firm, Profitability, Tobin's Q, Internationalisation, Size, Corporate governance, Financial leverage, Concentration of control, Stock issuing, Growth opportunity, Sector, Origin of control	100 Brazilian companies from largest non-financial sector between 2006 and 2008	<u>Content analysis approach</u>	<u>Panel data model</u> RESULT: Tobin's Q relates to SED; Sector and origin of control are statistically significant in SED; In contrast, size, governance, stock issuing, growth opportunities and concentration of control are not statistically significant in SED.

Mahadeo <i>et al.</i> (2011)	Corporate Social Disclosures (CSD)	Size, Profit, Leverage, Industry,	165 annual reports from an African developing economy (Mauritius) between 2004 and 2007	<u>Content analysis approach</u>	<u>Pooled regression analysis</u> RESULT: size positively impacts on overall CSD and social disclosures, whilst leverage is positively related to particular CSD (environmental and health and safety); there is no relationship between profit and CSD; the effects of industry affiliation on CSD are different depending on the category of CSD and industry.
Moroney <i>et al.</i> (2011)	The quality of Voluntary Environmental Disclosure	Environmental Assurance, Professional accountant assurer, Stock price volatility, Tobin's Q, J-F coefficient, Return of assets, Leverage ratio, Asset newness, Capital intensity	74 Australian companies from top 500 firms between 2003 and 2007	<u>Content analysis approach</u> An index based upon the Global Reporting Initiative (GRI)	<u>Linear regression model</u> RESULT: the quality of VED significantly and positively relates to environmental assured companies compared to unassured companies; the quality is no different in assured companies when assured by accountants or consultants; Experience improves the quality of VED.
Salama <i>et al.</i> (2012)	Environmental Disclosure	Industry, Profitability and Size	169 UK companies using a single year (1999)	<u>Content analysis approach</u>	<u>OLS regression, TOBIT and LOGIT formulations</u> RESULTS: size and industry have a significant positive impact upon environmental disclosures whilst profitability has a negative impact upon disclosures.

Zeng <i>et al.</i> (2012)	Voluntary Environmental Information Disclosure	SOE, Industry, Industrial Peers, Corporate governance, Brand, Firm size, Loans, Market, EPS, Age, Foreign- owned shares	792, 785, and 784 Chinese manufacturing firms in 2006, 2007, and 2008	<u><i>Content analysis approach</i></u>	<u><i>Linear specification and OLS regression</i></u> RESULT: state- owned enterprise and larger size of firm played an active role to drive environmental practice in the annual report; firms belonging to environmentally sensitive industries and firms with a better reputation also motivate companies to reveal more environmental information.
Juhmani (2014)	Corporate Social and Environmental Disclosure	Firm size, Profitability, Financial leverage, Firm age, and audit firm size	33 Bahraini companies covering sectors of commercial banks, investment, insurance, services, hotels and tourism, industrial	<u><i>Content analysis approach</i></u>	<u><i>Multiple regression analysis</i></u> RESULTS: the level of social and environmental disclosure is significantly and positively impacted by financial leverage and audit firm size.

In summary, the recent empirical studies on determinant factors of environmental disclosures tend to focus on developing countries. Table 3.1 shows the previous studies on the relationship between environmental disclosure and corporate characteristics between 2003 and 2014. There are some common factors existing in these previous studies: first, most studies employed the content analysis approach to measure environmental disclosures. Second, most of them indicated that size and sensitive industry positively effect environmental disclosures, which is consistent with the results of the previous studies. Furthermore, profitability and leverage was widely employed as an independent/control variable in many studies.

3.2.2 The relationship between Corporate Governance and Quantity of Environmental Disclosure

Aguilera *et al.* (2006) argued that differences between institutional investors (the mechanism of corporate governance) in the UK and the US affect a company's social responsibilities (CSR). They concluded that in contrast to the US, more institutional investors are acting to emphasise CSR issues in the UK, because of the significant distinction between the corporate governance arrangement in these two countries which includes the attitude and behaviour of the institutional investor community. The authors suggested that CSR is more likely to be incorporated into "core" corporate governance in the UK than in the US.

Naser *et al.* (2006) investigated the relationship between corporate social disclosure and its influencing factors, which include different ownership structures (individual investors, governmental ownership, institutional investors, and majority shareholders) and corporate characteristics (growth in assets, dividends paid, gearing ratio, and market capitalisation) in Qatar. Based on content analysis approach, they developed a checklist that consisted of 15 content categories within the annual report with testable dimensions, namely: theme, evidence, amount, and location in the report. The score of corporate social disclosure was equal to the sum of environmental information, energy information, human resources information, product information, and community involvement information. Multiple regressions were employed in this article to test data from the annual report of 21 firms listed on the Doha Stock Exchange for the year 1999/2000. The results indicated that variations in corporate social disclosure are found to be impacted by the business risk measured by growth in assets and gearing ratio, and firm size measured

by the market capitalisation. However, they did not find evidence to support any association between corporate social disclosure and ownership variables.

Gibson and O'Donovan (2007) employed 752 firm-year observations to investigate the associations between corporate governance and environmental reporting. This longitudinal study applied the content analysis approach to measure environmental reporting based on a sample of 41 listed Australian companies covering the 21-year period between 1983 and 2003. The research found that an increasing number of listed companies in Australia are revealing environmental information, and that the quantity of environmental disclosure in annual reports is improving. The authors indicated that an increase in environmental information could be obtained by effective corporate governance, because it contains environmental information provision for legitimate stakeholders.

Mohd Ghazali (2007) indicated that ownership structure had been overlooked in previous research on determinant factors of corporate social responsibility (CSR) disclosure, and they employed evidence from a developing country to fill this research gap. In the article, they examined the influence of ownership concentration, director ownership, and government ownership on CSR information in the 2001 annual reports of 87 non-financial Malaysian firms based on a multiple regression analysis. Ownership concentration was measured by percentage of shares held by substantial shareholders (top 10 largest shareholders); direct ownership was measured by percentage of shares held by directors; government ownership was the dummy variable, coded as 1 for a company with the government as the substantial shareholder and 0 otherwise. In addition, company size, profitability, and industry, three common and popular corporate characteristics engaged by previous studies on factors influencing disclosure practice,

were also employed as independent variables in this empirical paper. A CSR disclosure checklist and scoring method were adopted to measure the extent of disclosure. In detail, there were 22 items selected, which were founded on the prior studies (e.g., Hossain *et al.*, 1994; Haniffa and Cooke, 2002) and the adjudication criteria issued by the Bursa Malaysia. When a company revealed information which was included in the 22 items, a score of 1 was awarded; and 0 was given if there was no disclosure related to the checklist. The range of scores for each company was 0 – 22. The regression results showed that government ownership and company size play an effective role on the extent of CSR disclosure whereas director ownership relates to lower CSR information in the annual report.

Since the late 1980s, environmental reporting has become widespread in Western Europe (Gray *et al.*, 1996). Compared with other European countries, the development of environmental disclosure in Germany increased to a high level (Roberts, 1991). In the developing countries, lack of regulation was one of the main problems for authorities, who made less effort to encourage firms in revealing social and environmental information (Abu Shiraz, 1998). Ku Ismail and Ibrahim (2008) asserted that there is only a handful studies on social and environmental disclosure in developing companies in contrast with relatively mature research on this area in developed countries. Thus, they provided an empirical analysis to discover the determinant factors of social and environmental disclosure (SED) quantity in Jordan. In the article, the monitoring role of government ownership, firm size, and industry type on the extent of SED was examined by looking at 60 Jordanian companies in the manufacturing and service sectors for the year 2006. SED was measured by the number of sentences based on content analysis approach. Using ordinary least square (OLS) regression analysis, the empirical findings indicated that firm size played a significantly positive role to encourage firm in revealing

vast quantities of SED. In contrast to firms with a high level of government ownership, low government ownership in firms is more effective in influencing the amount of SED. However, there was no evidence found to support any significant relationship between SED and industry type. In addition, the paper found that 85 percent of the firms reveal SED somehow. Human resource is the most popular item disclosed in the annual report among these companies whilst environmental information is the least popular.

Rizk *et al.* (2008) surveyed corporate social and environmental reporting practices in the context of developing economies. Using a 34-item disclosure index, which covers environmental, energy, human resources, customer and community involvement issues, they measured the extent of disclosure practices. The influence of industry membership and ownership on each type of disclosure (employee-related disclosures; customer-related disclosures; general/public stakeholder-related disclosures; environmental-related disclosures) was examined through a random sample of 60 annual reports from Egyptian firms involved in nine high polluting industries for the 2002 financial year. The findings indicated that the extent of corporate social and environmental information revealed in the annual report is low in Egypt. In addition, the study found that the relationship between ownership structure and each type of disclosure (including environmental-related disclosures) is significant. The limitation of the article focused on the annual reports in the industrial sector only, therefore the authors suggested that future studies should look at the non-industrial sector for further research.

Kolk and Pinkse (2010) observed the association between corporate governance and corporate social responsibility (CSR) disclosure through evidence from Fortune Global 250 companies during a period between September 2004 and January 2005. Differing from many previous studies, they adopted corporate governance as the dependent

variable to investigate the integration of corporate governance in CSR disclosure for multinational enterprises. In this article, binary indicators were employed to measure corporate governance issues and CSR disclosure. There were two measurements of dependent variables, which were 1) the corporate governance section in the report and 2) corporate governance linked to environmental/social issues. Then, a 20-item scale, involving four separate types of CSR: employee conditions, business ethics, community issues, and climate change, were selected to measure the CSR disclosure. In addition, they applied a number of control variables: country of origin, environmental sector, firm performance, and firm size to test logistic regression in this paper. The findings indicated that a significantly positive relationship between CSR disclosure and corporate governance is supported, especially for two categories of CSR activities: employee conditions and business ethics.

Cong and Freedman (2011) investigated the associations between corporate governance, environmental performance and the extent of environmental disclosure. They also explored whether the development of corporate governance in the SOX era has an influence on the extent of pollution information. To collect and measure environmental disclosure, they adopted a manual data process to compile information from the companies' environmental reports and websites and relied on the methodology of pollution disclosure score employed by Freedman and Stagliano (2008). In this article, there were five criteria summarised to develop the scoring index: 1) 'Provide the TRI amount for each reporting year of 2003-2005'; 2) 'Report releases by specific chemical/compound for each reporting year'; 3) 'Disclose emissions data by plant for each reporting year'; 4) 'State the TRI amount for the recent three years'; and 5) 'Categorise releases by method (i.e., via air, water, or land)' (p.227). A score of "1" was given when they found environmental information disclosed by the firm, which refer to

one of five criteria. The maximum aggregate of the scores given to each company was “5”. OLS regression was employed to measure the associations, using a sample consisting of 50 firms, which are the top volume metric releasers of toxins from 1,897 firms with Gov-Scores, during 2003-2005 in the United States. Consistent with legitimacy theory, the main empirical results indicated that (1) there is no evidence to support the relationship between good corporate governance and good pollution performance; but (2) good corporate governance improved environmental disclosure in the early years after SOX.

Rouf (2011) pointed out that the objective of business has evolved from “profit maximising” to “social responsibility” during the last few decades, especially in the developing countries. They tested the corporate social responsibility (CSR) disclosures in corporate annual reports of listed companies in Bangladesh. Specifically, the impact of corporate attributes and firm characteristics on social responsibility disclosures was explored, using data from Dhaka Stock Exchanges in 2007. The ordinary least squares (OLS) regression model was adopted in their article. Based on content analysis method, the extent of CSR disclosure was measured by 39 items of information consisting of five categories: 1) environmental information; 2) employee information; 3) community and others; 4) energy; and 5) products (p.23). When disclosure in the annual report referred to an item of information (39 items), a score of 1 was given. The aggregate disclosures score (minimum: 0 and maximum: 39) was the final value of CSR disclosure for each company. They found that the monitoring role of corporate governance attributes, which contain independent directors, board leadership structure, and board audit committee, significantly and positively relate with the level of CSR disclosure. However, they did not find evidence to support a relationship between firm size and CSR disclosure practice.

Esa and Mohd Ghazali (2012) investigated the relationship between corporate governance and corporate social responsibility (CSR) disclosure in the annual reports of Malaysian Government-linked companies (GLCs) based on multiple regression analysis. They employed content analysis to collect CSR disclosure from the annual reports of 27 GLCs in 2005 and 2007. GLCs, defined as companies that are either directly controlled by the Malaysian Government or where their major ownership is the Malaysian Government, are the main influence in the Malaysian economy, and they contributed nearly 49 percent of the market capitalisation of Bursa Malaysia. Due to the launch of the Silver Book (the guidelines related to the role of the Board) which took place in 2006, the authors chose two years data, 1 year before and 1 year after, to examine CSR disclosure practice in relation to board composition (Board size and Independent directors). Consistent with expectations, there was an increase in CSR disclosure in the annual report. The empirical findings indicated that board size plays a positive monitoring effect on the extent of CSR disclosure.

Michelon and Parbonetti (2012) empirically tested the influence of board composition, leadership and structure on sustainability disclosures (including environmental information) based on stakeholder theory. They discussed that ‘good corporate governance and sustainability disclosure can be seen as complementary mechanisms of legitimacy that companies may use to dialogue with stakeholders’ (p.478). Sustainability disclosure was measured through 178 sustainability disclosure indicators based on the content analysis methodology. The sentence was chosen as the recording unit. Each sentence was matched with all the information indicators and awarded a score of 0 if it provided no information and 1 if it disclosed information related to the study. Independent directors, CEO duality, influential community members, and corporate social responsibility committees were employed as independent variables while size,

profitability, leverage, market risk, age, board of directors, reputation, listing status, country of origin and industry type were utilised as control variables to do multivariate analysis. There was a final sample of 114 companies in 2003, which involved 57 Dow Jones Sustainability Index (DJSI) companies and 57 match companies among US and European companies, engaged in this article. The findings related to environmental disclosure indicated that influential community members play a positive role on the extent of environmental information. However, they did not find any evidence to support a significant effect from independent directors, CEO duality, and corporate social responsibility committees on environmental disclosure.

Rao *et al.* (2012) provided a description of the advantages of environmental reporting, which would assist companies to obtain support from stakeholders and reduce firms' negative operations on the environment through assessing possible risks. They then indicated the importance of there being some control mechanisms in the firm to ensure that environmental disclosure is revealed properly. In this article, they examined the relationship between the amount of environmental disclosure and a number of corporate governance characteristics (independent directors, institutional investors, firm independence, board size, and female directors) based on 96 Australian companies listed on the Australian Stock Exchange (ASX) in 2008. The measurements of quantitative environmental disclosure were designed as total number of words referring to environmental issues in the annual report and the proportion those words to total words in the annual report. They found that the proportion of independent directors on a board has a positive regression coefficient which is significant at the 0.1 level to influence the amount of environmental reporting. In addition, the proportion of female directors on a board, institutional investors, and board size were found as significantly determinant factors at the 0.05 level which impact on environmental disclosure positively, although

the latter two were expected to have negative effects on the extent of environmental information. To sum up, this study proved that corporate governance mechanisms in Australian listed companies play an effective role on quantitative environmental disclosure in the annual reports. Furthermore, this article suggested that regulators (such as the ASX) and company strategists should consider corporate social responsibility (environmental disclosure) more and its relationship with board composition and board responsibility.

Wang *et al.* (2012) employed Taiwanese evidence to measure the effect of ownership structure on environmental disclosure (quantity and quality) based on an advanced panel regression model. They adopted content analysis approach to collect environmental information in the annual reports of 942 listed companies between 2006 and 2009. In their article, quantitative environmental disclosure was measured by the word count whereas qualitative environmental disclosure was measured by the scoring index. Corporate governance, the independent variable, was tested in three aspects: a) ‘the discrepancy between the voting rights and cash flow rights possessed by controlling shareholders’; b) ‘the pledge ration of director holdings’; c) ‘the holdings of institutional investors’ (p.137). As in many previous studies, firm size, liability ratio, and industry were engaged to control the regression. This paper found that enterprises paid attention to environmental disclosures increasingly during the period 2006-2009. Additionally, the empirical finding indicated that the monitoring role of some ownership structures on corporate disclosure of environmental information is proved, especially for firms in environmentally sensitive industries. The results agreed in the main with the above conclusions mentioned by Wang *et al.* (2012), ‘corporate governance is the most influential variable in explaining the level of disclosure of environmental information’ (p. 134), although no significant relationship was found between these three corporate

governance mechanisms and environmental disclosure in the annual reports of firms in non-sensitive industries.

Akrout and Othman (2013) researched the role played by ownership structure and some other corporate characteristics on corporate environmental disclosure in Arab Middle Eastern and North African (MENA) emerging markets. Differing from many previous studies on disclosure practice which looked at the annual reports, this article employed a sample of 153 websites of listed companies in December 2010 to collect environmental information. Based on the environmental indicators developed by the Global Reporting Initiative (the last version “G3.1” was issued in 2011), 33 scoring items were defined to measure dependent variables. Each item was scored one if revealed and zero if it was not. The aggregated scores were the final scores of environmental disclosure for each firm. In this article, business culture (whether firms tied with the Anglo-American countries), family ownership, government ownership, and Internet penetration were employed as independent variables to seek for association with disclosure practice. Additionally it controlled for firm size, leverage, and profitability. Under multivariate analysis, they found a negative relationship between family ownership and environmental disclosure. Consistent with prior studies, firm size and firm performance were found have significant influences on environmental information sharing on the listed companies’ websites.

Drawing on legitimacy theory framework, Khan *et al.* (2013) investigated the relationship between corporate governance and corporate social responsibility (CSR) disclosure in the annual reports using evidence from an Asian emerging economy. Specifically, the impact of managerial ownership, public ownership, foreign ownership, the proportion of independent directors on board, CEO duality, and audit committee on the extent of CSR disclosure was explored by regression analysis based on 116

manufacturing listed companies in Bangladesh during a 5-year period 2005-2009. In addition, they employed firm size, firm age, leverage, and return on assets as control variables to develop the regression. In the article, Khan *et al.* (2013) emphasised that ownership structure and board composition are significant determinants which influence CSR disclosure ‘by the choices, motives and values of those who are involved in formulating and taking decisions in the organisation’ (p.207). Based on empirical testing, they found a negative influence from managerial ownership on CSR disclosure. However, with regard to export-oriented industries, the effect of managerial ownership to CSR information became significant and positive. The findings also indicated that public ownership, foreign ownership, board independence, and audit committee play an active role in encouraging firms to improve CSR information in the annual report. An association between CEO duality and CSR disclosure was not found in this study. The authors summarised that corporate governance attributes, in general, have an important effect in ensuring organisational legitimacy through disclosure practice of CSR. This empirical research and its findings contributed knowledge and information to regulators and policy makers.

In summary, the relationship between corporate governance and CSR / environmental disclosures is well proved through evidence from developed markets. However, these studies have examined the impacts from the characteristics of corporate governance on voluntary environmental disclosure in developing countries to a much lesser extent.

Table 3.2

Empirical Studies on the Relationship between Corporate Governance and Quantity of Environmental Disclosure

Author(s) & Date	Dependent Variable	Independent Variable	Sample Size & Type, and Time of Observation	Environmental Disclosure Measure	Analysis & General Results
Naser <i>et al.</i> (2006)	Corporate social disclosure	Growth in assets, dividends paid, gearing ratio, individual investors, governmental ownership, institutional investors, and majority shareholders, Market capitalisation	21 firms listed on the Doha Stock Exchange for the year 1999/2000	<u><i>Content analysis approach</i></u>	<u><i>Multiple regression analyses</i></u> RESULT: variations in corporate social disclosure are found to be impacted by the business risk (growth in assets and gearing ratio) and firm size. They did not find any evidence to support the association between corporate social disclosure and ownership variables.
Mohd Ghazali (2007)	Corporate social responsibility (CSR) disclosure	Ownership concentration, director ownership, and government ownership, company size, profitability, industry	87 non-financial Malaysian firms in 2001	<u><i>The scoring index</i></u>	<u><i>Multiple regression analyses</i></u> RESULT: government ownership and firm size play an effective role on the quality of CSR disclosure whereas the director ownership with a higher proportion of shares relates with lower CSR information.
Ku Ismail and Ibrahim (2008)	Social and environmental disclosure (SED) quantity	Government ownership, firm size, and industry type	60 Jordanian companies in the manufacturing and service sectors for the year 2006	<u><i>Content analysis approach</i></u>	<u><i>OLS regression analyses</i></u> RESULT: firm size played a positive role in encouraging firms to reveal vast SED. Firms with low government ownership is more effective in influencing the amount of SED. There was no evidence found to support a significant relationship between SED and industry type.

Rizk <i>et al.</i> (2008)	Corporate social and environmental reporting	Industry membership and ownership	60 Egyptian companies in the industrial sector for the financial year 2002	<u><i>The scoring index</i></u>	<u><i>ANOVA tests</i></u> RESULT: the relationship between ownership structure and each type of disclosure (included environmentally-related disclosures) are significant.
Kolk and Pinkse (2010)	Corporate governance: 1) corporate governance section in report and 2) corporate governance linked to environmental /social issues	Corporate social responsibility (CSR) disclosure, country of origin, environmental sector, firm performance, and firm size	Fortune Global 250 companies during a period between September 2004 and January 2005	<u><i>The scoring index</i></u> : binary indicators	<u><i>Logistic regression analyses</i></u> RESULT: a significantly positive relationship between CSR disclosure and corporate governance is supported, especially for two categories of CSR activities: employee conditions and business ethics.
Cong and Freedman (2011)	Environmental performance and disclosure	Corporate governance, environmental performance	50 firms which are top volume metric releasers of toxins from 1,897 firms with Gov-Scores during 2003-2005 in the United States	<u><i>The scoring index</i></u>	<u><i>OLS regression</i></u> RESULT: there is no evidence to support the relationship between good corporate governance and good pollution performance; good corporate governance improves environmental disclosure in the early years after SOX.
Rouf (2011)	Corporate social responsibility (CSR) disclosure	Independent directors, firm size, Board leadership structure, profitability and audit committee	176 listed companies in Bangladesh in 2007	<u><i>Content analysis approach</i></u>	<u><i>Ordinary least squares (OLS) regression model</i></u> RESULT: the monitoring role of independent directors, board leadership structure, and board audit committee positively relate with the level of CSR disclosure. They did not find evidence to support the relationship between firm size and CSR disclosure.

Esa and Mohd Ghazali (2012)	Corporate social responsibility (CSR) disclosure	Board size, Independent directors, Company size, Profitability, Leverage	27 Malaysian Government-linked companies in 2005 and 2007	<u><i>Content analysis approach</i></u>	<u><i>Multiple regression analysis</i></u> RESULT: board size plays a positive monitoring effect on the extent of CSR disclosure.
Michelon and Parbonetti (2012)	Sustainability disclosure (including environmental information)	Independent directors, CEO duality, influential community members, corporate social responsibility committee, Size, profitability, leverage, market risk, age, board of directors, reputation, listing status, country of origin and industry type	114 companies in 2003, which involved 57 Dow Jones Sustainability Index (DJSI) companies and 57 match companies among US and European companies	<u><i>Content analysis approach</i></u> integrating the Global Reporting Initiative	<u><i>Multivariate analysis</i></u> RESULT: environmental disclosure indicated that influential community members played a positive role on the extent of environmental information. However, they did not find any evidence to support a significant effect from independent directors, CEO duality, and corporate social responsibility committees on environmental disclosure.
Rao <i>et al.</i> (2012)	Environmental disclosure	Independent directors, institutional investors, firm independence, board size, and female directors, firm size, profitability, and industry	96 Australian companies listed on the Australian Stock Exchange (ASX) in 2008	<u><i>Content analysis approach</i></u>	<u><i>Linear regression OLS analysis</i></u> RESULT: the proportion of independent directors on a board positively influences the amount of environmental reporting. In addition, the proportion of female directors on a board, institutional investors, and board size were found as significantly determinant factors which impact on environmental disclosure positively.

Wang <i>et al.</i> (2012)	Environmental Disclosure (quantity and quality)	The discrepancy between the voting rights and cash flow rights possessed by controlling shareholders; the pledge ratio of director holdings; the holdings of institutional investors, Firm size, liability ratio, and industry	942 Taiwanese listed companies between 2006 and 2009	<u>Content analysis approach</u>	<u>Advanced panel regression model</u> RESULT: increasingly attention to environmental disclosures is paid by enterprises during the sample period. Additionally the empirical finding indicated that the monitoring role of some ownership structures on corporate disclosure of environmental information is proved, especially for firms in environmentally sensitive industries.
Akrout and Othman (2013)	Corporate environmental disclosure	Business culture, family ownership, government ownership, and Internet penetration, firm size, leverage, and profitability	153 web sites of listed companies in December 2010	<u>The scoring index</u>	<u>Multivariate analyses</u> RESULT: a negative relationship between family ownership and environmental disclosure. Consistent with prior studies, a significant influence was found from firm size and performance on environmental information of listed companies' websites.
Khan <i>et al.</i> (2013)	Corporate social responsibility	Managerial ownership, public ownership, foreign ownership, proportion of independent directors on board, CEO duality, and audit committee, Firm size, firm age, leverage, and return on assets	116 manufacturing listed companies in Bangladesh during a 5-year period 2005-2009	<u>The scoring index</u> with a checklist containing 20 items. It is awarded 1 if an item included in the checklist is disclosed and 0 if it is not disclosed.	<u>Regression analyses</u> RESULT: There is a negative influence from managerial ownership on CSR disclosure. However, regarding export-oriented industries, the effect of managerial ownership to CSR information became significant and positive. Public ownership, foreign ownership, board independence, and audit committee positively impact on quality of CSR information.

3.2.3 The gap in previous research

Firstly, the mixed results of previous empirical research mainly occur in the relationship between voluntary disclosure and two mechanisms of corporate governance: ownership structure and board composition. These problems are produced because of two broad reasons: data selection and method application. Beck *et al.* (2010) developed a new method “consolidated narrative interrogation” (CONI) to examine environmental reporting (social and environmental disclosures). This analysis method integrates mechanistic content analysis approach (disclosure volumes and/or frequencies) (e.g., Ness and Mirza, 1991; Unerman, 2000; Wilmshurst and Frost, 2000; Campbell, 2003; Hasseldine *et al.*, 2005) and interpretative approach (meaning and understanding of disclosure) (e.g., Buhr and Reiter, 2006; Coupland, 2006) to reduce the errors of the research results. Beck *et al.* (2010) pointed out that there are some limitations if only mechanistic content analysis instrument is employed, although it is commonly applied in the prior research. The mechanistic content analysis approach is regarded as form oriented which involves ‘routine counting of words or concrete references’, but it overlooks meaning orientation which ‘focuses on the underlying themes in the texts under investigation’ (Smith and Taffler, 2000, p.627). The interpretative approach attempts ‘to capture meaning by disaggregating narrative into its constituent parts and then describing the contents of each disaggregated component’ (Beck *et al.*, 2010, p.208). It aims to seek greater understanding of what communication the firms need to express by disclosing information in the annual report. To some extent, interpretative analysis effectively offsets the limitation of mechanistic studies in the research of environmental disclosure. Therefore, this study engages both the mechanistic content analysis and the interpretative approach to measure environmental disclosure in order to minimise the errors.

Secondly, Xiao and Yuan (2007) investigated the impact of ownership structure and board composition on voluntary disclosure based on 559 Chinese listed companies in 2002, and then suggested that a future researcher should undertake a longitudinal study in this area. This research employs data from 1,230 Chinese listed companies during a 3-year period between 2009 and 2011.

Thirdly, several researchers have investigated the relationship between the extent of voluntary disclosure and corporate governance in China (e.g., Qiao, 2003; Xiao and Yuan, 2007; Li and Qi, 2008 ; Cheung *et al.*, 2010; Fu, 2010). Most of them examined corporate disclosure or financial disclosure. Research is lacking on environmental disclosure that relates to the mechanisms of corporate governance in China. Although Liu and Anbumozhi (2009) tested the effect of the pressure from blockholder ownership on the extent of VED, they only touched on a few of the corporate governance mechanisms. It overlooked examining the impact from other ownership structures and board component on the extent of VED.

In light of the above, this research mainly examines the role of ownership structure and board composition on the extent and quality of environmental disclosure in annual reports using evidence from the Chinese market, and applies the mechanistic content analysis approach together with the interpretative approach to collect and measure dependent variables. This research would enhance awareness of determinant factors (different mechanisms of corporate governance) on environmental disclosure. Furthermore, it would contribute to the existing literature on accounting and finance with relation to environmental disclosure of Chinese listed companies in English.

3.3 THEORY AND RESEARCH HYPOTHESES

3.3.1 Theory Framework

Reviewing related previous literature reveals that four different theory frameworks have been applied frequently to explain and analyse each of corporate social responsibility disclosure practice (including environmental disclosure) and corporate governance mechanisms and the relationship between them. They are legitimacy theory, stakeholder theory, agency theory, and stakeholder-agency theory. Stakeholder theory and legitimacy theory are two prominent theories, which have dominated the explanations of social and environmental disclosure practice (AbuRaya, 2012). Agency theory and stakeholder theory are the leading theories in corporate governance research. In addition, stakeholder-agency theory, an important contribution to literature, supplies the explanation of the explicit and implicit contracts between a corporation's stakeholders and environmental disclosure practice.

3.3.1.1 Legitimacy Theory

'Legitimacy is a generalised perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definition' (Suchman, 1995, p574). In firms, Mathews (1993, p31) argued that management seeks congruence between the outside perceptions of its own social values, and what is deemed by society to be appropriate social conduct. This congruence is viewed as organisation legitimacy. Legitimacy theory is defined as 'a condition or a status which exists when an entity's value system is congruent with the value system of the larger social system of which the entity is a part. When a disparity, actual or potential, exists between the two value systems, there is a threat to the entity's

legitimacy' (Lindblom, 1994, p.2). Chen and Roberts (2010) asserted that legitimacy theory focuses on seeking the accordance between the value system of the firm and the value system of society, and attempting to make the objective of firms be to meet social expectations. 'Legitimacy theory was integrated into the accounting literature as a means of explaining what, why, when, and how certain items are addressed by corporate management in their communication with outside audiences' (Magness, 2006). It 'rests on the concept that organisations have contracts with society and fulfilling these contracts legitimates the organisations and their actions' (Cormier and Gordon, 2001). As stated by Mathews (1993, p31), 'the social contract would exist between corporations (usually limited companies) and individual members of society. Society (as a collection of individuals) provides corporations with their legal standing and attributes and the authority to own and use natural resources and to hire employees. Organisations depend on community resources and output both goods and services and waste products to the general environment. The organisation has no inherent rights to these benefits, and in order to allow their existence, society would expect the benefits to exceed the costs to society'. It 'implies that firms will take measures to ensure their activities and performances are acceptable to the community' (Wilmshurst and Frost, 2000).

Some authors gave positive views about the impact of legitimacy (theory) on the relationship between the corporation and society. 'Because legitimacy is conferred and controlled by those outside the organisation, it is necessary for the corporation to communicate its activities to the public' (Buhr, 1998, p164). Dowling and Pfeffer (1975) mentioned that legitimacy theory assumed that the operation of the firm had to be congruent with society for its survival. Moreover, 'Legitimacy theory suggests that companies should aim to achieve congruence between their financial objectives and the accepted social norms. This entails having to incorporate social and environmental issues

in their decision-making process' (Elijido-Ten, 2004).

Dowling and Pfeffer (1975, pp126-7) pointed out that firms may become legitimate or maintain their legitimacy by three certain actions: 'First, the organisation can adapt its output, goals and methods of operation to conform to prevailing definitions of legitimacy. Second, the organisation can attempt, through communication, to alter the definition of social legitimacy so that it conforms to the organisation's present practices, output, and values. Finally, the organisation can attempt, again through communication, to become identified with symbols, values, or institutions which have a strong base of social legitimacy'. These actions relate to the four strategies of communication of Lindblom (1994), which are (1) the firm attempts to inform and educate the relevant stakeholder about actual changes in its actions (this relates to the first certain action of Dowling and Pfeffer); (2) and (4) it seeks to alter society's expectations (this relates the second action of Dowling Pfeffer), the difference between these two strategies is that the second one is without any changes in the firm's behaviour; (3) the firm attempts to focus on some positive activities and deflect society's attention away the issues of concern (this relates to the third action of Dowling and Pfeffer).

O'Donovan (2002) mentioned that repairing legitimacy is one of the main factors which influences disclosure decision; because Neu *et al.* (1998) indicated that corporate social responsibility disclosure would help to mitigate issues of organisational legitimacy. Neu *et al.* (1998) also stated that voluntary environmental disclosure (usually in the annual report) would maintain firm-specific and system-wide legitimacy. To sum up, it implies a close relationship between organisation legitimacy and disclosure. In the social and environmental accounting area, legitimacy theory is recognised as an explanatory theory of environmental disclosure. Brown and Deegan (1998) pointed out that legitimacy

theory has been the basis for several environmental disclosure studies. Patten (1992) tested legitimacy theory in the study of “Intra-industry environmental disclosures in response to the Alaskan oil spill” and concluded that ‘it appears that at least for environmental disclosure, threats to a firm’s legitimacy do entice the firms to include more social responsibility information in its annual reports’ (Patten, 1992, p475). Under the legitimacy perspective, a firm may choose to disclose certain social information to justify its existence within society. Compared with private ownership, state/government ownership (i.e. public) would be more affected by legitimacy theory. As indicated by Dowling and Pfeffer (1975, p133), ‘(w)hile legitimacy is a constraint on all organisations, it is likely that it affects some organisations more than others. This is because ... some organisations depend relatively more heavily on social and political support’. Thus, legitimacy theory is vital in some countries, which have a high proportion of state/government owned enterprises such as China.

3.3.1.2 Stakeholder Theory

The principle of a firm is to maximise the wealth of shareholders (one group of stakeholders). Stakeholder theory rejects that the principle is the only aim of the firm (Wijnberg, 2000). The interests of other groups of stakeholders, such as employees, customers, suppliers, creditors, competitors, public interest groups, governmental bodies, and communities, also need to be given as much value as possible by executives. In addition, corporate management needs to evaluate the importance of meeting stakeholder demands and balancing the conflicts of the demands of different stakeholders, because the stakeholders effectively impact the sustainable development of the firm. As identified by Elijido-Ten (2004), ‘the basic proposition of the stakeholder theory is that the firm’s

success is dependent upon the successful management of all the relationships that a firm has with its stakeholders’.

According to Deegan and Unerman (2006) and Gray *et al.* (1996), there are two variants which are subdivided in stakeholder theory. The first is the accountability variant, which is similar to the ethical or normative perspective of this theory (Orij, 2010, p.2). Gray *et al.* (1996, p.38) identifies this variant as ‘the duty to provide and account (by no means necessarily a financial account) or reckoning of those actions for which one is held responsible’. Stakeholder theory assumes that the firm has the ability to affect both its particular stakeholders and general society (Liu and Anbumozhi, 2009) and hence it has a responsibility to explain its actions through disclosure to stakeholders and to society in terms of ethics (fairness). As Deegan (2000) argued, all stakeholders have a right to be provided with information about how the firm is impacting on them, such as pollution, even though they do not use this information and/or the impact does not directly influence these stakeholders (Salama *et al.*, 2006). The second is the organisational and managerial variant. It argues that the firm would satisfy information demands of stakeholders who are powerful and that is crucial for managers’ positions (Deegan, 2000).

The term “stakeholder theory” was first used by Ansoff (1965) to define the objectives of the business. Freeman (1984) introduced the stakeholder theory in his book of “Strategic Management: A Stakeholder Approach” and identified the significance of stakeholders in the business. The author defines a stakeholder as ‘any group or individual who can affect or is affected by the achievement of the firm’s objective’. The applications of stakeholder theory have occurred in both ‘analytical and empirical analyses of the firm and the environment in which the firm operates’ (Roberts, 1992, p.598). Wilmshurst and Frost (2000) suggested that corporate management should be responsive to the (environmental)

information demands of stakeholders. Liu and Anbumozhi (2009) asserted that environmental information disclosure could be seen as a kind of dialogue between the firm and its stakeholders. As outlined by Gilkinson (1994, p.57), it ‘can enhance relations with a variety of stakeholders, including shareholders, lenders, insurers, underwriters, suppliers, customers, environmental activists and employees’. In addition, ‘Greater transparency and better environmental disclosure will keep stakeholders better informed about the way a company is being environmentally responsible and this will lead to stakeholders’ satisfaction.’ (Salama *et al.*, 2006, p.252).

3.3.1.3 Agency Theory

Agency theory identifies the agency relationship between one party, the principal, and another party, the agent (Mallin, 2004). Jensen and Meckling (1976) defined this relationship as ‘a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent’ (p.308). In a company, the shareholders, who own the company, are the principal; the directors and managers are the agents who control the business’s running. Generally, managers should make decisions that are consistent with the aim of maximising the wealth of shareholders, but sometimes managers do not act in the best interests of the shareholders (Yu, 2007), because they believe that maximising their own wealth is more important than maximising the wealth of shareholders.

Managers dominate the company’s running and get more information from the company’s day-to-day performance, management accounting data, and financial reports

than the shareholders who just get information through the annual report and general meeting. Thus, in the agency relationship, asymmetry of information is a significant problem between shareholders and managers. As the agent has an information advantage, shareholders need to increase their monitoring of the actions of management to deal this problem (Jensen and Meckling, 1976; Barako *et al.*, 2006). It means that some agency costs arise from the misalignment of the interests between these two parties (Jensen and Meckling, 1976). They defined the agency costs as below: 1) the monitoring costs by the principal to limit the agent's aberrant activities; 2) the bonding costs to guarantee that the agent does not undertake certain actions which harm the interest of the principal; and 3) the residual loss due to divergence in the agent's decisions. When the agency costs are too high, it could scare away the existing shareholders and potential investors. At the same time, high monitoring could threaten the position of the agent. Agency theory suggests that voluntary disclosure reduces the conflict of interests between shareholders and managers (Sun *et al.*, 2010). In addition, providing voluntary disclosure is a useful way to reduce agency costs (Hossain *et al.*, 1994). Thus, directors and managers may voluntarily disclose more information to mitigate the asymmetry of information and the agency problem in order to protect their position and increase investment. Wang and Coffey (1992) and Graves and Waddock (1994) mentioned that with regard to agents (managers) and principals (stockholders) under an agency theory framework, the former are more likely to emphasise environmental concerns, because they do not need to spend their own money in pursuing non-profit goals for their positions. Tricker (2009) noted that most scholars use agency theory to test the hypothesis about corporate governance because of a causal link between this theoretical approach and governance systems.

3.3.1.4 Stakeholder-agency Theory

Agency theory identifies the agency relationship between one party, the principal, and another party, the agent (Mallin, 2004). Jensen and Meckling (1976, p.308) defined this relationship as ‘a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent’. Tricker (2009) noted that most scholars use agency theory to test the hypothesis about corporate governance because of a causal link between this theoretical approach and governance systems. Considering environmental information disclosure is seen as a kind of dialogue between the firm and its stakeholders (Liu and Anbumozhi, 2009; Salama *et al.*, 2012), stakeholder-agency theory (Hill and Jones, 1992) is regarded as a proper framework to examine the effect of corporate governance mechanisms on the extent of environmental disclosure. This theory integrates the stakeholder concept into agency theory to define explicit and implicit contract(s) between a corporation’s stakeholders, who can affect and/or are affected by the firm’s success and failure (Freeman, 1984; Hill and Jones, 1992; Donaldson and Preston, 1995; Salama *et al.*, 2012). Gray *et al.* (1996) define a stakeholder as ‘any human agency that can be influenced by, or can itself influence, the activities of the organisation in question’ (p.33). Stakeholders include shareholders, employees, customers, suppliers, creditors, competitors, public interest groups, governmental bodies, and communities. Managers are recognised as unique stakeholders who control the business’s running as the agents and are contracted to relate to all other stakeholders. Based on KPMG (1997), Kolk (1999) summarised stakeholders’ environmental information needs as follows: suppliers and customers demand environmental messages about ‘selling environmentally sound products, willingness to contribute to consumer safety, disclosure of environmental problem[s]’; financiers desire environmental

information related to ‘risk management, cost savings through improved environmental management’; employees need to know ‘environmental policy, targets and results’; communities require ‘pollution limitation, responsible waste management’; authorities want information on ‘environmentally responsible activities, overview of costs and benefits of environmental actions’; and environmental organisations would like environmental disclosure concerning ‘improvement of environmental performance, interest in cooperation to improve matters’ (p.227). Corporate management needs to evaluate the importance of meeting stakeholder demands and balancing the conflicts of different stakeholders’ demands, because the stakeholders effectively impact on the sustainable development of the firm.

Applications of stakeholder theory have occurred in both ‘analytical and empirical analyses of the firm and the environment in which the firm operates’ (Roberts, 1992, p.598). Environmental disclosure ‘can enhance relations with a variety of stakeholders’ (Gilkinson, 1994, p.57). Corporate management should be responsible for the (environmental) information demands of stakeholders (Wilmshurst and Frost, 2000). ‘Greater transparency and better environmental disclosure will keep stakeholders better informed about the way a company is being environmentally responsible and this will lead to stakeholders’ satisfaction.’ (Salama *et al.*, 2006, p.252). According to Deegan and Unerman (2006) and Gray *et al.* (1996), there are two main perspectives which have evolved from stakeholder theory (Salama *et al.*, 2006). The first is the accountability perspective, which is similar to the ethical or normative perspective of this theory (Orij, 2010, p.2). Gray *et al.* (1996, p.38) identifies this perspective as ‘the duty to provide an account (by no means necessarily a financial account) or reckoning of those actions for which one is held responsible’. Stakeholder theory assumes that the firm has the ability to affect both its particular stakeholders and general society (Liu and Anbumozhi, 2009)

and hence it has the ethical responsibility to explain its actions through disclosure to stakeholders and society (fairness). Deegan (2000) argued that all stakeholders have a right to be provided with information about how the firm is impacting on them, such as pollution, even if they do not use this information and/or the impact does not directly influence these stakeholders. The second is the organisational and managerial perspective. It argues that the firm would satisfy the information demands of stakeholders who are powerful and where it is important for the managers' positions (Deegan, 2000).

3.3.1.5 Discussion, Analysis, and Estimation

The relevant theories of voluntary environmental disclosure are stakeholder theory (Ullmann, 1985; Roberts, 1992; Salama *et al.*, 2006) and legitimacy theory (Deegan and Rankin, 1996; Wilmshurst and Frost, 2000; Cormier and Gordon, 2001; Magness, 2006). Gray *et al.* (1996) indicated that these theories focus on the role of environmental disclosure in the relationship between firms, stakeholders and the environment. To some extent, stakeholder theory and legitimacy theory provide alternative explanations about why a firm needs to disclose environmental information. However, there are many similarities between stakeholder theory and legitimacy theory. That is, Gray *et al.* (1995a, p52) stated that 'it seems to us that the essential problem in the literature arises from treating each as competing theories of reporting behaviour, when stakeholder theory and legitimacy theory are better seen as two overlapping perspectives of the issue which are set within a framework of assumptions about political economy'. Although many studies adopted legitimacy theory as their framework in social and environmental disclosure literature and supported its explanatory power (e.g., Deegan and Gordon, 1996; Deegan and Rankin, 1996; Patten, 1992), some scholars failed to find evidence that support the

theory's explanatory ability in research on CSR disclosure practice (AbuRaya, 2012). As Wilmshurst and Frost (2000) asserted, legitimacy theory provides only a limited explanation on environmental disclosure decision. Moreover, Guthrie and Parker (1989) indicated that 'a relationship between legitimacy theory and disclosure was only marginally supported for environmental issues, unconfirmed for energy and community issues and subject to contradictory evidence for human resources issues' (p.351) and concluded that legitimacy theory is inadequate to fully evaluate CSR disclosure practice. In contrast with legitimacy theory focused on the whole society, stakeholder theory is directed rather towards particular groups who possess more power in affecting the firm's future (Deegan, 2002). AbuRaya (2012) indicated that 'the advantage of stakeholder theory is providing a means of dealing with multiple stakeholders with multiple conflicting interests' (p.141). Stakeholder theory is deemed as a useful framework to explain and analyse social and environmental disclosure practice (Snider *et al.*, 2003). As alluded to above, agency theory has been generally employed to test the hypothesis about corporate governance because of a causal link between this theoretical approach and governance systems. It mainly concentrates on the primary goal of the firm (maximising profit of shareholders) and overlooks the other organisational objectives (such as, corporate social responsibility). For this reason, agency theory is regarded as a framework that provides a limited explanation on the association with society and other organisations. In study on the relationship between corporate governance and environmental disclosure, stakeholder-agency theory, which integrates the stakeholder concept into agency theory to define explicit and implicit contract(s) between a corporation's stakeholders, is deemed as an appropriate framework to explain and analyse the decisions on environmental disclosure which are affected by different corporate governance mechanisms. Based on stakeholder-agency theory, the main

explanation and analysis centre on the explicit and implicit contract(s) between a corporation's stakeholders (e.g., shareholders, employees, customers, suppliers, creditors, competitors, public interest groups, governmental bodies, and communities) and unique stakeholders (e.g., managers). Under increasing environmental concern from the public, the latter responds to the rights and needs of the corporation's stakeholders and manages their relationship through revealing environmental information in the annual report. Therefore, in this empirical chapter, stakeholder-agency theory is adopted as the framework in which to explore the monitoring roles played by ownership structure and board composition on the quantity of environmental disclosure in Chinese listed companies.

3.3.2 Research Hypotheses

3.3.2.1 Ownership structure

Ownership is quite dispersed among a large number of individuals and institutional investors in the UK and the US (Shleifer and Vishny, 1997; Chew and Gillan, 2005). In contrast with the UK and the US, the unique characteristic of ownership structure in Chinese listed companies is 'a high level of ownership concentration' (Ma *et al.*, 2010). Shareholdings of Chinese listed companies are heavily concentrated in the hand of the state. In other words, in China, the state is the controlling shareholder in the listed companies. Another difference between the US and China is the duties and power of the shareholders. In the US, American Corporate Law gives a larger power to the board of directors, but less authority to the meeting of shareholders (Wei, 2003). In China, shareholders are required to vote on major business decisions such as merger or sale.

They also need to make other business decisions such as issuing bonds, and increasing or decreasing registered capital (Liu, 2009). The appointment of managers and directors is influenced by the government (largest shareholder) in Chinese listed companies. Moreover, a lot of former government officials are appointed in listed companies as managers by the government (Chen et al., 2010). Therefore, the large shareholder (state ownership) has enough power to control managers and directors.

Under the organisational and managerial perspective evolved from stakeholder theory and the unique characteristic of ownership in Chinese listed companies, management would satisfy the information demands of state ownership (the powerful stakeholder) because state ownership has sufficient power to decide on managers' positions. The main aim of state ownership is to fulfil the social objectives of the state (Khongmalai *et al.*, 2010) and to give consideration to the demands of other stakeholders, which includes employees, customers, local communities, and the general public. These stakeholders demand more VED due to increasing of public concern about social and environmental issues. Therefore, to safeguard their position, managers need to supply environmental information to satisfy influential stakeholders, both the state ownership and the other stakeholders who are cared for by the state. Moreover, green energy and green industries are a developing trend for the future. Good environmental practice could bring business opportunities and market benefits to the companies through having a strong reputation for environmental care and through improving their public relations (KPMG, 1997). The state ownership would like more VED to build the reputation of Chinese business and to attract more domestic and foreign investors in order to further develop the Chinese economy. It is hypothesised that:

Hypothesis 1(a) State ownership and quantity of voluntary environmental disclosure are positively related.

Blockholder ownership is the substantial shareholders who hold 5 per cent or more ordinary shares. In China, the shareholdings are heavily concentrated in the hand of the state. On average, the state-owned shares equated to more than 35 per cent between 2001 and 2007. In addition, the five largest shareholders own more than half of the total shares in 2007. In other words, blockholder ownership is one of the main forms in China's ownership structure. Shleifer and Vishny (1997) mentioned that substantial shareholders are expected to possess both an incentive and a greater power to monitor management because of their wealth being tied to the financial performance of the firm. Fama and Jensen (1983) argued that diffusion in ownership enhances the potential conflicts between the agent and the principal. When firms involve substantial shareholders in monitoring, the agency problem can be mitigated. However, it would incur more agency costs to monitor the actions of management. Xiao and Yuan (2007) predict that managers will enhance voluntary disclosure in annual reports to reduce agency costs entailed in monitoring activities. Empirical evidence on the association between blockholder ownership and environmental disclosure is limited. Mixed results were found in developing countries (Samaha *et al.*, 2012). In emerging markets, Haniffa and Cooke (2002) found that a positive role was played by blockholder ownership on voluntary disclosure based on the Malaysian context, while Hossain *et al.* (1994) found a negative impact. Following the argument that blockholder ownerships hold sufficient incentive and power to monitor management; and in consequence, managers would like to reveal more information to reduce such monitoring activities, it is hypothesised that:

Hypothesis 1(b) Blockholder ownership and quantity of voluntary environmental disclosure are positively related.

Managerial ownership means that the CEO, senior managers, and executive directors hold a significant proportion of ordinary shares. In this situation, these managers are not only regarded as agent-stakeholders, but they are also recognised as principal-stakeholders. Agency problems arise when there is a separation of the principal and the agent. When managerial ownership as principal-stakeholder is high, the agency problem may be reduced, because the managerial owners' interest aligns with the other principal-stakeholders. Under low managerial ownership, outside principal-stakeholders need to increase the agency cost to deal with the problem by monitoring the actions of the agent (Jensen and Meckling, 1976). In this situation, managers choose to increase voluntary disclosure in order to decrease monitoring and the agency cost. In addition, voluntary environmental disclosure helps to enhance the firm's reputation. It is a good way to improve the managers' performance to satisfy the shareholders and other stakeholders' need. It is hypothesised that:

Hypothesis 1(c) Managerial ownership and quantity of voluntary environmental disclosure are negatively related.

Legal person ownership, which is the second largest ownership identity in China's public listed companies, was created by China's policy makers to assist the transition of China's companies from state-owned to private-owned (Delios and Wu, 2005, p.151). Xu and Wang (1999) pointed out that legal-person ownership, like the institutional investors, has a great initiative and the professional expertise to monitor and supervise management. Compared with state shareholders, legal-person shareholders are more economically orientated and geared towards profit maximisation (Tan and Wang, 2004). As mentioned

by Qu *et al* (2013), legal-person shareholders, who hold industry expertise and management skills, urge companies to maximise profits in order to add to the shareholders' wealth (p.269). Currently, sustainable (green) development is the main trend in economic development. Companies could improve their image and attract more investment through environmental disclosure practice. Legal person shareholders should have the initiative to drive managers to engage in revealing environmental information in order to achieve shareholder wealth maximisation. On the other hand, in Chinese listed companies, generally, legal person ownership is composed of institutional promoters and other legal entities, most of which are state-owned or controlled through state-owned enterprises or other state-owned institutions (Yuan *et al.*, 2009, p.565). To some extent, the aim and the power legal person ownership holds is therefore influenced by state ownership or/and the State. Based on the organisational and managerial perspective and social objective of the State, a high level of legal person ownership is expected to relate to a high level of environmental disclosure quantity, because legal person ownership possesses a large power enough to potentially decide managers' positions and therefore managers would like to satisfy the legal person ownership's requirements. It is hypothesised that:

Hypothesis 1(d) Legal-person ownership and quantity of voluntary environmental disclosure are positively related.

Foreign share ownership means a higher level of information asymmetry due to different cultures, languages, and attitudes of risk (Broberg *et al.*, 2010). Managers may disclose more information to mitigate potential conflicts and misunderstandings between the kind of foreign stakeholders and themselves. In addition, some Chinese companies are not just listed on the Shanghai and Shenzhen Stock Exchanges; they are also listed on the Hong

Kong and/or the US stock exchanges. These companies are required to follow the accounting standards in those countries where they are listed (Xiao and Yuan, 2007). Thus, these companies may reveal more information to satisfy existing stakeholders and to gain new foreign investors. It is hypothesised that:

Hypothesis 1(e) Foreign shares ownership and quantity of voluntary environmental disclosure are positively related.

3.3.2.2 Board composition

Where the UK and the US listed companies have a single board (the Anglo-American model), and Germany has two-tier supervisory and management boards (the continental European model) (Charkham, 1994), the listed companies in China have a combined Anglo-American model and German board style (continental European model) which forms a mixed model containing Chinese characteristics which has dual boards: the board of directors and the supervisory board. Compared with those in the UK and the US, the board of directors in Chinese listed companies has less power in its role. In China, concentrated shareholdings are owned by the state in most companies. As a result, the board of directors is in the hands of the state. The development of independent directors in Chinese listed companies is relatively new. In 2001, the CSRC produced “Guidelines for Introducing Independent Directors to the Board of Directors of Listed Companies”. Later, Corporate Law (2006 version) mandatorily required a board of directors to have independent directors. Due to the development of corporate governance in China having borrowed many rules and experiences from the UK and the US, the Cadbury Report (1992) is one important reference to develop the roles of independent directors in China. It stated that IND ‘should be independent of management and free from any business or other relationship which could materially interfere with the exercise of their independent

judgement'. The non-official position of IND in the firm and their lack of material interest should determine that they can better monitor management and encourage board members to reveal information in order to satisfy the demands of stakeholders (Donnelly and Mulcahy, 2008; Rao *et al.*, 2012). As mentioned by Fama and Jensen (1983), a high level of IND could enhance board effectiveness in monitoring managerial opportunism and increase voluntary disclosure. Consequently, a higher proportion of IND should be more inclined to encourage the firms to increase disclosure for stakeholders. It is hypothesised that:

Hypothesis 2(a) The proportion of independent directors and quantity of voluntary environmental disclosure are positively related.

The board of supervisors in Chinese listed companies is elected by shareholders. Liu (2009) found that the duties of the Chinese supervisory board are similar to the functions of outside counsel in US corporate governance. Numerous scholars have deemed that the supervisory board in Chinese companies merely looks like an ineffective ornament (e.g., Dahya *et al.*, 2003; Mallin, 2006; Wei and Geng, 2008; Tricker, 2009). Dahya *et al.* (2003) pointed out five essential items lacking in the Chinese supervisory board: legal power, independence, technical expertise, information, and incentives. Wei and Geng (2008) satirised that they are merely holding a rubber stamp without virtually any rights. The Chinese supervisory board does not have the right to appoint or dismiss executive board directors (Mallin, 2006). However, Ding *et al.* (2010) mentioned that the rights of the supervisory board have been improved a lot due to the amendment of Corporation Law in 2005. The supervisory board currently has the power to propose dismissal of directors and top management, and sue managers who commit frauds. They can also raise questions and make suggestions in board meetings, and curb executive

compensation. The expanded right of the supervisory board effectively influences the monitoring of managerial opportunism. Compared to the board of supervisors less aligned with management, they are more inclined to the firms. The stakeholder-agency theory contends that firms tend to disclose more information to reduce information asymmetry (Hill and Jones, 1992, Huang and Kung, 2010). In addition, under the accountability perspective evolved from stakeholder theory, the firm has the ethical (fair) responsibility to supply disclosures explaining its actions to stakeholders and society. The companies can be expected to reveal more voluntary environmental information with a larger size of supervisory board. It is hypothesised that:

Hypothesis 2(b) The number of members in the supervisory board and quantity of voluntary environmental disclosure are positively related.

3.3.2.3 Control variables

Previous research provides several control variables which relate to voluntary disclosure. Firm size (FSIZE), which is measured by total revenue, total book value of assets, or total market value of the firm, is one recognised factor affecting voluntary disclosure (e.g., Meek *et al.*, 1995; Broberg *et al.*, 2010). Foster (1986, p.44) noted that ‘the variable most consistently reported as significant in studies examining differences across firms in their disclosure policy is firm size’. Large FSIZE, rather than small FSIZE, is expected to disclose more information for enhancing their reputation and increasing capital (Chow and Wong-Boren, 1987).

Leverage (DEBT) is measured by total liabilities divided by total asset. It has been hypothesised to be significantly related to disclosure level (e.g., Malone *et al.*, 1993;

Hossain *et al.*, 1994; Ahmed and Courtis, 1999; Ismail and Chandler, 2005; Broberg *et al.*, 2010). A firm with a high level of debt may incur more monitoring from shareholders and less confidence from the potential investors. That is: managers may utilise more disclosure to mitigate these problems (Ahmed and Courtis, 1999). In other words, the high-debt firm has more voluntary disclosure.

For profitability (ROE), Meek *et al.* (1995) mentioned that the well-run profitable firms have an incentive to reveal information to distinguish themselves from the less profitable firms. Profitability was found to markedly affect the disclosure level in annual reports in the study of Singhvi and Desai (1971).

Age of firm (AGE) is employed as an important variable in many studies of disclosure practices (e.g. Elijido-Ten, 2004; Alsaeed, 2006; Hossain *et al.*, 2006; Rettab *et al.*, 2009). However, there are mixed results in the association between the age of the firm and the level of disclosure. Alsaeed (2006) tested the effect of the variable AGE on the level of disclosure and found that there is no significant relationship between them. Delaney and Huselid (1996) revealed that the relationship between the firm's age and the level of corporate social responsible disclosure is positive, whereas, a negative association between them was found by the studies of Rettab *et al.* (2009).

Environmentally sensitive industries (INDUSTRY) also impacts on the extent of voluntary disclosure as a control variable (Hackston and Milne, 1996; Halme and Huse, 1997; Mock *et al.*, 2007; Brammer and Pavelin, 2008; Liu and Sun, 2010; Kuo *et al.*, 2012). Moroney *et al.* (2011) pointed out that companies are classified into high, medium and low environmental impact sectors by the socially responsible investment indices of FTSE 2007. Following the classification, industries of mining, manufacturing, water, electricity, and gas (resource and energy), and construction are considered as

environmentally sensitive industries in this study. In the research of Broberg *et al.* (2010), corporations in the manufacturing industry were found to have more voluntary disclosure. To sum up, FSIZE, DEBT, ROE, AGE, and INDUSTRY are chosen as control variables to examine the relationship between corporate governance and VED.

3.4 DATA AND METHODOLOGY

3.4.1 Sample

The sample of this research is collected from both the Shenzhen Stock Exchange (SZSE) and the Shanghai Stock Exchange (SHSE). There were 1,230 consecutive valid firms listed on these two stock exchanges between 2009 and 2011 (3,690 firm-year observations). It excludes the firms in the financial sector (such as banks and other financial firms). Xiao and Yuan (2007) stated that these firms are subject to different disclosure requirements in China. In addition, ST/*ST/S*ST firms with problems in finance are not considered in the study either. The valid sample covers 12 industry sectors as shown on table 3.3. It is apparent from the table that the industry of manufacturing reaches at 57.32% of the market share. The second highest percentages of industry sectors (retail/trade and real estate) are just 6.75%, respectively. It presents that the manufacture is the largest industry sector in Chinese market and an awfully imbalance development of industries in China. In this research, the CCER database and the CSMAR database are utilised for financial data collection and annual reports from both SZSE and SHSE are adopted for environmental disclosure data collection.

The research period in this study was selected to start from 2009 on account of the Environmental Information Disclosure Decree (Trial Edition), which was promulgated

by the State Environmental Protection Administration (SEPA) in 2007 and which took effect on May 2008 (Zhang *et al.*, 2010). In addition, in the same year, the Shanghai Stock Exchange published the “Guide on Environmental Information Disclosure for Companies Listed on the Shanghai Stock Exchange” to launch firms’ initiatives (Lin, 2010). To some extent, these regulations and guides more or less promote the development of environmental disclosure in the annual report in the following years. Due to such a large data set, the manual data collection for single year needs to take 3-4 months to complete. Therefore, 3-year research period from 2009 to 2011 is decided in the research.

Table 3.3

Descriptive Statistics of Industry sectors

TYPE	Name of Industry sector	Freq.	Percent	Cum.
A	Agriculture, forestry, animal husbandry and fisheries	27	2.20	2.20
B	Mining	31	2.52	4.72
C	Manufacturing	705	57.32	62.03
D	Water, electricity, and gas	52	4.23	66.26
E	Construction	25	2.03	68.29
F	Transport and storage	57	4.63	72.93
G	Communication	77	6.26	79.19
H	Retail/trade	83	6.75	85.93
J	Real estate	83	6.75	92.68
K	Services sectors	41	3.33	96.02
L	Media and culture	10	0.81	96.83
M	Comprehensive industry	39	3.17	100.00
Total		1230	100.00	

3.4.2 Annual report

In previous empirical studies, most of them have tended to focus on disclosure in annual reports, although a wide range of media is employed to disclose environmental information by the corporations, which includes advertisements, booklets, annual reports, focus groups, press releases, and employee councils (Gray *et al.*, 2001). Compared with other media, the annual report is more publicised and is a more visible document (Halme and Huse, 1997) which can be easily accessed (Wilmshurst, and Frost, 2000). As mentioned by Neu *et al.* (1998) and Gibson and O'Donovan (2007), the annual report is a primary information source for the communication between corporations and its stakeholders who include creditors, investors, employees, customers, environmental groups and the government. They also indicated that 'the annual report possesses a degree of credibility not associated with other forms of advertising' (Neu *et al.*, 1998, p.269). Lynch (2010) highlighted the reasons to employ the annual report in that it is a consistent source document for data gathered and compared because of a relatively homogenous format. Wiseman (1982, p.55) suggested that 'it is widely recognised as the principal means for corporate communications of activities and intentions to shareholders and is the primary source of environmental reporting by corporations. The annual report has been the source for virtually all previous corporate research'. Tilt (1994) found that the annual report is a common medium employed for corporate social information.

In China, there are a series of rules and standards required by the securities authority in China, the China Securities Regulatory Commission (CSRC), which is beneficial to the collection of manual data of information disclosure from annual reports. In 1999, the CSRC decided that firms should publish annual reports in both forms: publications and the Internet concurrently. This change not only provides key information to investors in a

timely fashion, but also, it satisfies the needs of the public in a convenient way. Scholars, for example, could expediently access the 10 most recent years' annual reports through the Internet. Bouten *et al.* (2011) deemed that the annual report being directly available on the Internet is one important element in the annual report being the widely favoured information resource. In addition, according to the CSRC, "the annual report should be prepared and disclosed to the public within 4 months subsequent to the end of financial year ... For those companies that float A & B shares concurrently, or list in domestic and foreign stock exchanges, then, the annual and interim reports must be made available to both foreign and domestic investors at the same time". These requirements, to some extent, have determined the timeliness and the convenience of the annual report in China. Ane (2012) asserts that the annual report is the most dominant form for revealing environmental information by Chinese companies. Thus, like most other studies, this research employs the annual report disclosure.

3.4.3 Quantity of environmental disclosure index

As to the quantity of environmental disclosure, prior studies commonly employed a "unit of analysis" to measure the amount of information. Gray *et al.* (1995) mentioned that three kinds of "unit" (number of words, sentences and pages) are have been preferred in this area. Many previous studies used these three paths to measure the quantity of environmental disclosure in annual reports: number of words (e.g., Zeghal and Ahmed, 1990; Neu *et al.*, 1998; Campbell, 2003; Eljayash *et al.*, 2012; Rao *et al.*, 2012; Wang *et al.*, 2012); sentences (e.g., Ingram and Frazier, 1980; Wilmshurst and Frost, 2000; Eljido-Ten, 2004; Ku Ismail and Ibrahim, 2008); and pages (e.g., Patten, 1992; Gray *et al.*, 1995a; Unerman, 2000). In addition, the number of lines is one alternative way,

which was used in the study of Wiseman (1982) to test the volume of environmental information in the annual reports of 26 US firms. Al-Tuwaijri *et al.* (2003) pointed out that each type of “unit” has its limitations. For example, when environmental information is included in pictures and/or graphs, it cannot be measured by number of words, lines and sentences. Different font, column or page sizes used in the annual reports influence the measurement of disclosure by utilising a “unit” of page (Elijido-Ten, 2004). For “unit” of word measuring, a problem arises when scholars collect the quantity of disclosure in different languages, in that some languages use more words than others to express the same meaning. For example, voluntary environmental disclosure in English is expressed in just 3 words, but the same meaning in Chinese (zi yuan xing huang jing jie lu) requires 7 words. Although this study merely collects environmental information from the annual report in Chinese, the larger number of words used in Chinese would increase the workload involved in counting the volume of disclosure. Thus, considering the above limitations of each of the four “units of analysis” and, bearing in mind that there are few pictures used to demonstrate environmental information in the annual reports of Chinese listed companies, for this empirical chapter, the number of sentences has been chosen as the “unit of analysis” (Gray *et al.*, 1995) to measure the quantity of environmental disclosure. The main reason is that it avoids inaccurate measurement from different font, column or page sizes used in the annual reports by measuring the “unit” of pages (Elijido-Ten, 2004) and avoids the additionally high workload of counting individual words in Chinese.

In the evaluation of the quantitative environmental disclosure, 27 environmental keywords are defined to look for the sentences of environmental information in the annual reports, base upon the “Sustainability Reporting Guidelines” of the Global reporting initiative and the environmental words appeared in 50 randomly chosen

Chinese annual reports. The 27 keywords include environment, green, conservation, protection, efficiency, cycle, control, pollution, emission, effluent, waste, resource, energy, material, biology, oil, coal, soil, water, gas, air, carbon, forestry, forest, land, park and mine. Base on the research function of PDF document, the sentences involving the above keywords are found out. Then, the number of the sentences are counted after read, estimated and confirmed.

3.4.4 Model specification

In previous empirical research, ordinary least squares (OLS) regression has been commonly employed in examining the relationship between the extent of social and environmental disclosure and its determinants. However, there is a limitation in OLS when the dependent variable is measured by content analysis to generate a part of the sample without any disclosure and which hence is scored as a zero value (Salama *et al.*, 2012) and where the other parts are more than zero. TOBIT formulation supplies a powerful check on the model where the value of the dependent variable is not less than zero. Therefore, TOBIT is also employed to examine the relationship between quantity of voluntary environmental disclosure and characteristics of corporate governance for minimizing any loopholes in regressions. The following model is estimated:

$$\begin{aligned} \text{DISCQuantity} = & \beta_0 + \beta_1\text{SOE} + \beta_2\text{BLOCK} + \beta_3\text{MOWN} + \\ & \beta_4\text{LEGAL} + \beta_5\text{FOWN} + \beta_6\text{IND} + \beta_7\text{SUPVR} + \\ & \beta_8\text{FSIZE} + \beta_9\text{DEBT} + \beta_{10}\text{ROE} + \beta_{11}\text{AGE} \\ & + \beta_{12}\text{INDUSTRY} + \varepsilon \end{aligned}$$

Where DISCQuantity, is the quantity of voluntary environmental disclosure score; SOE, is the dummy variable for state ownership, coded as 1 for where the ultimate ownership is the state and 0 otherwise; BLOCK, percentage of ordinary shares held by substantial shareholders (with 5 per cent or more of the shareholding); MOWN, the percentage of ordinary shares held by the CEO, senior managers, and directors; LEGAL, the percentage of ordinary shares held by legal persons; FOWN, the dummy variable for foreign share ownership, coded as 1 for the firm had issued B shares and/or H shares and 0 otherwise; IND, the proportion of independent non-executive directors to the number of directors on the board; SUPVR, the amount of members in the supervisory board; FSIZE, the natural logarithm of the firm's total assets in RMB; DEBT, the leverage ratio: total liabilities divided by total asset; ROE, profitability: return on shareholders' equity; AGE, age of the firm (since it set up); INDUSTRY, the dummy variable for environmentally sensitive firms, coded as 1 for the firm belongs to an environmentally sensitive industry and 0 otherwise.

3.5 RESULTS

3.5.1 Descriptive statistics of the variables

Table 3.4 provides the descriptive statistics of the variables based on 3,690 firm observations during the period 2009-2011. The dependent variable: the quantity of environmental disclosure (*SQDISCQuantity*) is measured by the square root in order that the dependent variable might tend towards a normal distribution as shown in the table 3.5. Table 3.4 displays the minimum scores of *SQDISCQuantity* as 0.00, which indicates

some listed companies in China without any environmental disclosure. The maximum scores (8.00) and mean values (2.75) express that quantitative environmental disclosure is quite insufficient in the annual reports of most Chinese listed companies. The skewness value of 0.62 in *SQDISCQuantity* implies that some but few companies disclose comparatively sufficient quantitative environmental information in the annual report. In the table, a decrease is shown in quantitative environmental information from 2.86 in 2009 to 2.66 in 2010. The main reason could be that item 7 of “Announcement on fulfilling the annual reports of listed companies in 2009 and relevant work” encourages firms to take social responsibility which includes environmental protection and the disclosure of this kind of information in the annual report. It impelled companies to disclose more environmental information in 2009. It is worth mentioning that, in this study, there are just 172 firm observations without any environmental disclosure out of 3,690 valid firm observations in total. In contrast with 34 per cent of Chinese listed companies with CER in 2002 and approximately 60 per cent in 2006, it shows that 95 per cent of Chinese listed companies have undertaken some environmental disclosure between 2009 and 2011. However, in the process of the manual data collection, this research found that these selected Chinese companies merely supply ‘good news’ in the annual reports and hide ‘bad news’. As indicated by Clarkson *et al.* (2008) and Iatridis (2013), voluntary environmental information is disclosed by companies which tend to use less environmentally harmful practices. In China, this situation is more serious. The possible reasons of almost all companies only reporting favourable environmental information are that these firms believe just positive environmental disclosure assisting them to build firms’ reputation, reduce shareholders’ concern, and obtain economic benefit.

From table 3.4 we note that the maximum value for state ownership (SOE) is 1 and the mean is 0.59. It suggests that state ownership is the dominant form of ownership structure in more than half of Chinese listed companies. The mean value of SOE decreased from 0.61 in 2008 to 0.55 in 2010, which reveals that the Chinese government is reducing its own holding of non-negotiable shares and transferring them to negotiable shares in the market. Similarly, the percentage of ordinary shares held by legal persons (LEGAL) also shows a decreasing trend from 2008 to 2010. One possible explanation is that it is a developing trend, with more and more negotiable shares in the market being transferred from non-negotiable shares. Managerial ownership (MOWN) has a minimum of 0.00% and a mean of 1%, which indicates very low managerial ownership in most Chinese listed companies. The IND is more than 36% on average, although some companies just have 9% (the minimum value). It means that all of the Chinese listed companies comply with the Corporate Law (2006 version), which mandatorily requires a board of directors to have independent directors. At the same time, the majority are following the “Code of Corporate Governance for Listed Companies in China” issued on 30th June 2003, which recommends that the board should be made up of at least one-third independent directors. The amount of members in the supervisory board (SUPVR) shows a minimum score of 1 and a maximum of 12 with a mean value of 3.90. It indicates that there is at least one member in the supervisory boards of Chinese listed companies and nearly four members in the supervisory boards on average. The mean value of INDUSTRY (0.66) and the median value (1) indicate that Chinese listed companies tend to operate in mainly environmentally sensitive industries.

Table 3.4

Descriptive Statistics of the variables

Variables	All Mean Std.Dev. Min. Max. Skewness Kurtosis	Mean 2009 Std.Dev. Min. Max. Skewness Kurtosis	Mean 2010 Std.Dev. Min. Max. Skewness Kurtosis	Mean 2011 Std.Dev. Min. Max. Skewness Kurtosis
Panel A: Dependent				
<i>SQDISCQuantity</i>	2.75 1.52 0.00 8.00 0.62 3.26	2.86 1.72 0.00 8.00 0.57 2.87	2.66 1.47 0.00 7.75 0.65 3.34	2.73 1.35 0.00 7.55 0.55 3.39
Panel B: Independent				
lagSOE	0.59 0.49 0.00 1.00 -0.36 1.13	0.61 0.49 0.00 1.00 -0.46 1.21	0.60 0.49 0.00 1.00 -0.41 1.17	0.55 0.50 0.00 1.00 -0.22 1.05
lagBLOCK	0.46 0.17 0.00 0.95 0.05 2.55	0.48 0.17 0.00 0.95 0.00 2.52	0.46 0.17 0.00 0.95 0.05 2.54	0.45 0.17 0.00 0.95 0.11 2.61
lagMOWN	0.01 0.06 0.00 0.69 5.96 42.86	0.01 0.06 0.00 0.69 7.81 71.25	0.01 0.05 0.00 0.54 5.95 43.48	0.02 0.08 0.00 0.56 4.61 25.18

Variables	All Mean Std.Dev. Min. Max. Skewness Kurtosis	Mean 2009 Std.Dev. Min. Max. Skewness Kurtosis	Mean 2010 Std.Dev. Min. Max. Skewness Kurtosis	Mean 2011 Std.Dev. Min. Max. Skewness Kurtosis
Panel B: Independent				
lagLEGAL	0.10 0.18 0.00 0.85 1.99 6.10	0.14 0.20 0.00 0.81 1.39 3.88	0.09 0.18 0.00 0.85 2.07 6.46	0.06 0.15 0.00 0.81 2.96 11.53
lagFOWN	0.09 0.28 0.00 1.00 2.97 9.84	0.08 0.28 0.00 1.00 2.99 9.92	0.08 0.28 0.00 1.00 2.99 9.92	0.09 0.28 0.00 1.00 2.95 9.70
lagIND	0.36 0.05 0.09 0.71 1.53 7.28	0.36 0.05 0.14 0.63 1.53 7.37	0.36 0.05 0.09 0.71 1.55 8.12	0.37 0.05 0.13 0.63 1.49 6.38
lagSUPVR	3.90 1.26 1.00 12.00 1.31 5.17	3.93 1.29 2.00 12.00 1.36 5.58	3.90 1.25 2.00 12.00 1.31 5.17	3.88 1.24 1.00 11.00 1.24 4.67

Variables	All Mean Std.Dev. Min. Max. Skewness Kurtosis	Mean 2009 Std.Dev. Min. Max. Skewness Kurtosis	Mean 2010 Std.Dev. Min. Max. Skewness Kurtosis	Mean 2011 Std.Dev. Min. Max. Skewness Kurtosis
Panel B: Independent				
lagLogFSIZE	21.77 1.21 18.27 27.62 0.80 4.07	21.60 1.16 18.98 27.35 0.86 4.32	21.76 1.20 18.27 27.49 0.80 4.08	21.95 1.22 19.08 27.62 0.76 3.92
lagDEBT	0.48 0.19 0.01 0.96 -0.21 2.35	0.47 0.18 0.02 0.96 -0.18 2.38	0.48 0.18 0.02 0.94 -0.20 2.30	0.49 0.19 0.01 0.95 -0.24 2.36
lagROE	0.09 0.09 -0.44 0.44 -0.39 6.51	0.08 0.09 -0.35 0.44 -0.57 6.15	0.09 0.08 -0.44 0.44 -0.47 6.96	0.10 0.08 -0.44 0.42 0.13 5.78
lagAGE	12.52 4.41 1.00 29.00 0.03 2.85	11.52 4.34 1.00 27.00 0.03 2.84	12.52 4.34 2.00 28.00 0.03 2.84	13.52 4.34 3.00 29.00 0.03 2.84
lagINDUSTRY	0.66 0.47 0.00 1.00 -0.68 1.46	0.66 0.47 0.00 1.00 -0.68 1.46	0.66 0.47 0.00 1.00 -0.68 1.46	0.66 0.47 0.00 1.00 -0.68 1.46

Figure 3.1

Dependent variable distributions

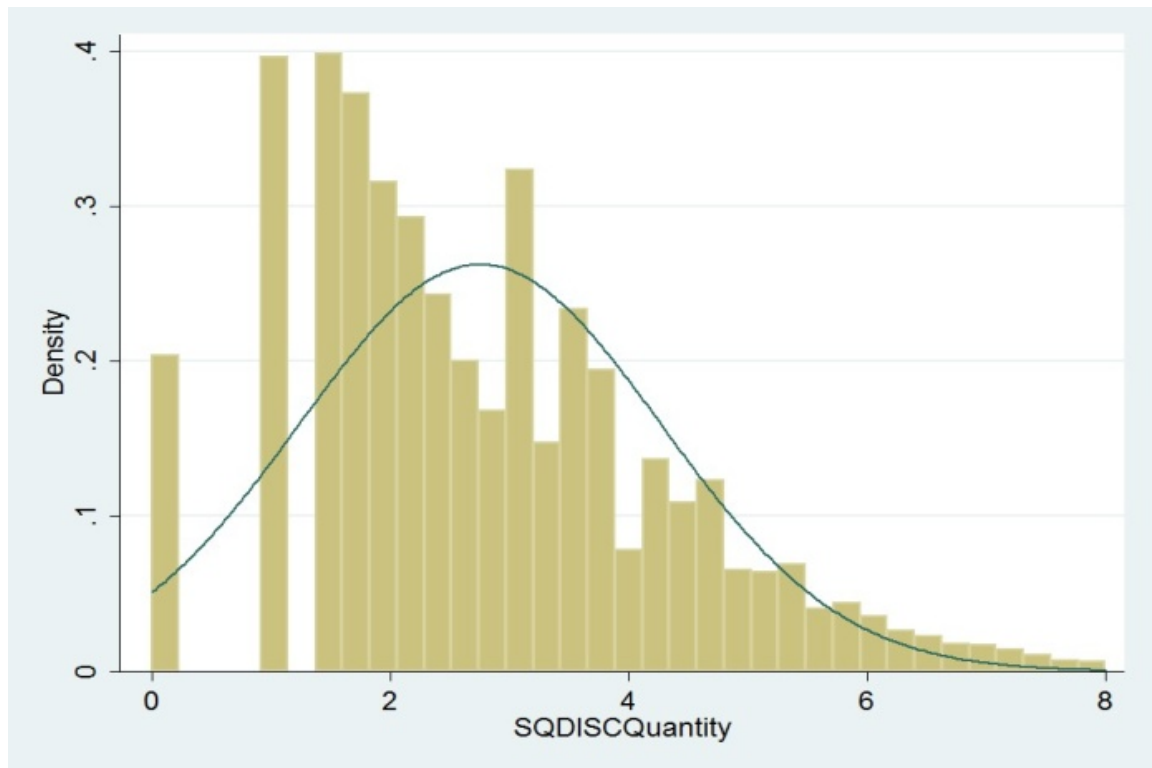


Table 3.5 describes the mean values of dependent and independent variables in twelve industries. According to the table, the top three mean values of high volume environmental disclosures are found in the Mining industry ($SQDISCQuantity = 4.091$), the Water, electricity and gas industry ($SQDISCQuantity = 3.734$), and the Manufacturing industry ($SQDISCQuantity = 3.001$). This table also indicated that the industries of Media and culture ($SQDISCQuantity = 1.434$), Retail/trade ($SQDISCQuantity = 1.638$), and Communication ($SQDISCQuantity = 1.710$) reveal a low volume of environmental information in the research years. To some extent, they reflect that firms operating in environmentally sensitive industries are more inclined to publish a large quantity of environmental disclosure in their annual report. In the Chinese market, Mining is the youngest industry ($lagAGE = 9.516$), which has been growing

rapidly and it holds the largest firm size on average ($\text{lagLogFSIZE} = 23.206$). In other words, this kind of heavy industry has been the focus of economic development in China in recent years. At the same time, a number of environmental issues have been produced by the rapid development of this heavy industry.

3.5.2 Multicollinearity

This research employs Pearson's Correlation to explore the relationship between the structure of corporate governance, characteristics of the company, and quantity of environmental disclosure. The results are shown in Table 3.6. The highest correlation coefficient is -0.4396 between SOE and LEGAL in this study. Harmful levels of multicollinearity could present when the correlation coefficient reached ± 0.8 or ± 0.9 (Farrar and Glauber, 1967). It accords with the view of Hossain *et al.* (1995), which claimed collinearity does not occur when the correlation coefficient is less than 0.8. Thus, there is no unacceptable level of multicollinearity between the independent and control variables. Moreover, Moroney *et al.* (2011) and Leng and Ding (2011) mentioned that very low tolerance levels (approaching zero) or very high variance inflation factors (VIF) would suggest that multicollinearity might be a concern. When the VIF value exceeds 10, it would indicate a threat of multicollinearity (Neter *et al.*, 1983; Pallant, 2007; Wang, *et al.*, 2012). In this research, VIF scores ranged from 1.02 for IND to 1.59 for logFSIZE as showed in Table 3.7, which is well below the VIF value of 10. Therefore, multicollinearity is not a concern in this research.

Table 3.5

Variable mean values by industry

Variable	No obs	<i>SQDISCQ</i> quantity	lagSOE	lagBLOCK	lagMOWN	lagLEGAL	lagFOWN	lagIND	lagSUPVR	lagLogFSIZE	lagDEBT	lagROE	lagAGE	lagINDU STRY
Agriculture, forestry, animal husbandry and fisheries	81	2.900	0.519	0.465	0.005	0.074	0.000	0.357	3.864	21.316	0.470	0.067	11.852	0
Mining	93	4.091	0.957	0.589	0.004	0.013	0.194	0.379	4.882	23.206	0.433	0.166	9.516	1
Manufacturing	2115	3.001	0.536	0.458	0.018	0.111	0.080	0.364	3.822	21.580	0.464	0.083	11.851	1
Water, electricity, and gas	156	3.734	0.904	0.510	0.000	0.026	0.096	0.360	4.622	22.492	0.584	0.062	14.288	1
Construction	75	2.795	0.640	0.472	0.013	0.090	0.040	0.384	4.173	22.646	0.729	0.110	11.520	1
Transport and storage	171	2.695	0.889	0.533	0.002	0.026	0.211	0.355	4.485	22.453	0.412	0.090	12.368	0
Communication	231	1.710	0.468	0.454	0.033	0.073	0.065	0.364	3.545	21.339	0.390	0.093	11.494	0
Retail/trade	249	1.638	0.671	0.424	0.004	0.103	0.060	0.361	3.896	21.789	0.557	0.106	14.964	0
Real estate	249	2.041	0.494	0.462	0.009	0.143	0.108	0.374	3.606	22.363	0.604	0.102	15.542	0
Services sectors	123	2.296	0.634	0.489	0.007	0.113	0.122	0.358	3.854	21.346	0.451	0.075	12.317	0
Media and culture	30	1.434	0.900	0.486	0.000	0.020	0.000	0.361	3.733	21.770	0.347	0.086	13.100	0
Comprehensive industry	117	2.520	0.538	0.345	0.000	0.097	0.000	0.373	4.009	21.757	0.503	0.077	16.359	0

Table 3.6

Correlation coefficients of key variables

	SQDISCQuantity	lagSOE	lagBLOCK	lagMOWN	lagLEGAL	lagFOWN	lagIND	lagSUPVR	lagLogFSIZE	lagDEBT	lagROE	lagAGE	lagINDUSTRY
SQDISCQuantity	1												
lagSOE	0.1477	1											
lagBLOCK	0.1173	0.0369	1										
lagMOWN	-0.0068	-0.2470	0.0548	1									
lagLEGAL	-0.0822	-0.4396	0.2379	-0.0319	1								
lagFOWN	0.0441	0.1326	0.1335	-0.0660	-0.0753	1							
lagIND	0.0087	-0.0282	0.0475	0.0449	-0.0151	0.0278	1						
lagSUPVR	0.1765	0.2680	0.0439	-0.1151	-0.1609	0.0666	-0.0756	1					
lagLogFSIZE	0.3215	0.2764	0.1780	-0.1481	-0.1134	0.2965	0.0665	0.2159	1				
lagDEBT	0.1311	0.1473	-0.0472	-0.1073	-0.0614	0.0469	-0.0068	0.1177	0.4352	1			
lagROE	0.0063	-0.0792	0.1494	0.0522	0.0575	-0.0076	-0.0219	0.0066	0.1685	0.0070	1		
lagAGE	-0.0999	0.1305	-0.3619	-0.2270	-0.0914	0.1463	-0.0297	0.0714	0.1339	0.1777	-0.0263	1	
lagINDUSTRY	0.3063	-0.0275	0.0325	0.0449	0.0242	-0.0032	0.0074	0.0264	-0.0392	-0.0279	-0.0334	-0.1931	1

Note: N=3690 observations

DISC voluntary environmental disclosure score; *SOE* dummy variable for state ownership, coded as 1 where the ultimate ownership is the state and 0 otherwise; *BLOCK* percentage of ordinary shares held by substantial shareholders (with 5 per cent or more shareholding); *MOWN* percentage of ordinary shares held by the CEO, senior managers, and directors; *LEGAL* percentage of ordinary shares held by legal person; *FOWN* dummy variable for foreign share ownership, coded as 1 for if the firm had issued B shares or/and H shares and 0 otherwise; *IND* proportion of independent non-executive directors to the number of directors on the board; *SUPVR* the amount of members in supervisory board; *FSIZE* natural logarithm of the firm's total assets in RMB; *DEBT* leverage ratio: total liabilities divided by total assets; *ROE* profitability: return on shareholders' equity; *AGE* age of the firm (since it set up); *INDUSTRY* dummy variable for environmentally sensitive firms, coded as 1 for a firm operating in an environmentally sensitive industry and 0 otherwise

3.5.3 Endogeneity test

The endogeneity problem was first identified and introduced by Tobin (1958). Jo and Harjoto (2011) asserted that an OLS would produce biased parameter estimates if the endogeneity problems were not taken into consideration in the estimation procedure (p.357). Similarly, Core *et al.* (2006) and Ntim *et al.* (2012) deemed that endogeneity problems existing in empirical regressions would impact on their results significantly. Brown *et al.* (2011) addressed analysis and research on endogeneity in their study of “Corporate governance, accounting and finance: a review”. They asserted that endogeneity is regarded as a real and fearful issue in a lot of the CG literature. Fixed-effects estimation and an instrumental variables (IV) approach are two general methods to deal with endogeneity problems in most studies. In the research on disclosure practice, Cheung *et al.* (2010) employed the panel regression model with fixed effect in order to minimise endogeneity problems. In addition, they also engaged a comprehensive set of control variables to avoid the omitted-variable bias, and to mitigate the effect of endogeneity (Cheung *et al.*, 2010).

In terms of an instrumental variables (IV) approach, Ronnie Lo (2009) mentioned that standard econometric procedures suggest addressing endogeneity issues by the use of an instrument variable for the potentially endogenous variable (p.356). However, an ideal instrument variable is difficult to find based on its criteria that require an exogenous variable which should be correlated with the endogenous variable and which would not be impacted by the dependable variable of interest. Borsch-Supan and Koke (2002) pointed out that even if such an instrument variable were found, it would possibly be a weak instrument. Therefore, lagged value and industrial average have usually been adopted as instrumental variables in prior studies. For example, state ownership (SOE) is

identified as an endogenous variable, and thus the lagged value of SOE needs to be found to replace the original value in order to avoid any impact by the endogeneity.

In the endogeneity test, firstly, scholars need to distinguish between endogenous and exogenous variables based on a literature review of previous research. The second step is to conduct the Durbin-Wu-Hausman Test (Hausman Test). In this process, additional variables (such as instrumental variables) are employed to replace the identified endogenous variable. In this study, the independent and control variables are lagged from the dependents so as to reduce potential problems with endogeneity (Dam and Scholtens, 2012). Then it uses single-equation instrumental-variables regression with the two-stage least squares (2SLS) estimator and assumes H_0 that variables are exogenous to do the Hausman Test. The assumption (H_0) is accepted when p value is insignificant ($p > 0.05$) whereas it is rejected if p value is significant ($p < 0.05$ or $p < 0.01$). In other words, insignificant F value suggests that the regression do not have an endogeneity problem and vice versa. The result of Hausman test in this study shows that F value is equal to 1.51516 with $p = 0.1573$, which is insignificant. Therefore, the endogeneity problem is not considered in this research.

3.5.4 Results of empirical testing

The empirical results on the relationship between the dependent variable (quantity of environmental disclosure) and independent variables (characteristics of corporate governance) are tested by STATA 10.0, which is shown in table 3.7 and table 3.8. The independent and control variables are lagged from the dependents so as to reduce potential problems with endogeneity (Dam and Scholtens, 2012). It employs OLS

regression and TOBIT formulation to test the association of corporate governance with quantitative environmental disclosure. Compared with the results of TOBIT, there are similar outcomes from OLS regression in this study. The table reveals adjusted R-squared of 0.230, which explains about 23 per cent of the variation in the quantity of environmental disclosure level. The F value of OLS regression is 90.69 with significance at $p = 0.000$, lower than 0.001, which means that the regression model is statistically significant (Leng and Ding, 2011).

In both the OLS and TOBIT regressions, there are seven independent and control variables which are identical, SOE, FOWN, SUPVR, LogFSIZE, ROE, AGE, and INDUSTRY, with a regression coefficient which is significant at a 0.01 level. In addition, the independent variables BLOCK and LEGAL are significant at a 0.05 level and MOWN is significant at a 0.1 level. The empirical findings reveal that the associations between environmental disclosure and two control variables (LogFSIZE and INDUSTRY) are significant and positive. The result accords with the findings of Gray *et al.* (2001, p.328) and Beck *et al.* (2010), the (larger) size of firms in 'environmentally-sensitive' industry is known to impact on disclosure behaviours significantly and positively. In addition, it is consistent with the findings of Liu and Anbumozhi (2009) and Zeng *et al.* (2012). They researched the influence of factors on the extent of environmental disclosure using evidence from Chinese listed companies and concluded that environmentally sensitive industries and size are significant factors that positively affect environmental disclosure. Thus, the results in this research concerning these two control variables (LogFSIZE and INDUSTRY) are well confirmed.

Table 3.7

Regression results

Variable	Predicted sign	OLS Regression		Tobit Regression		VIF
		Quantity of VED		Quantity of VED		
		Coeff.	Robust Std. Err.	Coeff.	Robust Std. Err.	
INTERCEPT		-7.101 ***	(0.507)	-7.104 ***	(0.507)	
lagSOE	+	0.138 ***	(0.053)	0.138 ***	(0.053)	1.52
lagBLOCK	+	0.345 **	(0.152)	0.346 **	(0.151)	1.42
lagMOWN	-	0.695 *	(0.365)	0.694 *	(0.365)	1.16
lagLEGAL	+	-0.292 **	(0.139)	-0.292 **	(0.138)	1.42
lagFOWN	+	-0.329 ***	(0.087)	-0.329 ***	(0.087)	1.16
lagIND	+	-0.366	(0.432)	-0.367	(0.432)	1.02
lagSUPVR	+	0.109 ***	(0.020)	0.109 ***	(0.020)	1.12
lagLogFSIZE		0.419 ***	(0.025)	0.419 ***	(0.025)	1.59
lagDEBT		-0.029	(0.132)	-0.028	(0.131)	1.29
lagROE		-0.789 ***	(0.265)	-0.789 ***	(0.264)	1.08
lagAGE		-0.025 ***	(0.006)	-0.025 ***	(0.006)	1.36
lagINDUSTRY		0.965 ***	(0.048)	0.965 ***	(0.048)	1.05
Adj R-squared		0.230	Pseudo R2	0.072		
N		3690		3690		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

DSCORE voluntary environmental disclosure score; *SOE* dummy variable for state ownership, coded as 1 where the ultimate ownership is the state and 0 otherwise; *BLOCK* percentage of ordinary shares held by substantial shareholders (with 5 per cent or more shareholding); *MOWN* percentage of ordinary shares held by the CEO, senior managers, and directors; *LEGAL* percentage of ordinary shares held by legal persons; *FOWN* dummy variable for foreign share ownership, coded as 1 for if the firm had issued B shares or/and H shares and 0 otherwise; *IND* proportion of independent non-executive directors to the number of directors on the board; *SUPVR* the amount of members in supervisory board; *FSIZE* natural logarithm of the firm's total assets in RMB; *DEBT* leverage ratio: total liabilities divided by total assets; *ROE* profitability: return on shareholders' equity; *AGE* age of the firm (since it set up); *INDUSTRY* dummy variable for environmentally sensitive firms, coded as 1 for a firm operating in an environmentally sensitive industry and 0 otherwise

Table 3.8

Fixed or Random: Hausman test

Variable	Quantity of VED					
	Fixed		Random		Random	
	Coeff.	Robust Std. Err.	Coeff.	Robust Std. Err.	Coeff.	Robust Std. Err.
INTERCEPT	5.710 ***	(1.708)	-5.372 ***	(0.715)	-4.399 ***	(0.748)
lagSOE	-0.072	(0.091)	0.142 **	(0.057)	0.138 **	(0.057)
lagBLOCK	0.191	(0.381)	0.227	(0.193)	0.175	(0.192)
lagMOWN	1.205 ***	(0.286)	0.606 **	(0.300)	0.694 **	(0.298)
lagLEGAL	-0.432 ***	(0.154)	-0.273 **	(0.126)	-0.234 *	(0.126)
lagFOWN	0.130	(0.368)	-0.201	(0.136)	-0.203	(0.134)
lagIND	-0.581	(0.735)	-0.535	(0.497)	-0.454	(0.492)
lagSUPVR	-0.031	(0.057)	0.107 ***	(0.027)	0.092 ***	(0.027)
lagLogFSIZE	-0.067	(0.088)	0.352 ***	(0.036)	0.348 ***	(0.036)
lagDEBT	-0.623 **	(0.315)	-0.152	(0.171)	-0.033	(0.173)
lagROE	0.736 **	(0.314)	-0.023	(0.261)	0.068	(0.265)
lagAGE	-0.077 ***	(0.027)	-0.037 ***	(0.008)	-0.037 ***	(0.008)
lagINDUSTRY			0.943 ***	(0.073)	-0.602 *	(0.344)
Industry effect	No		No		Yes ***	
Hausman			101.07 ***		102.34 ***	
Number of observations	3690		3690		3690	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

DSCORE voluntary environmental disclosure score; *SOE* dummy variable for state ownership, coded as 1 where the ultimate ownership is the state and 0 otherwise; *BLOCK* percentage of ordinary shares held by substantial shareholders (with 5 per cent or more shareholding); *MOWN* percentage of ordinary shares held by the CEO, senior managers, and directors; *LEGAL* percentage of ordinary shares held by legal persons; *FOWN* dummy variable for foreign share ownership, coded as 1 for if the firm had issued B shares or/and H shares and 0 otherwise; *IND* proportion of independent non-executive directors to the number of directors on the board; *SUPVR* the amount of members in supervisory board; *FSIZE* natural logarithm of the firm's total assets in RMB; *DEBT* leverage ratio: total liabilities divided by total assets; *ROE* profitability: return on shareholders' equity; *AGE* age of the firm (since it set up); *INDUSTRY* dummy variable for environmentally sensitive firms, coded as 1 for if the firm operates in an environmentally sensitive industry and 0 otherwise

For profitability (ROE), Singhvi and Desai (1971) found that profitability was significantly positive in affecting the corporate financial disclosure level in the annual report. It denotes that firms with high returns like to disclose their financial advantages with the aim of satisfying shareholders and attracting new investors. In contrast, firm with a lower level of profit like to reveal more environmental information to appease stakeholders. This is consistent with the result in this paper: a negative connection

between ROE and quantity of environmental disclosure. The empirical result of leverage in table 3.7 is supported by previous studies (e.g., Ho and Wong, 2001; Chau and Gray, 2002; Haniffa and Cooke, 2005; Mohamad *et al.*, 2010), which did not find any significant effect of leverage on voluntary disclosure / corporate social disclosure. In previous research, there are mixed results on the relationship between the age of the firm and the level of disclosure. The regression result shows a negative association between them in this research, which accords with the study of Rettab *et al.* (2009). It indicates that new companies promote themselves in the market and attract the attention of stakeholders by using environmental disclosure.

This research also employs panel data from 2009 to 2011 by a fixed and random effect model (with and without industry effects) to conduct a hausman test. Wang *et al.* (2012) explained that purpose of the Hausman test is to find whether the intercept item should be conducted using the fixed or random effect model. The figures in parentheses are standard errors robust to heteroscedasticity. The significant values (101.07 with $p = 0.000$, 102.34 with $p = 0.000$) for the Hausmen test indicate that the random effect estimators are inconsistent and the fixed effect estimates are more appropriate. In Table 3.8, the results of the fixed effect model show that the relationship of environmental disclosure with MOWN and LEGAL is significant, no impact is found on environmental disclosure from IND, and AGE affects the quantity of environmental information negatively, which is almost consistent with the outcomes from OLS regression and TOBIT regression. Contrasted with pooled data, however, there are many differing results. It displays that SOE, BLOCK, FOWN, SUPVR and FSIZE are not significantly associated with quantity of environmental disclosure. The great discrepancy in the outcomes between the pooled data and the panel data is probably caused by a 3-year observation period being too short to do the Hausman test by panel data.

In this research, the empirical results in Table 3.7 confirm Hypothesis 1(a) and Hypothesis 2(b) in both regressions. State ownership and size of the supervisory board significantly and positively relate to quantitative environmental disclosure. For OLS regression, it shows that voluntary environmental disclosure increases with state ownership ($\beta_1 = 0.138, p = 0.009$), and larger size of the supervisory board ($\beta_6 = 0.109, p = 0.000$). Results for state ownership negate the previous prejudice that the ‘dominating state-owned share monopolizes under internal control’ (Xu and Wang, 1997) is one of main factors leading to asymmetric information. On the contrary, ultimate state ownership in the company could increase voluntary disclosure, at least for environmental disclosure. It accords with the study of Zeng *et al.* (2012); they examined what factors drive voluntary disclosure of environmental information (EID) using evidence from Chinese listed companies and found that state-owned firms have been more engaged in EID. The result relating to the size of the supervisory board endorses this paper’s differing view from that of many other scholars (e.g., Dahya *et al.*, 2003; Mallin, 2006; Wei and Geng, 2008; Tricker, 2009) who deemed that the supervisory board in Chinese companies was an ineffective ornament. The result indicates that the role of the supervisory board in Chinese listed companies is effective in improving quantitative environmental disclosure. It could be explained by two aspects. Firstly, the supervisory board holds sufficient power to monitor that managers meet the demands of stakeholders (such as, disclosure requirement) since its rights and powers have been much improved under the amendment of Corporation Law in 2005. Secondly, the members of the supervisory board are elected by the shareholders’ meeting. They serve for a maximum term of three years, but can be re-appointed. The shareholders urge these members to work actively on behalf of their interest. The stakeholder-agency theory mentions that firms tend to disclose more information in order to reduce information asymmetry (Hill

and Jones, 1992, Huang and Kung, 2010). That is why the amount of members in the supervisory board and the extent of VED are positively related.

Hypothesis 1(b) in this research is also supported. A positive regression coefficient which is significant at the 0.05 level is found with blockholder ownership, which means that it positively influenced environmental disclosure. It accords with the mention of Laidroo (2009), that in contrast with small investors with pooled control rights, blockholder ownership has enough power and incentives to collect information and to monitor management (Shleifer and Vishny, 1997). Although, under the agency theory, managers may enhance voluntary disclosure to mitigate the agency problem and reduce agency costs incurred by the diffusive shareholders, Zeckhauser and Pound (1990) and Barako *et al.* (2006) indicated an alternative perspective in that dispersed ownership may not be a formidable enough force to affect a firm's reporting practice because of the low ownership stake of individual shareholders and a lack of monitoring capacity. This perspective is consistent with the situation in China facing the new agency problem of the principal and the principal (P&P). In China, the main blockholder ownership is the state (the principal) that holds the absolute right to dominate managers' actions. The attitude and interest of diffusive shareholders (the principal) are almost overlooked. The state would like more environmental disclosure, due to increasing public concerns about environmental issues, for their political aim and social goals, which results in more environmental information being revealed by managers. Consequently, there is a positive effect of blockholder ownership in Chinese listed companies on the extent of voluntary environmental disclosure in the annual report. Similarly, Xiao and Yuan (2007) and Li and Qi (2008) also found a significant and positive relationship between ownership concentration and voluntary disclosure based on 559 Chinese listed firms in 2002 and 100 non-financial Chinese listed companies for the period 2003-2005, respectively.

The findings, which refer to state ownership, blockholder ownership and size of the supervisory board, meet the explanation of the relationship between corporate governance and environmental disclosure practice by two variants of stakeholder theory that the accountability perspective and the organisational and managerial perspective. In detail, state ownership, which is the main form of blockholder ownership, holds dominant right that it is important for the managers' positions. Therefore, satisfied the demands of state ownership are the most significant duties to managers. In regard to the supervisory board, it requires the firm to supply disclosures explaining firm's actions to stakeholders and society, which is accordant with the stakeholder-agency theory and the accountability perspective. The fit between the theories and the findings identifies the uniqueness of Chinese case that a high level of ownership concentration with a high level of (political) right and the large power distance between state ownership and managers result managers in the hand of blockholder ownership in China, which drives the development of environmental disclosure practice.

From table 3.7 we note that a significantly positive relationship between managerial ownership and quantitative environmental disclosure, which is contrary to Hypothesis 1(c). However, this result is in accordance with the principal finding of the study of Li and Qi (2008), which also collected samples from the Chinese stock market. It describes that firm with high managerial ownership would disclose a high level of voluntary information. Where a firm has high managerial ownership, it means the benefit of shareholders concerns managers to a greater extent. They would therefore be more likely to choose voluntary disclosure to contribute to the firm. Donnelly and Mulcahy (2008) deemed that if the balance of additional managerial ownership leans toward shareholders, voluntary disclosure might be expected to increase; but where additional managerial ownership tips the balance toward management, voluntary information would be reduced.

Up to a certain range, the incentives and interests of managerial ownership and shareholders are aligned. They will be therefore expected to disclose more information. As the finding of Minow and Bingham (1995, p.497), ‘nothing makes directors think like shareholders more than being shareholders’. However, when managerial ownership gets so large and is over a certain level, it can become entrenched and immune from monitoring, and then there is a lack of incentives for management to disclose information voluntarily (Morck *et al.*, 1988; Donnelly and Mulcahy, 2008). In the Chinese market, as mentioned above, there is a very low level of managerial ownership in the majority of Chinese listed companies. It means Chinese managerial ownership is in the range whereby a higher proportion of managerial ownership relates with a greater quantity of voluntary disclosure.

Legal person ownership is found to negatively impact on the extent of environmental disclosure in this study. It is inconsistent with Hypothesis 1(d). One of the possible explanations is that the costs created from the operation of environmental disclosure practices which are against profit maximisation. Tan and Wang (2004) mentioned that legal-person shareholders are more economically orientated and geared towards profit compared with state shareholders. In other words, legal person ownership would like to pay more attention to cost reduction and profit enhancement rather than social objectives. The result also reflects the possibility that current profit holds more attraction for legal person ownership than long-term benefit that can be brought by green development (such as environmental disclosure practice). Furthermore, with a high level of legal person ownership in the firm it is easier to hide bad environmental information in order to protect a company’s image and profit, which also explains why legal person ownership plays a negative role on the extent of environmental disclosure.

Hypothesis 1(e) outlines that foreign share ownership is expected to influence more disclosure in order to reduce the high level of information asymmetry that can arise due to different cultures, languages, and attitudes of risk (Broberg *et al.*, 2010). However, the failure to find a significantly positive association between foreign share ownership and quantity of voluntary disclosure does not support the H1(d). In the study of Singhvi (1968), it found a significant effect of foreign ownership on companies' corporate reporting practices. Haniffa and Cooke (2002) reported a similar result in that the level of voluntary disclosure is impacted by foreign ownership positively. However, in the study of Bokpin and Isshaq (2009), they argued against Mangena and Tauringana (2007)'s finding of a positive relationship between disclosure and foreign ownership. They employed panel regression to investigate the reciprocity effect between corporate disclosure and foreign ownership based on evidence from the Ghana Stock Exchange during the period from 2002 and 2007, and then demonstrated a significantly negative relationship between them at the level of 1 per cent. They suggest that foreign ownership in a firm means less corporate disclosure. The result in this research is consistent with the finding of Bokpin and Isshaq (2009), although it contradicts the target of foreign investors being that they are far from their home country and invest in overseas companies for more transparency. In the Chinese market, a firm which has issued B shares and/or H shares is required to issue its annual report in both Chinese and English. 'Relatively high levels of collectivism and power distance, and strong uncertainty avoidance' are typical characteristics in this socialist country (Ronnie Lo, 2009, p.7). Based on this property of their society, Chinese companies would tend to reduce transparency and disclose less voluntary information about their environmental practices in the annual reports to foreign stakeholders in order to refrain from risk-taking because of uncertainties. In addition, under the organisation and managerial perspective evolved

from stakeholder theory, the firm would not need to meet the information demands of foreign ownership who are not powerful and that is not important for managers' position. It may explain why foreign shares ownership and quantity of VED are negatively related in Chinese listed companies.

With regard to the association between independent directors and voluntary disclosure, there is a great deal of literature proving that more independent directors in a directors' board means more voluntary disclosure information in the annual report (e.g., Fama and Jensen, 1983; Forker, 1992; Chen and Jaggi, 2000; McConomy and Bujaki, 2002; Cheng and Courtenay, 2006; Donnelly and Mulcany, 2008; Akhtaruddin *et al.*, 2009; Rouf, 2011). However, Erer and Dalgic (2011) and Esa and Mohd Ghazali (2012) argued that the relationship between independent directors and voluntary disclosure is unclear. For instance, some studies found a negative relationship between them (e.g. Eng and Mak, 2003; Barako *et al.*, 2006); and some studies did not find any significant association (e.g. Ho and Wong, 2001; Mohd Ghazali and Weetman, 2006; Mohamad *et al.*, 2010; Michelon and Parbonetti, 2012; Samaha *et al.*, 2012). The "managerial hegemony theory" pointed out a passive board reliance on top executives for information, may explain why no positive relationship was found (Kosnik, 1987); or possibly the reason, as in the view of Lin *et al.* (2003), that directors are too busy to perform their obligations effectively. In China, the development of independent directors in the listed companies is relatively new and immature. Zhang (1999) and Wei (2002) argued that many independent directors in China are too busy to care about the companies or they lack the knowledge and experience needed to exert any substantial influence on the board. In detail, the independent non-executive directors in Chinese listed companies are composed of social celebrities and important government officials. Few of them hold the qualification of accountant or solicitor. The rest of the members are mainly technical experts and scholars

who are busy engaging in academic research, which means they have less energy and time to perform their obligations effectively in companies. The situation has resulted in useless independent directors in Chinese corporate governance. These reasons explain why Hypothesis 2(a) is not confirmed.

3.6 CONCLUSION

In this empirical chapter, it developed the stakeholder-agency framework and explored the monitoring role played by ownership structure and board composition on the quantity of voluntary environmental disclosure using evidence from Chinese listed companies between 2009 and 2011. The empirical results indicated that quantity of environmental disclosure positively relates to state ownership, blockholder ownership, managerial ownership, and size of the supervisory board; negatively relates to legal person ownership and foreign share ownership; and does not significantly relate with the proportion of independent directors on the board of directors (IND). These results proved that differences in corporate governance relating to ownership structure and board composition influence the quantity of environmental disclosure. They could improve upon the relevant preceding views regarding Chinese corporate governance, especially state ownership structure and the supervisory board. State ownership and a larger size of the supervisory board where it has an effective monitoring role in the company urge the firm to be engaged in voluntary environmental disclosure. However, there was no empirical evidence to support that IND effectively acts on environmental disclosure. It reflects an immature mechanism and some problems which remain in Chinese corporate governance at the moment. The code of corporate governance and corporate law should strengthen requirements for independent non-executive directors. In addition, enhanced

power and initiatives of IND are also vital in order to set up an effective corporate governance system and a mature market. Furthermore, this study denoted that there is much less environmental information disclosed in the annual report of most Chinese listed companies and that the market is in a budding stage of development in disclosure practice. Environmental disclosures in Chinese listed companies are mainly revealed by scattered modality in the reports of Directors Boards, reports of Supervisory Boards, and notes attached to the financial reports. In contrast with environmental disclosure in US and UK, environmental information disclosed in China is more scattered, unsystematic, and incomplete. This study suggests that, with regard to the stakeholder-agency framework, firms should reveal more environmental information, in the future for a win-win situation between themselves and their stakeholders.

CHAPTER FOUR

THE RELATIONSHIP BETWEEN CORPORATE GOVERNANCE AND QUALITY OF ENVIRONMENTAL DISCLOSURE: EMPIRICAL EVIDENCE ON CHINESE FIRMS

4.1 INTRODUCTION

Corporations are the basic cells of the activities of a social economy and also the source of industrial pollution. They play a very important role in both economic development and environmental issues. For the process of production, corporations require resources from nature and give in return a number of contaminants (see appendix). According to British Petroleum (BP)'s Statistical Review of World Energy 2010, the proportion of energy consumption in China is 20.3% of the global total, which is more than the U.S.'s 19%. However, energy efficiency in China is just 33% of the global average. The amount of energy consumed in China increased from 1,504.06 million tons in 2001 to 3,480.02 million tons in 2011. The consumption of coal is 68.4% of the total energy consumed in China. With Chinese companies using so many resources from nature, a large number of contaminants are given back to the environment which thus threaten people's health. This phenomenon is attracting increasing attention from both the government and the public.

Environmental disclosure, which is regarded as a dialogue between the firm and the public, is now being given a lot of attention from governors, corporations, and communities. Research on environmental disclosure is very limited in the context of China as information disclosure practice has just started in Chinese listed companies

relative to that of western countries. Chen (2013) outlined some characteristics of current environmental disclosure in the Chinese market: the proportion of firms that reveal environmental information is not high and these firms are mainly limited to listed environmentally sensitive companies; there is an increasing trend of firms choosing to disclose environmental information and the content of disclosure produced varies from simple to complex; however, environmental disclosure revealed by companies tends to still be incomplete, incomparable and with a lack of continuity; and it is not yet the norm to disclose information.

In China, the quality of environmental disclosure is always despised or overlooked by the public because of dissatisfaction with the information environment in the Chinese market. Recently, its development has attracted some scholars to start investigating this area. Ane (2012) researched qualitative environmental information disclosure based on Chinese data from 2007 to 2009 and found that there is an increasing trend in the improvement of qualitative environmental disclosure, although the disclosure content is still limited and incomplete. In May 2008, the regulation of environmental information disclosure took effect. It would be expected to have impacted on the environmental practice and activities of listed companies in the following years, which indicates the importance of observing the development of qualitative environmental disclosure and its determinants from 2009. Moreover, previous studies on environmental disclosure based on Chinese data have tended to focus on a small sample size, short research period, and quantity information and have not looked at the investigation of the monitoring roles and effects of various ownership structures and board composition upon environmental information quality. Therefore, in this empirical chapter, the effect of five typical ownership structures (state ownership, blockholder ownership, managerial ownership, legal-person ownership and foreign ownership) and two characters of the board composition (the

proportion of independent directors and the board of supervisors) on the quality of environmental disclosure is examined in the context of China based on 3,690 firm-year observations during a consecutive period between 2009 and 2011.

The remainder of this chapter is designed as follows. Section 4.2 provides an overview of environmental disclosure quality and reviews the literature background of the relationship between corporate governance and quality of environmental disclosure. In the next sections, theory and research hypotheses are discussed and developed. Section 4.4 explains the sample, the variables and the methodology employed in this chapter. After that, the empirical results are provided and analysed. The last section sums up the findings and contribution.

4.2 LITERATURE REVIEW

4.2.1 Quality of Environmental disclosure: An Overview

According to the Financial Accounting Standards Board's Concepts Statement No. 2, the quality of environmental disclosure means whether environmental information is useful to the stakeholders. With regard to the concept of usefulness of environmental information to users, Ane (2012) put forward four points, which are Relevance, Reliance, Comparability, and Clarity. In detail, Ane (2012) indicated that 'environmental information is deemed relevant if it assists stakeholders in understanding' (p.421) a firm's environmental protection policies, for example, or their strategies, aims, and achievement, resource consumption, environmental investment and cost of pollution control, or their environmental facilities; reliance expresses that environmental information needs to focus on accuracy, reliability and verifiability; comparability refers

to ‘accounting for similar events in the same way, as well as accounting differently for dissimilar events’ (p.421), that information could display a competitive advantage or/and disadvantage; clarity means the information is understandable, organised and comprehensible.

4.2.2 The relationship between Corporate Governance and Quality of Environmental disclosure

Cormier *et al.* (2005) investigated environmental disclosure quality in large German companies and identified its determinant factors through a multi-tiered conceptual framework that depends on economic incentives, public pressures and institutional theory. German evidence was chosen because of a distinct legal and regulatory context and acute environmental concerns in this continental European country. In the measurement of environmental disclosure, there were thirty-nine items that were divided into six categories: environmental expenditure and risks, laws and regulations, pollution abatement, sustainable development, land remediation and contamination, and environmental management. The score system for information quality was based on a score of one to three: a score of “3” for an item described explicitly with either monetary or quantitative terms, “2” if an item is described specifically, and “1” when an item is mentioned in general. Using a sample of 55 large German firms during the period 1992-1998, they found that risk and ownership are potentially significant determinants of environmental disclosure strategy. In addition, environmental disclosure quality was found to be associated with fixed assets, age and firm size. Media pressure determined the level of environmental information by large German companies, but there was no link between environmental disclosure and financial condition. Finally, findings suggested

that disclosure by German firms is converging over time, which is consistent with institutional theory predictions. Results strongly claimed that environmental disclosure is multi-dimensional and is influenced by complementary forces.

Brammer and Pavelin (2006) examined the patterns in voluntary environmental disclosures (VED) made by looking at a sample of large UK firms. The study distinguished between the decisions to make a VED and decisions concerning the quality of such disclosures, and examined how each type of decision is determined by firm and industry characteristics. Based on the FTSE All-Share Index, the data of this paper comprised that of 447 UK firms for the year 2000. VED data were acquired from the “PIRC Environmental Reporting 2000” survey. There were six indicators identified to measure the quality of corporate VED, which included 1) disclosure of an environmental policy; 2) existence of board-level responsibility for environmental matters; 3) the description of environmental initiatives; 4) reporting on environmental improvements; 5) setting of environmental targets; and 6) the presence of an environmental audit or assessment. Two dependent variables were constructed in the study. The first, DISCLOSE, was measured by a dummy variable, which is coded as 1 if a company participates in any of the six components of environmental disclosure identified in the PIRC’s report, and 0 otherwise. The second, QUALITY, is the number of the aspects identified by the PIRC apparent in the disclosure of each company. Based on Probit and Ordered Probit regression, they found that larger, less indebted firms with a dispersed ownership structure are significantly more likely to reveal VED, and that the VED quality is positively linked with firm size and corporate environmental impact. Concerning the characteristics of corporate governance and VED quality, they found a significantly negative impact from the size of the largest shareholding in a firm on

quality disclosure; and no evidence to prove a relationship between the number of non-executive directors and environmental disclosure quality.

Brammer and Pavelin (2008) empirically tested the factors relating to the quality of corporate environmental disclosure (CED). It is worth mentioning that company ownership, board composition and other corporate characteristics were employed as independent variables to measure the influence on CED. Ownership concentration, as measured by the total share of any ownership which owns in excess of 3% shareholdings; and non-executive directors, as measured by the proportion of independent non-executive directors to the number of directors on the board. The other independent variables included environmental fines, as measured by the fines that companies received for environmental transgressions; size, as measured by the natural logarithm of the value of total assets; media exposure, as measured by the incidence of news media coverage of the company; profitability, as measured by return on total assets; and firm leverage, as measured by the ratio of total debt to total assets. Logistic regression was utilised in this study based on a sample of 447 large UK firms in 2000. The result indicated that an increase in non-executive directors means a decrease in the number of firms that describe environmental initiatives. In addition, they found there is a significantly negative connection between ownership concentration and firms with a group-wide environmental policy disclosed. Furthermore, it found that a firm's size and its business activities are determinants of CED; large firms operating in an industry with environmental sensitivity have high CED; but media exposure does not relate to CED.

Jamali *et al.* (2008) explored the synergies and interrelationships between corporate governance and corporate social responsibility. They drew on in-depth interviews with top managers in eight Lebanese companies and adopted a qualitative interpretive research

methodology, and found that most managers deemed corporate governance as ‘a necessary pillar for sustainable corporate social responsibility’ (p.443). Additionally it indicated that the link between corporate governance and corporate social responsibility is an undoubtedly salient two-way association and the interrelationship between them is increasing. One of the important theoretical propositions in the paper mentioned is that ‘good CG is increasingly considered in developing country contexts as a necessary foundational pillar for a genuine and sustainable CSR orientation’ (p.455).

Based on Ullmann’s conceptual framework (1985), Prado-Lorenzo *et al.* (2009) tested a stakeholder theory approach to analysing corporate social responsibility (CSR) disclosure and investigated the monitoring role played by shareholder power and dispersed ownership structure on CSR information in the annual report. In the context of Spain, the presence of financial institutions in the ownership structure, the presence of a physical person who represents a dominant shareholder in the ownership structure, and the percentage of independent board members in the board were employed as independent variables to find their relationships with CSR disclosure. In addition, in the OLS regression, Government power (size, transport and communications sector, industry sector, energy sector, and construction sector), Creditors power (debt-to-equity ratio), Strategic posture (ISO14001 environmental certification, OHSAS 18001 certification), and Economic performance (the return on asset) were adopted as control variables. This article measured the level of CSR information contents, their quality and objectivity founded on the rules for preparation of the GRI (Global Reporting Initiative) model. It also took into account whether the fulfillment of these rules had been certified by the GRI organisation, and whether the data reflected had been verified or audited by entities independent of the firm (p.104). They used five dummy dependent variables, which include information disclosure; informal preparation, preparation for GRI; GRI

Certification; and verification information, to identify the content and quality of CSR information. The empirical findings indicated that the effect of certain stakeholders (government and creditors) upon the strategic posture on the decision to reveal CSR information is confirmed. However, there was no evidence found to prove a relationship between economic performance and CSR disclosure.

Arora and Dharwadkar (2011) tested the effect of corporate governance on corporate social responsibility (CSR) in the context of a developed economy based on time series and cross-sectional regression analysis. They drew out a sample of 518 firms from the S&P 500 and the KLD Domini 400 Universe between 2001 and 2005. In this article, the archival ratings of CSR obtained from the firm Kinder, Lydenberg, and Domini (KLD) Inc. were adopted as the dependent variable. Ownership concentration, managerial ownership and the proportion of independent directors were selected as independent variables to measure the association between corporate governance and CSR. A number of control variables were employed as followed: industry, firm size, research and development intensity, product differentiation, market growth, demand instability, industry structure concentration, capital intensity, dividend pay-outs, CEO age and CEO tenure. The results indicated that strong corporate governance symmetrically impacts on CSR and that it decreases both positive and negative CSR. Additionally it found that the link between effective governance and positive/negative depends on positive attainment discrepancy and the level of organisation slack. At the end, the authors emphasised that ‘good governance reduces negative CSR are unique in that respect and focused on an ignored aspect of governance – preventing bad things from happening’ (p.148).

Cormier *et al.* (2011) investigated the informational contribution of social and environmental disclosures (SEDs) for investors. The main purpose of the article is to

explore whether the quality of SEDs have a substitutionary or a complementary influence in lessening information asymmetry between managers and stock market participants. Based on Wiseman (1982), a coding instrument was adopted to measure environmental disclosure. The quality information rate was set a score from one to three. A score of three is given for an item described in monetary or quantitative terms, two is given when an item is described specifically, and one is given for an item discussed in general. In this paper, environmental disclosure items were divided into two broad dimensions: 1) there is disclosure about environmental debts, risks and litigations, which were captured to make up components of the content grid as follows: expenditure and risk, compliance with laws and regulations, pollution abatement, and land remediation and contamination; 2) there is disclosure about environmental management practices that relates to sustainable development and environmental management grid captions. Using a sample of 137 large Canadian firms listed on the Toronto Stock Exchange for the year 2005, the effect of environmental performance, free float (ownership dispersion), analyst following, leverage, profitability, firm size, board independence, board size, board size squared, audit committee size, and environmental news exposure on SEDs were tested by regression analysis. The findings indicated that environmental performance, environmental news exposure, and firm size are key determinant factors of SEDs. Moreover, analyst following, leverage, and board size were proved to significantly relate with environmental disclosure. However, there was no evidence found to confirm any association between environmental disclosure quality and each of free float, profitability, board independence, and audit committee size.

Dincer (2011) researched whether or not the shareholders really care about corporate social responsibility (CSR) reporting. On the basis of Ullmann's framework, they investigated whether the CSR reporting of firms can be explained by stakeholder power,

strategy and economic performance based on multiple regression models. A sample of 92 companies listed in the Istanbul Stock Exchange was employed. In measurement of CSR reporting, three principal components of analysis (after Varimax rotation) were defined to weigh economic, social and environmental disclosure: informal reports, formal reports, GRI style reports, and GRI and verified reports. The study found a significant effect from certain stakeholders (government and creditors) on the publication of a CSR report. However, a relationship between economic performance and CSR practice was not found in this study. In addition, financial institutions, investors, and dispersed shareholders do not seem to be interested in a firm's sustainable strategies or activities.

AbuRaya (2012) explored the relationship between corporate governance and environmental disclosure (CED), using UK evidence. The objective of the study was to empirically test the influence of corporate governance on both the quantity and the quality of environmental disclosure using a sample of 229 UK companies during the period 2004-2007. At the same time, they controlled for some corporate characteristics, as well as conducting an in-depth exploration of quality identification and assessment issues. Environmental disclosure quantity was measured by an un-weighted index. A score of 1 was awarded when there was the presence or disclosure of an item in the annual report and 0 otherwise. Disclosure quantity indices were computed as the percentage of the sum of quantity score awarded to maximum applicable quantity scores. Environmental disclosure quality was measured according to four parameters, which named type, direction, outlook and verifiability based on the International Accounting Standards Board (IASB). The rating for CED Type was based on a score of 1 to 3. Three points were given if an item was monetary quantitative, 2 if an item was non-monetary quantitative, and 1 if an item was declarative. The score rate for CED Direction was set at 2 levels of marks: a score of 2 if an item was good or bad and 1 if an item was neutral.

For CED Outlook, a score of 2 was given to forward-looking information and 1 to historical information. Similarly, for CED Verifiability, 2 if an item was verifiable and 1 if an item was non-verifiable. CED Quality Index for each firm was computed as the sum score of CED Type, CED Direction, CED Outlook and CED Verifiability, and then divided by 4. In this research, board independence, role duality, board size, board meetings, education, community influence, cross-directorships, CER committee presence, audit committee independence, remuneration committee independence, nomination committee independence, ownership structure and institution ownership were employed as independent variables to research the role of corporate governance on each CER quantity and quality. In addition, they controlled for size, industry, profitability, leverage, liquidity, systematic risk and cross-listing in OLS regression analysis. The empirical findings indicated that role duality, board size, board meetings, education, corporate environmental responsibility (CER) committee presence, audit committee independence, ownership concentration, size, and industry play a significant role on VED quantity while board meetings, cross-directorships, CER committee presence, audit committee independence, remuneration committee independence, size, industry, liquidity, and systematic risk effectively influence VED quality.

Dam and Scholtens (2012) examined whether ownership type matters for CSR looking at a sample of 690 multinational firms from 16 European countries covering 35 industries in 2005. They collected data of corporate social performance based on the Ethical Investment Research Service (EIRIS) dataset instead of the well-known KLD dataset, because the latter one merely covers US companies while EIRIS involves 2,600 firms globally. Specifically, there were 20 different indicators from the dataset and then three factor scores were summarised by the authors based on various aspects of CSR, which were labelled “stakeholders”, “ethics”, and “environment”. Five score levels were

defined as follows: score of “-1” for inadequate; “0” for weak; “1” for moderate; “2” for good; and “3” for exceptional. They controlled for size, ROA, industry type, country of origin, leverage, and liquidity ratio. The result indicated that the holdings by employees, individuals, and firms play a negative role on CSR performance. However, this research failed to prove a significant relationship between CSR and ownership by the state, banks and institutional investors. The authors suggested that companies should take the information of their ownership structure into consideration when they establish and implement CSR strategy.

Iatridis (2013) focused on common-law Malaysia to explore the environmental disclosure quality evidence with relation to corporate governance, environmental performance and value relevance. With regard to the relationship between quality of environmental disclosure and corporate governance, the author used 3,703 firm-year observations between 2005 and 2011. The research period was chosen because of the International Financial Reporting Standards (IFRSs) applied by Malay listed companies from January 2012. Environmental disclosure quality was measured by the scoring index based on the GRI Guidelines. The score for all firms ranged between 0% and 100%. The findings indicated that the quality of environmental disclosures is significantly impacted by the percentage of independent directors in the board and the audit committee, big 4 auditors, audit committee, managerial ownership, institutional ownership, change in management, cross-listed company, ROA, and firm size.

Top executive's turnover is a normal in corporate operations (Shen and Cho, 2005) and the average frequency of top executives' turnover rates reached 25.5 percent in Chinese listed companies (Chang and Wong, 2009). Meng *et al.* (2013) asserted that top executives play a vital role in taking on corporate environmental responsibility, and thus

they explored whether top executives' turnover impacts on environmental disclosure practice, using a sample of 782 Chinese manufacturing firms listed on the Shanghai and Shenzhen Stock Exchanges during a 3-year period from 2006 to 2008. In the Chinese context, the chairman was chosen to represent the top executive in this article. The main reason was that the chairman is an executive position with supreme power and it ranks higher than the CEO (p.342). The authors applied content analysis to score the quality of environmental information in the annual report awarding a score of between 0 and 3 for each company. A score of 3 means a company with monetary and quantitative environmental information; 2 means specific description is given; 1 means some general environmental information is mentioned, and 0 is awarded for no information. They found that a negative link exists between environmental disclosure and involuntary, negative turnover, such as having a chairman outgoing because of dismissal, poor health, death, or forced resignation. Furthermore, the findings indicated that corporate environmental responsibility, measured by environmental information disclosure, is not related to normal turnover and more positive types of chairman's succession, such as, a chairman outgoing because of retirement or contract expiration or internal/external promotion.

Table 4.1

Empirical Studies on the relationship between corporate governance and quality of environmental disclosure

Author(s) & Date	Dependent Variable	Independent Variable	Sample Size & Type, and Time of Observation	Environmental Disclosure Measure	Analysis & General Results
Cormier <i>et al.</i> (2005)	Environmental disclosure quality	Information costs (captured by risk, reliance on capital markets, trading volume, concentrated ownership and foreign ownership), financial condition (captured by market return and leverage), media pressure, fixed assets age, firm size and SEC registrant	55 large German companies which are taken from the DAX 30 /DAX 70 during the 1992-1998	<u><i>The scoring index</i></u>	<u><i>OLS Regression</i></u> RESULT: Risk, ownership, fixed assets age, firm size determined environmental disclosure quality. Moreover, results suggested that German firms' disclosure is converging over time. Overall, results strongly suggested that environmental disclosure is multi-dimensional and is driven by complementary forces.
Brammer and Pavelin (2006)	The quality of voluntary environmental disclosure (VED)	Industry type, environmental performance, firm size, organisational visibility, company ownership, profitability, leverage and board composition	447 UK companies from large firms in 2000	<u><i>Content analysis approach</i></u>	<u><i>Probit and Ordered Probit regression analyses</i></u> RESULT: they found a significantly negative impact from the size of the largest shareholding in a firm on VED quality; and no evidence to prove a relationship between the number of non-executive directors and VED quality.

Brammer and Pavelin (2008)	The quality of corporate environmental disclosure (CED)	Environmental fines, size, media exposure, ownership concentration, profitability, firm leverage, non-executive directors	447 UK companies from large firms in 2000	<u>Content analysis approach</u>	<u>Logistic regression analyses</u> RESULT: firm's size and its business activities are determinants of CED; large firms with environmental sensitivity have high CED; media exposure does not relate to CED.
Prado-Lorenzo <i>et al.</i> (2009)	Corporate social responsibility (CSR) disclosure	Financial institutions, dominant shareholder, independent board members, size, different sectors, DEBT, ISO14001, OHSAS18001, and ROA	99 non-financial Spanish companies quoted on the Spanish continuous market	<u>The scoring index</u> founded on the rules for preparation of the GRI model	<u>OLS Regression</u> RESULT: the results obtained confirm that the influence exerted by certain stakeholders (government and creditors), together with the strategic posture of the firm, have an important effect on the publication of a CSR report. Economic performance has a null effect on this process.
Arora and Dharwadkar (2011)	Corporate social responsibility (CSR)	Ownership concentration, managerial ownership, independent director, governance index, industry, firm size, research and development intensity, product differentiation, market growth, demand instability, and industry structure concentration, capital intensity, dividend payouts, CEO age and CEO tenure	518 firms from the S&P 500 and the KLD Domini 400 Universe during the period 2001-2005	<u>Archival ratings of CSR</u> based on the KLD dataset	<u>Regression analysis</u> RESULT: strong corporate governance has a symmetric influence on CSR and that it decreases both positive and negative CSR.

Cormier <i>et al.</i> (2011)	Social and environmental disclosures (SEDs)	Environmental performance, free float (ownership dispersion), analyst following, leverage, profitability, firm size, board independence, board size, board size squared, audit committee size, and, environmental news exposure	137 Canadian firms included in Toronto Stock Exchange S&P/TSX Index for year 2005	<u>The scoring index</u>	<u>Regression analyses</u> RESULT: environmental performance, environmental news exposure, and firm size are key determinant factors of SEDs. Analyst following, leverage, and board size were proved to significantly relate with environmental disclosure. There was no evidence found to confirm the association between the environmental disclosures quality and each of free float, profitability, board independence, and audit committee size.
Dincer (2011)	Corporate social responsibility (CSR) reporting	Stakeholder power, strategy and economic performance	92 companies listed in the Istanbul Stock Exchange	<u>The scoring index</u>	<u>Multiple regression analyses</u> RESULT: an important effect from certain stakeholders (government and creditors) on the publication of CSR reporting. The relationship between economic performance and CSR practice was not found in this study. In addition, financial institutions, investors, and dispersed shareholders seem to not be interested in firms' sustainable strategies or activities.

AbuRaya (2012)	Quantity and the quality of environmental disclosure	Board independence, role duality, board size, board meetings, education, community influence, cross-directorships, CER committee presence, audit committee independence, remuneration committee independence, nomination committee independence, ownership structure and institution ownership, Size, industry, profitability, leverage, liquidity, systematic risk and cross-listing	229 UK companies during a period 2004-2007	<u>Content analysis approach</u>	<u>OLS Regression analyses</u> RESULT: role duality, board size, board meetings, education, corporate environmental responsibility (CER) committee presence, audit committee independence, ownership concentration, size, and industry play a significant role on VED quantity while board meeting, cross-directorships, CER committee presence, audit committee independence, remuneration committee independence, size, industry, liquidity, and systematic risk effectively influence VED quality.
Dam and Scholtens (2012)	Corporate social responsibility (CSR)	Ownership type: state, banks, institutional investors, employees, individuals and firms, Size, ROA, industry type, country of origin, leverage, and liquidity ratio	690 multinational firms from 16 European countries and 35 industries in 2005	<u>The scoring index</u> based on three factor scores “stakeholders”, “ethics”, and “environment” from EIRIS dataset	<u>Regression analyses</u> RESULT: ownership by the state, banks and institutional investors is not found to have a significant relationship with CSR. The holdings by employees, individuals, and firms are proved to relate with poor CSR performance.

Iatridis (2013)	Environmental disclosure quality	Independent directors, % of independent directors in the audit committee, big 4 auditor, audit committee, managerial ownership, institutional investors, change in the management, cross-listed company, ROA, leverage ratio, and size	529 Malaysian listed companies during the period 2005 - 2011	<u><i>The scoring index</i></u> based on the GRI Guidelines	<u><i>The OLS regression analysis</i></u> RESULT: quality of environmental disclosures are significantly impacted by percentage of independent directors in board and the audit committee, big 4 auditors, audit committee, managerial ownership, institutional ownership, change in management, cross-listed company, ROA, and firm size.
Meng <i>et al.</i> (2013)	Environmental information disclosure (EID)	Top executive's turnover, firms' size, concentration of ownership, economic performance, leverage/financial risk and duality	782 Chinese manufacturing firms listed on Shanghai and Shenzhen Stock Exchanges during a 3-year period from 2006 to 2008	<u><i>Content analysis approach</i></u>	<u><i>Regression analyses</i></u> RESULT: a negative link between EID and involuntary and negative turnover (e.g., chairman outgoing because of dismissal, health and death, and forced resignation); EID is not related with the normal turnover and the types of chairman's succession (e.g., retirement or contract expiration or internal/external promotion).

4.3 THEORY AND RESEARCH HYPOTHESES

This empirical chapter mainly examines the role of the two mechanisms (ownership structure and board structure) of corporate governance on the quality of voluntary environmental disclosure using Chinese evidence. Stakeholder theory (e.g., Roberts, 1992; Brammer and Pavelin, 2008; Liu and Anbumozhi, 2009; Spitzeck, 2009; Huang

and Kung, 2010; Kolk and Pinkse, 2010; Cong and Freedman, 2011; Bayoud *et al.*, 2012; Dam and Scholtens, 2012) and agency theory (e.g., Hackston and Milne, 1996; Halme and Huse, 1997; Rouf, 2011) are frequently chosen as the framework in this research area. Based on the discussion, analysis and estimation of the theoretical framework in Chapter 3.3, stakeholder-agency theory, which was introduced by Hill and Jones (1992) and applied by Salama *et al.* (2012), is also adopted in this empirical chapter to develop research hypotheses of the impact on qualitative environmental disclosure from five forms of ownership structure (state ownership, blockholder ownership, managerial ownership, legal person ownership, and foreign share ownership) and board structure (the proportion of independent directors (non-executive directors) on the board of directors and the amount of members in the supervisory board) respectively. This theory integrates the stakeholder concept into agency theory to define explicit and implicit contract(s) between a corporation's stakeholders, who can affect and/or is affected by the firm's success and failure. Different forms of ownerships are involved in stakeholders. Managers are recognised as unique stakeholders who control the business's running as the agents and are contracted to relate to all other stakeholders. Corporate management needs to evaluate the importance of meeting stakeholder demands and balancing the conflicts of different stakeholders' demands, because the stakeholders effectively impact on the sustainable development of the firm.

4.3.1 Ownership structure

In China, most listed companies were restructured from SOEs. The government, currently, have still ultimate ownership in more than 50 per cent of firms. It shows that state ownership significantly affects most listed companies in China. The government is

can easily access information from other sources. Therefore, the state ownership does not need to acquire information from the annual report. However, according to the OECD (2010), governments explicitly aim at improving the quality of the environmental and social conditions in most countries (Dam and Scholtens, 2012). Khongmalai *et al.*, (2010) indicated that the main target of state-owned enterprises is to fulfil the social objectives of the state. It therefore needs a high level of environmental disclosure due to increasing public concern about social and environmental issues. State ownership could desire higher quality environmental disclosure in order to build the firm's reputation with the aim of satisfying various stakeholders and attracting more domestic and foreign investors to further develop the Chinese economy. It is hypothesised that:

Hypothesis 3(a) State ownership and quality of voluntary environmental disclosure are positively related.

Blockholder ownership, the substantial shareholders who hold 5 per cent or more ordinary shares, is one of the main forms in China's ownership structure. Although many studies (e.g., Jensen and Meckling, 1976; Adrem, 1999; Eng and Mak, 2003; Brammer and Pavelin, 2008) deemed that dispersed shareholders would incur a greater agency problem due to the conflict interests between agents and many principals, Laidroo (2009) pointed out that dispersed ownerships hold less power and therefore have more difficulty in obtaining the attention of managers and quality information. As in the finding of Broberg *et al.*, (2010), there is no evidence to support a positive relationship between general voluntary disclosure and dispersed ownership based on 431 annual reports from companies listed on the Stockholm Stock Exchange during a 4-year period from 2002. Shleifer and Vishny (1997) argued that substantial shareholders are expected to possess both incentives and greater power to monitor management because of their wealth being

tied to the financial performance of the firm. Brown *et al.* (2011) believed that large blockholders have enough ability to drive managers to take actions which align with their intentions. Under pressure from blockholder ownership, managers may provide higher levels of disclosure in annual reports to free themselves from additional monitoring activities and reduce agency costs entailed in these activities. On the basis of the monitoring role and the abilities of blockholder ownership, a positive relationship between this kind of ownership structure and qualitative environmental disclosure would be expected. It is hypothesised that:

Hypothesis 3(b) Blockholder ownership and quality of voluntary environmental disclosure are positively related.

Managerial ownership in this empirical chapter is measured as the proportion of ordinary shares held by the CEO, senior managers, executive directors, and supervisors. Agency problems arise as a result of the separation between shareholders (the principals) and managers (the agents) (Fama and Jensen, 1983). The latter may reveal information to shareholders in order to reduce the agency problem and cost. When managers take the role of ownership, the conflict between principals and agents would be mitigated. As argued by Jensen and Meckling (1976), additional monitoring is required by outside shareholders as managerial ownership reduces. On the other hand, Adrem (1999) indicated that opportunistic management behaviour is more likely to occur in companies with a low share of management ownership, which would intensify the conflict between principals and agents. Consequently, such companies are expected to increase disclosure with quality information compared to companies with a high level of managerial ownership. Consistent with Eng and Mak (2003), ‘it is expected that voluntary disclosure increase with [a] decrease in managerial ownership’ (p.330). It is hypothesised that:

Hypothesis 3(c) Managerial ownership and quality of voluntary environmental disclosure are negatively related.

Legal person ownership, which comprises domestic legal entities and institutions, including stock companies, private companies, state-owned enterprises and non-bank financial institutions (i.e., investment funds and security companies) (Xu and Wang, 1997; 1999), holds around one-third of total market capitalisation in China (Ma *et al.*, 2010). Legal person shares are not tradable on the stock exchanges, but are allowed to be transferred between institutions with the approval of government (Xiao and Yuan, 2007; Chalmers *et al.*, 2010). Although most legal person shares are similar to state shares which are directly or indirectly controlled by different levels of government (provincial, municipal, or county), a legal person ownership's primary interest may be more monetary than political which is inconsistent with state ownership (Wei *et al.*, 2005). Therefore, legal person shareholders may have more incentives to monitor management as they are likely to be engaged in profit maximisation. Environmental disclosure could help a company to achieve a better reputation and increase investment, which can assist a firm's economic development. Management may choose to increase the quality of environmental information to satisfy the legal person ownership in order to reduce both monitoring and agency cost. It is hypothesised that:

Hypothesis 3(d) Legal-person ownership and quality of voluntary environmental disclosure are positively related.

Foreign share ownership means a higher level of information asymmetry due to different cultures, languages, and attitudes of risk (Broberg *et al.*, 2010). More information with high level of quality in the annual report is expected which would mitigate potential conflicts and misunderstandings between foreign shareholders and managers. Moreover,

Khan *et al.* (2013) mentioned that foreign investors would desire more information including environmental disclosure to assist them when making decisions due to their different values and knowledge. Haniffa and Cooke (2005) found that a positive significant association is found between foreign ownership and corporate social responsibility disclosure based on the context of Malaysia. And they argued that foreign owners need disclosure in order to monitor the actions of management. It is hypothesised that:

Hypothesis 3(e) Foreign shares ownership and quality of voluntary environmental disclosure are positively related.

4.3.2 Board composition

The board composition and the size of the board would affect its ability and function (Brown *et al.*, 2011). In this empirical chapter, the relationship between quality of environmental disclosure and the proportion of independent non-executive directors (INDs) to the number of directors on the board is examined to explore the role of INDs in disclosure practice. According to the Cadbury Report (1992), IND should be more inclined to encourage the firms to increase disclosure for shareholders, because they are less aligned with management (Eng and Mak 2003). A greater presence of outside directors should lead to 'heightened salience of stakeholder claims and augmented resources to address stakeholder claims' (Zhang *et al.*, 2013, p.384). On the other hand, disclosure (including environmental information) is symbolic actions (Mahadeo *et al.*, 2011), which is seen to be part of the 'organisation-society' interaction (Gray *et al.*, 1995, p.56). IND has incentives to disclose more information with a higher quality for the

purpose of establishing the reputation of its monitoring ability (Fama and Jensen, 1983). As noted by Brickley and Zimmerman (2010), outside directors favour social and political objectives. According to the study of De Villier *et al.* (2009), companies with strong environmental practices have more outside directors. Many previous studies show a higher proportion of INDs on the board were associated with a higher level of disclosure in a firm (e.g., Forker, 1992; Chen and Jaggi, 2000; Akhtaruddin *et al.*, 2009).

It is hypothesised that:

Hypothesis 4(a) The proportion of independent directors to the number of directors on the board and quality of voluntary environmental disclosure are positively related.

In 1993, China's company law was enacted, which made requests about the supervisory board. This law pointed out that companies have to hold a supervisory board, with at least three members, who are independent of the board of directors and whose duty it is to oversee the board of directors (Firth *et al.*, 2007). Many scholars (e.g., Dahya *et al.*, 2003; Mallin, 2006; Wei and Geng, 2008; Tricker, 2009) deemed that the supervisory board in Chinese companies is an ineffective ornament. As Mallin (2006) noted, that the supervisory board in Chinese companies does not have right to appoint and dismiss executive board directors. However, Ding *et al.* (2010) mentioned that the powers of the supervisory board are improved significantly since the amendment of Corporation Law in 2005. Supervisory boards now have the power to propose the dismissal of directors and top management, and sue managers who commit frauds. They can also raise questions and make suggestions in the board meeting, and curb executive compensation. The expanded mandate of the supervisory board improves the quality of accounting information (Firth *et al.*, 2007). In the same way, the quality of environmental disclosure also could be expected to improve, based on the stakeholder-agency theory, that firms

tend to disclose more information in order to reduce information asymmetry (Hill and Jones, 1992, Huang and Kung, 2010) and obtain stakeholders' trust. Compared with quantitative environmental information, qualitative disclosure is more effective in increasing reputation (Hasseldine *et al.*, 2005) and satisfying various stakeholders. Consequently, the supervisory board, which should play a pivotal role in setting policies and monitoring procedures of information disclosure in listed companies (CSRC), is expected to improve board effectiveness in qualitative disclosure practice. It is hypothesised that:

Hypothesis 4(b) The number of members in the supervisory board and quality of voluntary environmental disclosure are positively related.

4.3.3 Control variable

Firm size (FSIZE), measured by the natural logarithm of the firm's total assets in RMB in this chapter, is one of the common elements employed in previous research on determining factors of disclosure. Mahadeo *et al.* (2011) asserted that larger firms would view legitimacy as such a significant resource for them 'to manage in their dealings with multiple stakeholders' that they 'are expected to be involved in a more systematic way in the communication of their social responsibilities' (p.549). Consistently, Ku Ismail and Ibrahim (2008) deemed that large firms with more stakeholders mean more visibility to the public compared with small firms. There are many empirical studies which have proved a significant and positive link between firm size and environmental disclosure in both developed countries (e.g., Brammer and Pavelin, 2008; da Silva Monteiro and Aibar-Guzmán, 2010; Salama *et al.*, 2012) and developing countries (e.g., Ku Ismail and

Ibrahim, 2008; Liu and Anbumozhi, 2009; Mahadeo *et al.*, 2011; Zeng *et al.*, 2012; Iatridis, 2013 ; Khan *et al.*, 2013; Meng *et al.*, 2013). In this chapter, therefore, a positive influence of firm size on the level of environmental disclosure in Chinese listed company is expected.

Leverage (DEBT) is total liabilities divided by total assets. Haniffa and Cooke (2005), Reverte (2009) and Mahadeo *et al.* (2011) mentioned that firms with a high level of financial risk need to disclose more quality information (including environmental disclosure) to avoid or to lessen a negative reaction or worry on the part of lenders. It assumes a positive link between leverage and quality of environmental disclosure.

For profitability (ROE), return on shareholders' equity, a low performing firm may use good quality environmental disclosure to divert the eyes of stakeholders away from its financial difficulties. It may intend for this qualitative environmental information to convince its shareholders and potential investors that its current environmental practice and/or activities may create an economic benefit for them in the future (Reverte, 2009). Hence, a negative relationship between profitability and quality of environmental disclosure is assumed.

Age of firm (AGE) is also employed as a control variable in this chapter. Compared with mature firms with long-standing reputation and brand awareness to help obtain investment, a new firm may reveal more qualitative environmental information in order to attract the attention of financial stakeholders. The quality of environmental information not only improves the image of the firm, but it also increases the confidence of investors that the firm would develop in a right and proper way and therefore has the potential to produce economic benefit in the future. Consequently, a significant negative association is expected between age of firm and qualitative environmental disclosure.

Environmentally sensitive industries (INDUSTRY) is measured by a dummy variable, coded as 1 for a firm belonging to an environmentally sensitive industry and 0 otherwise. INDUSTRY is an important control variable for exploring the determinant factors of environmental information in the annual report. As mentioned by Patter (1991), the nature of the industry is a significant factor on social responsibility disclosure (including environmental information). A firm belonging to an environmentally sensitive industry has more attention focused on it by the public with regard to environmental issues and protection. In contrast with other industries, firms operating in environmentally sensitive industries have greater environmental impacts on society (Ku Ismail and Ibrahim, 2008), and hence they need to take more social responsibility to reveal a greater quality of environmental information to mitigate the concern of stakeholders and refine its image. Concordant with many studies (e.g., García-Ayuso and Larrinaga, 2003; Hossian *et al.*, 2006; Brammer and Pavelin, 2008; Rao *et al.*, 2012), a positive role of INDUSTRY is assumed to relate with quality of environmental disclosure in this chapter.

4.4 DATA AND METHODOLOGY

4.4.1 Sample

In this empirical chapter, there are 3,690 valid firm-year observations used, which are listed on both the Shenzhen and Shanghai Stock Exchanges between 2009 and 2011. It excludes the firms in the financial sector (such as, bank and other financial firms) with a separate disclosure requirement and ST/*ST/S*ST firms with finance problems in the chapter. The valid sample covers 12 industry sectors. In this research, the CCER database

and the CSMAR database are utilised for financial data collection and annual reports from both the SZSE and the SHSE are adopted for environmental disclosure collection.

4.4.2 Quality of environmental disclosure index

In content analysis, commonly measured variables are divided into quantitative and qualitative items (Kuo et al., 2012). In contrast with quantity units measuring quantitative items, text descriptions are appropriate for the measurement of qualitative items (Aerts and Cormier, 2009). In the same way, environmental disclosure, the dependent variable in this research, is grouped into quantity and quality of environmental information. In the first empirical chapter, the impact on quantitative environmental disclosure from the role played by corporate governance was investigated using Chinese evidence. In this empirical chapter, the unique Chinese corporate governance system (highly concentrated ownership and two-tier structure) motivates the exploration of the association between corporate governance and qualitative environmental disclosure practice in the annual report.

In the evaluation of the qualitative environmental disclosure, at the beginning, 10 items of information are defined in the index to score disclosure in the annual reports, based upon the “Sustainability Reporting Guidelines” of the Global reporting initiative, the “Environmental Information Disclosure Measurement” issued by the Chinese State Environmental Protection Administration (SEPA) and the actual status of China. However, the item of “source significantly affected by withdrawal of source (e.g., water. Coal, ...)” is found barely mentioned in the annual reports of Chinese listed companies in the process of data collection. Therefore, this item is deleted and finally 9 items are

confirmed in this research. A scale of zero to three is assigned to each item: a zero if there is no environmental information, a score of one for items mentioned in general, a score of two for well described items, and a score of three for the item with narrative, quantitative and comparable data and monetary information (Wiseman, 1982; Meng *et al.*, 2013). Based on these 9 items, it could identify company rating for the different categories of qualitative environmental information. In addition, in contrast to a scale of zero to three assigned to each company, the score system in this paper extends to the measurement of qualitative environmental disclosure in detail. For example, any high level of disclosure scores given in this study do not only highlight the companies with narrative, quantitative, comparable data and monetary information, but also reflects that these firms make great efforts on manifold environmental disclosure practice. There are nine items selected for this research as following:

- 1 The firm's environmental protection policies, strategies, aims, and achievement
- 2 Consumption of materials, water, energy and other resources
- 3 Percentage of materials/resources that is recycled
- 4 Materials, energy and resources saved due to conservation efforts, efficiency and technology improvement.
- 5 Type, quantity, concentration and destination of emissions, effluent and waste
- 6 The firm's environmental investment and cost of pollution control
- 7 Construction and operation of environmental facilities
- 8 Fines/awards paid / received by firm
- 9 Other voluntary environmental information disclosed by the firm

4.4.3 Environmental disclosure index example

A scale of zero to three is assigned to each item: a zero is given for no environmental information and a score of three for the item with narrative, quantitative and comparable data and monetary information (Wiseman, 1982). For example, the 2009 annual report from China Vanke Co., Ltd. stated that ‘..., but also reduce secondary pollution resulting from separate refurbishing by customers, thereby lowering the consumption of construction waste and in line with the energy saving and environmental friendly concept’. For this type of environmental disclosure, it is coded as “1”. In contrast, the 2009 annual report from China Merchants Property Development Co., Ltd. stated that ‘Based on its understanding of and responsibility for the sustainable development of both the industry and cities, the Company has kept exploring the new modes for living and real estate development and held six sessions of “Sino-foreign Green Property Forum” during 2004-2009, with the themes respectively being “Concept and Practice of Sustainable Development”, “Green Community and Harmonious Homeland”, “Green Buildings and Circular Economy”, “Green Practice and Urban Regeneration”, “Green Development and Urban Upgrading” and “Green New Cities and Low-carbon Development”. Through the said six sessions, the forum has become a grand occasion of gathering for both experts and scholars in the field of ecological development and green construction as well as media both at home and abroad, and grown into one of the public-welfare international conferences with the highest academic level in China’s green development field. While advocating the concept of green properties, the company also vigorously applies green technologies to develop “green buildings”.’ This is coded as “2”. The 2009 annual report from China Fangda Group Co., Ltd. stated that ‘In the report term, the products of the Company including energy saving curtain wall, metro screen door, and LED products have saved 7,949 KWH of power, equals to 32,000 ton of coal consuming, reduced CO2

by 83.84 thousand ton, reduced SO₂ by 272 ton, and NO₂ by 236.8 ton. This saved nearly 100 million of power expenses a year'. This type of detailed information is coded as "3".

4.4.4 Reliability test of Content Analysis

'The importance of reliability tests on the assurance it provides that data are obtained independent of the measuring event, instrument or person. Reliable data, by definition, are data that remain constant throughout variations in the measuring process' (Kaplan and Goldsen, 1965, pp.83-84). Stability and reproducibility, two common types of reliability, are summarised by Krippendorff (2004). Stability is the weaker form of reliability, which can be determined when data is constant over time. It uses the same coder to measure the same content more than once using the same predefined criteria (Salama, 2003). Reproducibility refers to two or more analysts measuring the same project at the same time, but at different locations under varying circumstances. These analysts have to work independently of each other. Observed conflicts between these analysts' performances result from intraobserver inconsistencies and interobserver disagreements in the understandings and scoring criteria for the same units of analysis (Krippendorff, 2004). Reproducibility is recognised as having intercoder reliability, which is a much stronger measure of reliability than stability. In this research, both stability and reproducibility are employed to measure the reliability of environmental disclosure. The research employed four coders to measure the environmental disclosure of 15 randomly chosen annual reports. These four coders include the author, one chartered public accountant, and two PhD students in accounting and finance. Each coder read the fifteen annual reports and coded the environmental disclosure independently. Two weeks later, they did these same measurements again to ensure reliability over time.

When more than 2 coders are employed, Coefficient alpha (Waltz *et al.*, 1991, p.166) is an effective adjustment to the coefficient of agreement which is concerned with environmental disclosure content analysis. The result of inter-rater reliability was 77.1 per cent in this study, which accords with the view of Wimmer and Dominick (1991). They pointed out that 75 per cent or better is normally accepted within the content analysis literature. After resolving the disagreements on type and the total of environmental disclosure among the coders, the final inter-rater reliability was 92.8 per cent.

4.4.5 Environmental disclosure index analysis

Table 4.2 shows the proportion of each item measured by scores. For example, the total scores of item 1 in 2009 are 1,540, the percentage of item 1 in 2009 is $1,540/7,741=19.89\%$; the total scores of item 1 for three years are 5,058, the percentage of item 1 is $5,058/22,833=22.15\%$. From the table, it shows that item 1 (22.15%), item 6 (19.79%), and item 9 (28.27%) are close to or over one fifth overall. In other words, companies like to share their environmental protection policies, strategies, aims, and achievement; and also their environmental investment and cost of pollution control to stakeholders via the annual report. On the contrary, item 3 (2.16%), item 4 (4.39%), and item 7 (2.22%) are less than five per cent, which indicates that these three items are chosen by very few companies to be communicated with their stakeholders. In contrast with the most popular environmental disclosure, these kinds of information, which involve the percentage of materials/resources that are recycled; materials, energy and resources saved due to conservation, efficiency and technology improvement; and construction and operation of environmental facilities, are more practical. They would reflect what the firms did concretely for implementing good

environmental practice, and how they did it. The fact that these kinds of environmental information are insufficiently disclosed means that most companies are falling short in the practice of recycling and saving materials and/or resources, and in using environmental facilities utilisation.

Table 4.2

Per cent of each item

	ITEM1	ITEM2	ITEM3	ITEM4	ITEM5	ITEM6	ITEM7	ITEM8	ITEM9	TOTAL
2009	1,540	856	262	524	595	988	187	545	2,244	7,741
% of item	19.89%	11.06%	3.38%	6.77%	7.69%	12.76%	2.42%	7.04%	28.99%	100.00%
2010	1,705	476	121	349	322	1,754	155	565	2,072	7,519
% of item	22.68%	6.33%	1.61%	4.64%	4.28%	23.33%	2.06%	7.51%	27.56%	100.00%
2011	1,813	487	111	252	229	1,777	164	600	2,140	7,573
% of item	23.94%	6.43%	1.47%	3.33%	3.02%	23.46%	2.17%	7.92%	28.26%	100.00%
Total per item	5,058	1,819	494	1,125	1,146	4,519	506	1,710	6,456	22,833
Total % per item	22.15%	7.97%	2.16%	4.93%	5.02%	19.79%	2.22%	7.49%	28.27%	100.00%

Table 4.3

Detail of each item

	ITEM1	ITEM2	ITEM3	ITEM4	ITEM5	ITEM6	ITEM7	ITEM8	ITEM9
A score of 1	1,007	689	115	63	183	72	98	160	727
A score of 2	1,175	100	20	33	67	86	33	142	508
A score of 3	567	310	113	332	273	1,425	114	422	1,571

Table 4.3 shows how many observations reveal environmental disclosure for each item at each of the three different levels. For example, 1,007 firm-year observations are scored 1 for item 1; 1,175 firm-year observations are scored 2 for item 1. The table shows company preference in environmental disclosure practice. With regard to item 1, it shows that more companies tend to reveal descriptive information about their firm's environmental protection policies, strategies, aims, and achievement. For item 6, companies prefer to disclose narrative, comparable data and monetary information to explain their environmental investment and cost of pollution control.

4.4.6 Model specification

Due to the scores of qualitative environmental disclosure being not less than zero, both ordinary least squares (OLS) and TOBIT formulation are employed in this empirical chapter, as for the regression of quantitative environmental disclosure. Moreover, ordered PROBIT regression is also engaged to examine the impact of ownership structure and board composition on quality of environmental disclosure in order to minimise loopholes in empirical testing. The following model is estimated:

$$\begin{aligned} \text{DISCQuality} = & \beta_0 + \beta_1\text{SOE} + \beta_2\text{BLOCK} + \beta_3\text{MOWN} + \\ & \beta_4\text{LEGAL} + \beta_5\text{FOWN} + \beta_6\text{IND} + \beta_7\text{SUPVR} + \\ & \beta_8\text{FSIZE} + \beta_9\text{DEBT} + \beta_{10}\text{ROE} + \beta_{11}\text{AGE} \\ & + \beta_{12}\text{INDUSTRY} + \varepsilon \end{aligned}$$

Where DISCQuality, is the quality of voluntary environmental disclosure score; SOE, the dummy variable for state ownership, coded as 1 for where the ultimate ownership is the state and 0 otherwise; BLOCK, the percentage of ordinary shares held by substantial

shareholders (with 5 per cent or more shareholding); MOWN, the percentage of ordinary shares held by the CEO, senior managers, and directors; LEGAL, the percentage of ordinary shares held by a legal person; FOWN, the dummy variable for foreign share ownership, coded as 1 for if the firm had issued B shares or/and H shares and 0 otherwise; IND, the proportion of independent non-executive directors to the number of directors on the board; SUPVR, the amount of members in the supervisory board; FSIZE, the natural logarithm of the firm's total assets in RMB; DEBT, the leverage ratio: total liabilities divided by total assets; ROE, profitability: return on shareholders' equity; AGE, age of the firm (since it set up); INDUSTRY, the dummy variable for environmentally sensitive firms, coded as 1 for a firm belonging to an environmentally sensitive industry and 0 otherwise.

4.5 RESULTS

4.5.1 Descriptive Statistics of the variables

Table 4.4 provides the descriptive statistics of dependent and independent variables based on 3,690 firm-year observations during the period 2009-2011 in this empirical chapter. The dependent variable, the quality of environmental disclosure (*SQDISCQuality*), is measured by the square root of *DISCQuantity* in order that the dependent variable might tend to a normal distribution as shown in Figure 4.1. The maximum score of *SQDISCQuality* is 5.2 and the average *SQDISCQuality* is 2.29 with the median value 2.24, which reflects the quality of environmental disclosure in the annual report tending to a comparatively low level in most Chinese listed companies. In addition, the minimum score of *SQDISCQuality* (0.00) shown in Figure 4.1 indicates that

there are some listed companies in China which have not revealed any environmental information at all in the annual report. In contrast with *SQDISCQuantity*, dependent variable distributions for *SQDISCQuality* are more symmetrical and balanced. Figure 4.2 depicts the trend in qualitative environmental disclosure in each of the sample years, 2009-2011 inclusive. There is a steady increase in *SQDISCQuality* over the research period, where the mean quality of environmental disclosure is 2.27 in 2009, 2.28 in 2010, and 2.30 in 2011. The increasing trend reflects an improvement of environmental information quality in the annual reports of Chinese listed companies on average in recent years. The possible explanations for the increase of qualitative environmental disclosure are modified relevant policies and regulations of disclosure practice (e.g., “Measures for the Disclosure of Environmental Information (for Trial Implementation)” and “Guidance for strengthening the supervision and management on the Environmental Protection of listed compan[ies]” issued by the Ministry of Environmental Protection of the People’s Republic of China in 2008; “Guidelines of environmental disclosure in listed companies” issued by the Shanghai Stock Exchange in 2008; “Announcement on fulfilling the annual reports of listed companies in 2009 and relevant work” issued by the China Securities Regulatory Commission (CSRC); and “Guidelines of environmental disclosure in listed companies (Draft)” issued by the Ministry of Environmental Protection of the People’s Republic of China in 2010) and the higher requirement of stakeholders because of their more extensive knowledge and higher achievements (e.g., higher education, convenient Internet access, and various other sources of information). However, It is worth mentioning that, in the annual reports of Chinese listed companies, the increase of qualitative environmental still lacks ‘bad news’ disclosed.

Blockholder ownership shows a minimum score of 0.00% and maximum of 95% in the table. Its mean value (46%) and median value (47%) show that its distribution is quite

symmetrical at all levels of blockholder's percentage. As can be seen from table 4.4, insider shares (non-tradable) held by the CEO, senior managers, and directors represents 1% of the issued share capital on average. The mean value (9%) of foreign share ownership indicates that very less Chinese firms are issued B shares on one of these two Chinese flagship stock exchanges, which are set up in Shanghai and Shenzhen, or/and issued H shares in Hong Kong exchange. The average number of independent non-executive directors is 36 per cent (median is 33 per cent) and the average supervisory board has 3.9 members (median is 3) reflecting that most listed companies in China are complying with the requirements of size and proportion in board composition based on the relevant rules and regulations, which are the Corporate Law (2006 version) and the "Code of Corporate Governance for Listed Companies in China". It is just 29 years since the oldest company was set up, which means that all listed companies are still young in the Stock Exchanges. In terms of skewness and kurtosis, Mohamed *et al.* (2010) mentioned there is a symmetrical distribution when the values of skewness and kurtosis are between 1.0 and -1.0, and vice versa. As shown in the table 4.4, we found that at least one value of skewness and kurtosis for all of variables are over the range. It means that not all variables are fully symmetrical. However, the values of these variables in this study are nevertheless close to the range. In other words, their distributions are relatively symmetrical, which is expedient for developing the regression tests.

Table 4.4

Descriptive Statistics of the variables

Variables	Mean (Median)	Standard Deviation	Minimum (Maximum)	Skewness	Kurtosis
Panel A: Dependent					
<i>SQ</i> DISCQuality	2.29 (2.24)	0.98	0.00 (5.20)	-0.21	2.88
Panel B: Independent					
lagSOE	0.59 (1.00)	0.49	0.00 (1.00)	-0.36	1.13
lagBLOCK	0.46 (0.47)	0.17	0.00 (0.95)	0.05	2.55
lagMOWN	0.01 (0.00)	0.06	0.00 (0.69)	5.96	42.86
lagLEGAL	0.10 (0.00)	0.18	0.00 (0.85)	1.99	6.10
lagFOWN	0.09 (0.00)	0.28	0.00 (1.00)	2.97	9.84
lagIND	0.36 (0.33)	0.05	0.09 (0.71)	1.53	7.28
lagSUPVR	3.90 (3.00)	1.26	1.00 (12.00)	1.31	5.17
lagLogFSIZE	21.77 (21.63)	1.21	18.27 (27.62)	0.80	4.07
lagDEBT	0.48 (0.49)	0.19	0.01 (0.96)	-0.21	2.35
lagROE	0.09 (0.08)	0.09	-0.44 (0.44)	-0.39	6.51
lagAGE	12.52 (12.00)	4.41	1.00 (29.00)	0.03	2.85
lagINDUSTRY	0.66 (1.00)	0.47	0.00 (1.00)	-0.68	1.46

Figure 4.1

Dependent variable distributions

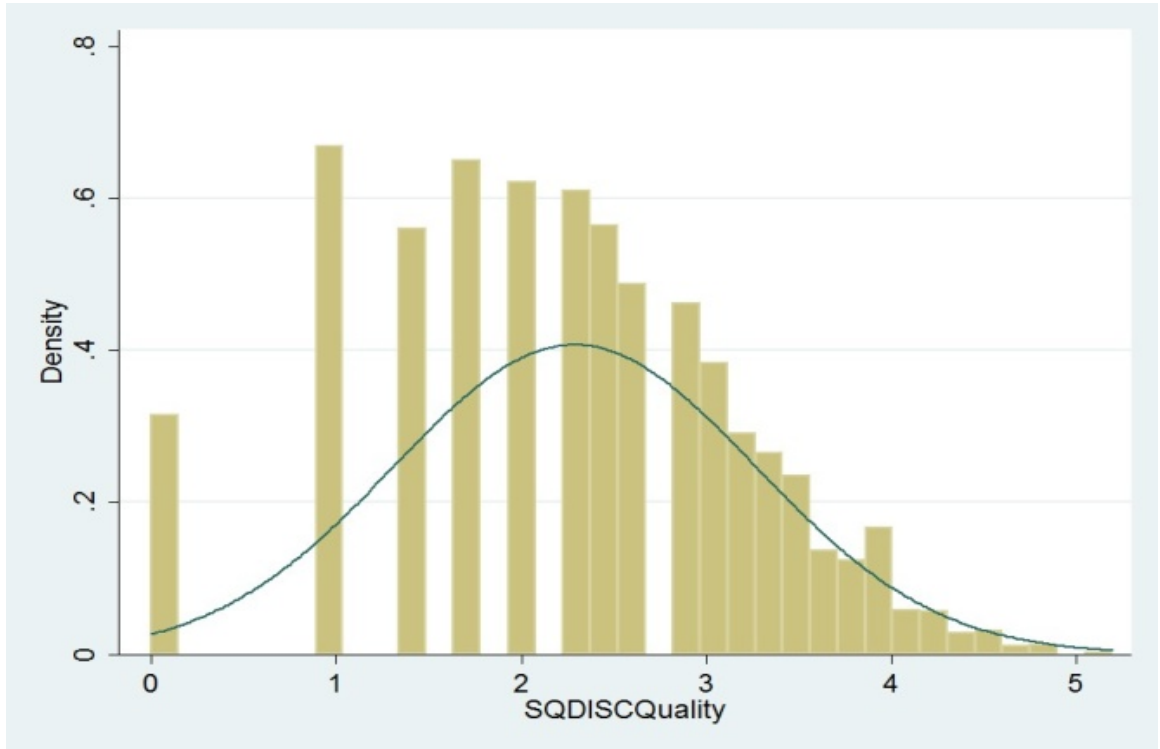
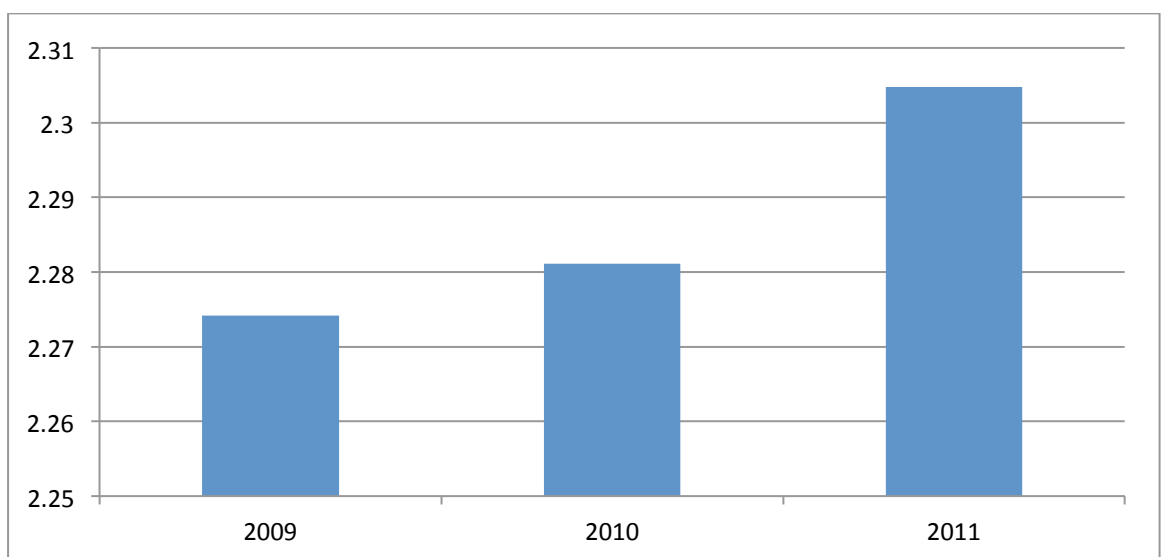


Figure 4.2

Trend of Environmental Disclosure Quality



4.5.2 Multicollinearity

In this empirical chapter, Pearson's Correlation is adopted to measure whether multicollinearity is a problem in the relationship between independent and control variables. Due to the same independent and control variables being employed in the regressions to test the relationships both with quantity and with quality of environmental disclosure, the correlation coefficient between these variables to each other in table 4.5 is the same as in table 3.6. The highest value of coefficient is -0.4396 between SOE and LEGAL, which is at an acceptable level of multicollinearity well below the harmful level (more or equal to ± 0.8). In the same way, looking at VIF, which is another effective means of testing multicollinearity (Ho and Wong, 2001), scores also ranged from 1.02 for IND to 1.59 for logFSIZE as shown in table 4.6, which is well below the harmful value of VIF (10). Thus, together these results indicate that multicollinearity is not an issue in this study.

Table 4.5

Correlation coefficients of key variables

	lagSOE	lagBLOCK	lagMOWN	lagLEGAL	lagFOWN	lagIND	lagSUPVR	lagLogFSIZE	lagDEBT	lagROE	lagAGE	lagINDUSTRY	
SQDISCQuality	1												
lagSOE	0.1398	1											
lagBLOCK	0.1011	0.0369	1										
lagMOWN	-0.0244	-0.2470	0.0548	1									
lagLEGAL	-0.0730	-0.4396	0.2379	-0.0319	1								
lagFOWN	0.0352	0.1326	0.1335	-0.0660	-0.0753	1							
lagIND	-0.0023	-0.0282	0.0475	0.0449	-0.0151	0.0278	1						
lagSUPVR	0.1678	0.2680	0.0439	-0.1151	-0.1609	0.0666	-0.0756	1					
lagLogFSIZE	0.2896	0.2764	0.1780	-0.1481	-0.1134	0.2965	0.0665	0.2159	1				
lagDEBT	0.1163	0.1473	-0.0472	-0.1073	-0.0614	0.0469	-0.0068	0.1177	0.4352	1			
lagROE	-0.0087	-0.0792	0.1494	0.0522	0.0575	-0.0076	-0.0219	0.0066	0.1685	0.0070	1		
lagAGE	-0.0899	0.1305	-0.3619	-0.2270	-0.0914	0.1463	-0.0297	0.0714	0.1339	0.1777	-0.0263	1	
lagINDUSTRY	0.3638	-0.0275	0.0325	0.0449	0.0242	-0.0032	0.0074	0.0264	-0.0392	-0.0279	-0.0334	-0.1931	1

Note: N=3690 observations

DISCORE voluntary environmental disclosure score; *SOE* dummy variable for state ownership, coded as 1 for where the ultimate ownership is the state and 0 otherwise; *BLOCK* percentage of ordinary shares held by substantial shareholders (with 5 per cent or more shareholding); *MOWN* percentage of ordinary shares held by the *CEO*, senior managers, and directors; *LEGAL* percentage of ordinary shares held by a legal person; *FOWN* dummy variable for foreign share ownership, coded as 1 for where the firm had issued B shares or/and H shares and 0 otherwise; *IND* proportion of independent non-executive directors to the number of directors on the board; *SUPVR* the amount of members in supervisory board; *FSIZE* natural logarithm of the firm's total assets in RMB; *DEBT* leverage ratio: total liabilities divided by total assets; *ROE* profitability: return on shareholders' equity; *AGE* age of the firm (since it set up); *INDUSTRY* dummy variable for environmentally sensitive firms, coded as 1 for a firm belonging to an environmentally sensitive industry and 0 otherwise

4.5.3 Endogeneity test

Due to endogeneity problems existing in empirical regressions would impact on their results significantly (Core *et al.*, 2006; Ntim *et al.*, 2012), the regression of the relationship between quality of environmental disclosure and corporate governance need to do endogeneity test in order to insure the accuracy of the research findings in this empirical chapter.

According with the suggestion of Dam and Scholtens (2012) and Nitm *et al.* (2012), the independent and control variables are lagged from the dependent variables in order to reduce potential problems with endogeneity. Then, single-equation instrumental-variables regression with a two-stage least squares (2SLS) estimator is employed to do the Hausman test. In the process, independent variables are regarded as endogenous variables; control variables are treated as exogenous variables; and lagged endogenous variables are found as instrumental variables to run the single-equation instrumental-variables regression. It assumes that H_0 : variables are exogenous. The result of the endogeneity test indicates that F value is equal to 1.38684 with $p = 0.2063$. H_0 is accepted when p value is more than 0.05. Thus, endogeneity problems are not a concern in this research.

4.5.4 Results of empirical testing

The empirical results on the relationship between environmental disclosure quality and corporate governance are tested through both cross-sectional and time series data. Table 4.6 presents the results of regressing the explanatory variables on the quality of environmental disclosure score based on OLS, TOBIT and Ordered PROBIT formulation

by cross-sectional data. This table indicates an adjusted R-squared value of 0.245 and an F value of 102.03 ($p=0.000$), which shows that 24.5% of the variation in the environmental disclosure quality level can be explained by variation in the whole set of independent and control variables. The F value of OLS regression is 102.03 with significance at $p=0.000$ which means that this regression model is statistically significant. There are two independent variables (FOWN and SUPVR) with a regression coefficient which is significant at the 0.01 level and two independent variables (SOE and BLOCK) with a regression coefficient which is significant at the 0.05 level in these three regressions. Moreover, the independent variable (LEGAL) is significant at the 0.1 level. Some well-known control variables (e.g., LogFSIZE, ROE, AGE, and INDUSTRY) from previous research are provided to influence the analysis of environmental disclosure quality in this study. Table 4.7 shows the outcomes of regressing panel data by fixed and random effect models (with and without industry effects). The figures in parentheses are standard errors robust to heteroscedasticity. The significant values (54.96 with $p=0.000$ and 52.41 with $p=0.000$) for the Hausmen test indicate that the fixed effect estimates are more appropriate than the random effect estimates in this empirical study. In the results of fixed effect model, it shows a positive significant coefficient ($\beta = 0.633, p < 0.01$) of the managerial ownership (MOWN) variable. It implies more managerial ownership means a higher level of environmental information in the annual report based on the time series data. There is no impact found on environmental disclosure from IND on the quality of environmental information, which is consistent with the outcomes from OLS, TOBIT, and Ordered PROBIT regressions. In contrast with pooled data, however, there are many different results. It displays that SOE, BLOCK, LEGAL, FOWN, SUPVR and FSIZE are not significantly associated with quality of environmental disclosure. The great discrepancy in the outcomes between pooled data and panel data is probably caused

by a 3-year observation period being too short to do the Hausman test by panel data. Therefore, the analysis and discussion of the regression results is mainly focused on the cross-sectional data in this empirical chapter to explore the monitoring role played by different corporate governance mechanisms on environmental disclosure quality.

Table 4.6

Regression results

Variable	Predicted sign	OLS Regression		Tobit Regression		Ordered Probit Regression		VIF
		Quantity of VED		Quantity of VED		Quantity of VED		
		Coeff.	Robust Std. Err.	Coeff.	Robust Std. Err.	Coeff.	Robust Std. Err.	
INTERCEPT		-3.616 ***	(0.308)	-3.619 ***	(0.308)			
lagSOE	+	0.084 **	(0.035)	0.084 **	(0.035)	0.100 **	(0.041)	1.52
lagBLOCK	+	0.201 **	(0.100)	0.202 **	(0.100)	0.261 **	(0.118)	1.42
lagMOWN	-	0.132	(0.202)	0.132	(0.201)	0.141	(0.236)	1.16
lagLEGAL	+	-0.164 *	(0.093)	-0.164 *	(0.093)	-0.199 *	(0.109)	1.42
lagFOWN	+	-0.223 ***	(0.053)	-0.223 ***	(0.053)	-0.269 ***	(0.063)	1.16
lagIND	+	-0.393	(0.270)	-0.392	(0.270)	-0.476	(0.322)	1.02
lagSUPVR	+	0.065 ***	(0.012)	0.065 ***	(0.012)	0.080 ***	(0.014)	1.12
lagLogFSIZE		0.248 ***	(0.015)	0.249 ***	(0.015)	0.302 ***	(0.019)	1.59
lagDEBT		-0.051	(0.087)	-0.052	(0.087)	-0.069	(0.102)	1.29
lagROE		-0.586 ***	(0.174)	-0.587 ***	(0.174)	-0.786 ***	(0.208)	1.08
lagAGE		-0.012 ***	(0.004)	-0.011 ***	(0.004)	-0.014 ***	(0.004)	1.36
lagINDUSTRY		0.749 ***	(0.031)	0.749 ***	(0.031)	0.890 ***	(0.039)	1.05
Adj R-squared		0.245	Pseudo R2	0.102	Pseudo R2	0.052		
N		3690		3690		3690		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

DSCORE voluntary environmental disclosure score; *SOE* dummy variable for state ownership, coded as 1 for where the ultimate ownership is the state and 0 otherwise; *BLOCK* percentage of ordinary shares held by substantial shareholders (with 5 per cent or more shareholding); *MOWN* percentage of ordinary shares held by the CEO, senior managers, and directors; *LEGAL* percentage of ordinary shares held by a legal person; *FOWN* dummy variable for foreign share ownership, coded as 1 for where the firm had issued B shares or/and H shares and 0 otherwise; *IND* proportion of independent non-executive directors to the number of directors on the board; *SUPVR* the amount of members in supervisory board; *FSIZE* natural logarithm of the firm's total assets in RMB; *DEBT* leverage ratio: total liabilities divided by total assets; *ROE* profitability: return on shareholders' equity; *AGE* age of the firm (since it set up); *INDUSTRY* dummy variable for environmentally sensitive firms, coded as 1 for a firm belonging to an environmentally sensitive industry and 0 otherwise

Table 4.7

Fixed or Random: Hausman test

Quality of VED								
Variable	Fixed		Random			Random		
	Coeff.	Robust Std. Err.	Coeff.	Robust Std. Err.	Coeff.	Robust Std. Err.	Coeff.	Robust Std. Err.
INTERCEPT	3.921 ***	(1.329)	-3.041 ***	(0.421)	-2.591 ***	(0.445)		
lagSOE	-0.001	(0.058)	0.079 **	(0.038)	0.080 **	(0.038)		
lagBLOCK	0.229	(0.262)	0.160	(0.127)	0.141	(0.126)		
lagMOWN	0.633 ***	(0.210)	0.275	(0.183)	0.328 *	(0.183)		
lagLEGAL	-0.188	(0.116)	-0.201 **	(0.090)	-0.187 **	(0.090)		
lagFOWN	0.027	(0.269)	-0.181 **	(0.077)	-0.186 **	(0.076)		
lagIND	-0.279	(0.469)	-0.350	(0.309)	-0.296	(0.306)		
lagSUPVR	-0.003	(0.036)	0.063 ***	(0.016)	0.056 ***	(0.016)		
lagLogFSIZE	-0.081	(0.067)	0.223 ***	(0.021)	0.225 ***	(0.021)		
lagDEBT	-0.369 *	(0.223)	-0.134	(0.110)	-0.062	(0.113)		
lagROE	0.161	(0.204)	-0.197	(0.176)	-0.127	(0.178)		
lagAGE	0.024	(0.018)	-0.012 **	(0.005)	-0.013 **	(0.005)		
lagINDUTRY			0.747 ***	(0.045)	-0.225	(0.200)		
Industry effect	No		No		Yes***			
Hausman			54.96 ***		52.41 ***			
Number of observations	3690		3690		3690			

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

DSCORE voluntary environmental disclosure score; *SOE* dummy variable for state ownership, coded as 1 for where the ultimate ownership is the state and 0 otherwise; *BLOCK* percentage of ordinary shares held by substantial shareholders (with 5 per cent or more shareholding); *MOWN* percentage of ordinary shares held by the CEO, senior managers, and directors; *LEGAL* percentage of ordinary shares held by a legal person; *FOWN* dummy variable for foreign share ownership, coded as 1 for where the firm had issued B shares or/and H shares and 0 otherwise; *IND* proportion of independent non-executive directors to the number of directors on the board; *SUPVR* the amount of members in supervisory board; *FSIZE* natural logarithm of the firm's total assets in RMB; *DEBT* leverage ratio: total liabilities divided by total assets; *ROE* profitability: return on shareholders' equity; *AGE* age of the firm (since it set up); *INDUSTRY* dummy variable for environmentally sensitive firms, coded as 1 for a firm belonging to an environmentally sensitive industry and 0 otherwise

In the study, Table 4.6 shows a positive significant coefficient ($\beta = 0.084$, $p < 0.05$) of the state ownership (SOE) variable in OLS regression. Moreover, positive significant coefficients ($\beta = 0.084$, $p < 0.05$; and $\beta = 0.100$, $p < 0.05$) of SOE variables are also presented in both TOBIT and Ordered PROBIT regressions, respectively. They imply that the state having ultimate ownership results in a high level of environmental disclosure thus supporting Hypothesis 3(a). In China, where there is state ownership in

listed companies, it holds supreme power, sufficient to determine the career of managers (such as, promotion, demotion, and even dismissal) and the targets of the corporation. Therefore, the main objective of managers operating these firms is to fulfill the aims of the state ownership in order to protect their own position and get promotion. The State, as the main ownership in a firm, aims to fulfil social objectives rather than merely maximising shareholders' wealth. Especially in recent years, environmental issues have reached such a severity as to give a negative image of China. Hence, managers need to increase the quality of environmental information given in order to reduce concerns about environmental problems and to improve public impressions in order to satisfy the state. The evidence of this study confirms well that state ownership effectively drives managers to reveal a higher level of environmental disclosure quality in the annual reports to mitigate increasing of public concern about social and environmental issues, to build the firms' reputation to satisfy various stakeholders, and to attract more domestic and foreign investors for the development of the Chinese economy.

In the results of both OLS and TOBIT regressions, there is evidence found to support the effective impact of blockholder ownership (BLOCK) on the quality of environmental disclosure. It presents a significant positive relationship between blockholder ownership (with coefficients $\beta = 0.201$, $p < 0.05$ in the OLS regression; and $\beta = 0.202$, $p < 0.05$ in the TOBIT regression) and environmental disclosure quality. In addition, there is a positive significant coefficient ($\beta = 0.261$, $p < 0.05$) of BLOCK in Ordered PROBIT formulation, which implies that a higher proportion of blockholder ownership results in a higher level of environmental disclosure quality. Consequently, Hypothesis 3(b) is proved through analysing the evidence of Chinese listed companies. As mentioned above, managers prefer to utilise a high level of environmental disclosure in order to satisfy the demands of blockholder ownership and thus to relieve monitoring activities and reduce

agency costs entailed in these activities, because blockholder ownership is deemed to hold enough ability and power to drive managers to take actions aligning with its intentions (Brown *et al.*, 2011). In China, as many blockholder ownerships are controlled by the state, social objectives are considered as well as financial in their decision-making.

In the association between managerial ownership and voluntary information disclosure, there are mixed findings in previous research. In table 4.6, it displays that managerial ownership (MOWN) is not significantly associated with the level of qualitative environmental disclosure. In detail, there is a slightly positive influence of managerial ownership (with coefficients $\beta = 0.132$, $p > 0.1$ in OLS regression; $\beta = 0.132$, $p > 0.1$ in TOBIT regression; and $\beta = 0.141$, $p > 0.1$ in Ordered PROBIT regression) on quality of environmental disclosure. In contrast with quantitative disclosure practice, the outcomes reflect that managerial ownership does not attach importance to the quality of environmental disclosure. In other words, managerial ownership deems that the amount of disclosure information alone would be adequate to contribute to the aim of the firm; they do not need to provide meaningful information in the annual report. However, a positive significant relationship between managerial ownership and environmental disclosure quality is found based on time series data. Combined with the results of cross-sectional data, it suggests that although managerial ownership on the whole does not pay a lot of attention to environmental disclosure quality, the importance of qualitative environmental disclosure practice is gradually being realised by managerial ownership, year on year.

Hypothesis 4(d) is unacceptable based on the findings in the research. In all three regressions, legal person ownership is found to negatively impact on environmental disclosure quality. The results reflect that legal person ownership prefers profit

maximisation and current interest rather than social and political objectives and long-term benefit. In detail, many costs would be incurred in the process of environmental disclosure practice. It could hinder profit maximisation which is the main aim of legal person ownership. Although quality of environmental disclosure could contribute to the social and political objectives of the state and bring long-term benefit from sustainable development, current profit maximisation holds more attraction for legal person ownership which emerged as a part of economic reform plans to reduce government intervention in companies and encourage profit-seeking incentives and competition (Qian, 1999; Delios and Wu, 2005). Furthermore, compared with limited good environmental information, legal person ownership would actually prefer to hide environmental information, especially poor information, in order to protect a firm's image and profit. These interpretations explain why a high level of legal person ownership relates to a low level of environmental disclosure quality.

The results present negative significant coefficients ($\beta = -0.223$, $p < 0.01$ in OLS regression; $\beta = -0.223$, $p < 0.01$ in TOBIT regression; and $\beta = -0.269$, $p < 0.01$ in Ordered PROBIT regression) of foreign share ownership (FOWN) variables in three regressions. It indicates that the firms issuing B shares and/or H shares resulted in having a low level of qualitative environmental disclosure, which is contrary to Hypothesis 3(e). One possible explanation for the failure to find a positive significant association between foreign share ownership and environmental disclosure quality is the characteristic properties of Chinese society (e.g., strong uncertainty avoidance). When firms in Chinese market, which have issued B shares and/or H shares, are required to supply their annual reports in both Chinese and English, they would tend to reduce transparency and reveal less voluntary information about the environment in the annual reports to foreign stakeholders in order to refrain from risk-taking because of uncertainties. In the study of

Bokpin and Isshaq (2009), a negative significant relationship between total disclosure score (TDS) and foreign ownership (FORESHRE) was found through analysing the evidence from the Ghana Stock Exchange during a six-year period 2002-2007. Aksu and Kosedag (2006) and Mangena and Tauringana (2007) employed two models to investigate the impact of foreign ownership (independent variable) on total disclosure score (dependent variable) and the influence of disclosure score (independent variable) on foreign ownership (dependent variable), respectively. They found negative significant coefficients ($\beta = -0.001, p < 0.01$) of FORESHRE and ($\beta = -72.921, p < 0.01$) of TDS in these two regression results and therefore suggest that a high level of foreign ownership in a firm results in less corporate disclosure. The results of their study on corporate governance, disclosure and foreign share ownership is consistent with the finding in this research about the effect of foreign share ownership on environmental disclosure quality.

In this study, there is no evidence found to confirm Hypothesis 4(a) that a positive significant role is played by independent non-executive directors (IND) on environmental disclosure quality. Table 4.6 documents negative coefficients ($\beta = -0.393, p > 0.1$ in OLS regression; $\beta = -0.392, p > 0.1$ in TOBIT regression; and $\beta = -0.476, p > 0.1$ in Ordered PROBIT regression) of IND, which means a slightly negative association between IND and environmental disclosure. It reflects that in terms of VED, the role of independent non-executive directors in Chinese listed companies is ineffective. This result is consistent with the role of IND on quantity of environmental disclosure, which is explored in Chapter 3. For similar reasons, independent non-executive directors in Chinese listed companies are regarded as a kind of symbolic mechanism in order to meet the requirement of the “Code of Corporate Governance for Listed Companies in China” which states that the board should be made up of at least one-third independent directors. In fact, almost all independent non-executive directors in Chinese listed companies are

social celebrities and important government officials. They are too busy to perform their obligations effectively (Lin *et al.*, 2003), and/or they lack the knowledge and experience needed to exert any substantial influence on the board (Zhang, 1999; Wei, 2002). In addition, most independent non-executive directors have their own jobs. Independent directorship is a temporary post or a subordinate occupation for these people, and so losing it would not threaten their livelihood. That is why independent non-executive directors do not focus their attention and energy on the development of environmental disclosure practice. There is another possible explanation that the findings are inconsistent with Hypothesis 4(a). As the above mentioned, managers are in the hand of the state ownership in Chinese listed companies. Therefore, managers directly follow the interests of state ownership or other powerful blockholder ownerships who are important for managers' position (based on the organisation and managerial perspective evolved from stakeholder theory). To some extent, it makes independent non-executive directors mere figureheads who cannot impact the decisions of disclosure practices. Although there are many Guides and Codes issued in China to direct and rule independent directors' activities, the results of this study implies that these rules and regulations are useless, and therefore need to be strengthened and improved if they are to regularise independent directors' behaviour and increase their initiative.

Hypothesis 4(b) is confirmed well in this study. There are positive significant coefficients ($\beta = 0.065$, $p < 0.01$ in the OLS regression; $\beta = 0.065$, $p < 0.01$ in TOBIT regression; and $\beta = 0.080$, $p < 0.01$ in Ordered PROBIT regression) of the supervisory board (SUPVR) variables in Table 4.6. It means that more members in the supervisory board results in a higher level of qualitative environmental disclosure. As mentioned above, the rights and powers of the supervisory board have been improved due to the amendment of Corporation Law in 2005. The expanded rights could assist the

supervisory board in encouraging managers to be engaged in quality disclosure practice. Based on the stakeholder-agency theory, the supervisory board, which should play a pivotal role in setting policies and monitoring procedures of information disclosure in listed companies (CSRC), is expected to improve board effectiveness in qualitative disclosure practice. This study proved that the supervisory board with its improved rights effectively drives managers to reveal a higher level of environmental disclosure quality in the annual report in China. Compared with independent non-executive directors, board members in the supervisory board with Chinese characteristics attach more importance to their job in the listed company and therefore assist with the development of qualitative environmental disclosure practice.

Table 4.6 also confirms two well-known control variables from prior studies on determinants of disclosure practice. Firm size (FSIZE) and firms operating in environmentally sensitive industries (INDUSTRY) are found to play an important role in driving environmental disclosure quality in the annual report. In other words, quality of environmental information is effectively better in larger firms which are in environmentally sensitive industries. Firm age (AGE) and return on shareholders' equity (ROE) are found to have negative significant coefficients at the 0.01 level to relate with environmental disclosure practice. It reflects that new firms and firms with low profit prefer to reveal a high level of environmental information in order to satisfy shareholders' demand and attract investors compared to well-known firms and firms with high profitability, which prefer profitable financial disclosure to influence the decision making of shareholders and investors. However, the relationship between total liabilities divided by total assets (DEBT) and quality of environmental disclosure is not proved using the context of China in this study.

4.6 CONCLUSION

In this empirical chapter, the effect of corporate governance on environmental disclosure quality was examined and analysed using Chinese evidence. Based on the stakeholder-agency framework, it distinguished different monitoring roles played by various ownerships and board composition in Chinese listed companies during a three period, 2009-2011. The empirical findings indicate that quality of environmental disclosure is significantly and positively related to state ownership, blockholder ownership, size of the supervisory board, firm size and industry; and it is negatively related to legal person ownership, foreign share ownership, profitability and firm age. In contrast with the findings of research on quantitative environmental disclosure in the last empirical chapter, the difference in quality of environmental disclosure shows that, based on cross-sectional data, there is no evidence to support the impact of managerial ownership on qualitative environmental information in the annual report. However, the fixed effect model of panel data documents a positive significant relationship between managerial ownership and environmental disclosure quality. The combination of cross-sectional and time series data suggests that although managerial ownership in general pays little attention to environmental disclosure quality, there is a gradual realisation of the importance of qualitative environmental disclosure by managerial ownership, year on year.

In addition, this study confirms that state ownership, blockholder ownership and a bigger supervisory board with an effective monitoring role in the company encourage the firm be engaged in environmental disclosure quality. Firm size and working within an environmentally sensitive industry are two effective determinants of high levels of qualitative environmental information in the annual report. Comparable the relationship between IND and the quantity of environmental disclosure, there is no empirical

evidence to support the theory that IND effectively acts on environmental disclosure quality. It reflects an immature mechanism of independent non-executive directors, which would be ameliorated by amending the code of corporate government and corporate law to strengthen requirements for board directors and for improving the knowledge and skills of independent non-executive directors. Furthermore, this study notes that there was a very low level of quality environmental information disclosed in the annual reports of most Chinese listed companies. It suggests that firms should improve the quality of environmental information in the future to promote a win-win situation between the firm and their stakeholders under the stakeholder-agency framework.

CHAPTER FIVE

THE VALUE RELEVANCE OF ENVIRONMENTAL DISCLOSURES: SOME CHINESE EVIDENCE

5.1 INTRODUCTION

Since the 1950s, following the Second World War, the economies of developed countries have been growing quickly. This rapid development has produced lots of serious pollution and environmental issues. According to the report of the World Health Organisation, approximately three-quarters of the 49 million deaths each year are related to environmental problem. For this reason, many governments are paying more and more attention to sustainable development and environmental protection. A series of regulations and standards on the environment have been published to control and reform corporations' behaviour. Environmental disclosure in the annual report is regarded as an important instrument of information transmission from companies to the public, and an approach of supervising firms by society (Shen, 2011) which has been attracting more attention from various stakeholders.

Managers have an interest in utilising environmental disclosure in order to enhance their firms' image and reputation, and thus attract existing and potential investors (Hooghiemstra, 2000; Dixon *et al.*, 2005; Sun *et al.*, 2010), because any information, including environmental disclosure, obtained by shareholders and potential investors could be beneficial to their appreciation of firm value (Cormier and Magnan, 2007). In addition, high quality (environmental) disclosure would also enhance the reputation of

managers and their social profile which could reduce uncertainty and obtain the firm a competitive advantage, international investor confidence and economic benefits (Iatridis, 2013). For example, Ernst and Young (2002) interviewed senior executives at 147 firms from the Global 1000 companies and found that ‘Companies are increasingly acknowledging that corporate ethical, environmental and social behaviour can have a material impact on business value (that is, the market utilises the information). The great majority of companies (79 per cent) forecast the importance of this issue to rise over that next five years as companies across a range of industry sectors recognise its relevance to their business. Research has found that a company’s reputation in respect to issues pertaining to CSR is a factor in purchasing decision for 70 per cent of all consumers’ (Deegan, 2004, p.93).

Cormier *et al.* (2005) provided ‘extensive evidence that environmental information is useful for decision-making by financial stakeholders’ (p.6). Similarly, environmental disclosure requirements of shareholders were explored by de Villiers and van Staden (2010), using data from Australia, the UK and the US. They found that more than two thirds of shareholders want to receive environmental disclosure in order to decide how their funds are utilised. De Klerk *et al.* (2012) emphasised that CSR (environmental disclosure is a part of CSR) plays a helpful role in shareholders’ investment decisions. As stated by Cormier and Magnan (2007), ‘environmental reporting will be likely used by investors to better assess firm’s earnings prospects and reduce implied uncertainty’ (p.614). An intelligence company enhances the confidence of investors via voluntary disclosure (Li and Qi, 2008), because it decreases the information asymmetry between the insiders (managers and directors) and outsiders (shareholders and investors) of the company (Lo, 2009) and increases investors’ understanding of the firm. Berglof and

Pajuste (2005) implied that voluntary disclosure reduces the cost of capital in the firm and increases firm value.

Although there is a growing body of literature on the relationship between disclosure and its value-relevance, most of it was investigated using data from developed countries. China, as a representative developing country, has the main features of emerging capital markets: relatively weak corporate governance, highly concentrated ownership and high-developing potential. In addition, it has its own uniqueness of socialism, its legal system and cultural traditions. The People's Republic of China, a socialist country, was founded on the 1st of October, 1949. 1978 was a turning point of economic reform. The Chinese government adopted the 'open-door' policy for improving its economy. There have been many successful cases of privatising SOEs in developed countries through share issuing privatisation since the 1980s (Megginson and Netter, 2001), a step which was also taken by China in order to reform its economic system. The early 1990s began to see a change. In December 1990, the first stock exchange started trading in Shanghai. Then, Shenzhen Stock Exchange was set up in April 1991. Many businesses started to restructure from SOEs to companies listed on these two stock exchanges. By 6th March 2015, the number of companies listed in Shanghai and Shenzhen Stock Exchanges had increased to 2,659 firms and the total market value amounted to RMB 40,520 billion.

Whilst the Chinese economy has been growing rapidly, pollution and other environmental issues are also getting worse in China. According to the BBC (2005) and the New York Times (2007), the industrial pollution (air and water) problems in China seriously threaten the health of the population. Recently, (in January, 2013) news of severe pollution in Beijing, the Chinese capital, was frequently appearing in the BBC News. The news indicated that air pollution has soared to hazardous levels as outlined by

the World Health Organisation (WHO). A BBC correspondent pointed out that coal dust and car fumes are the main sources of air pollution. Economic growth has left a severe air problem in many cities in China. Serious environmental issues are attracting increasing concerns from the public. Disclosing environmental information by corporations is one way to mitigate the concern. At the same time, good environmental practices could bring business opportunities and market benefits to companies through a greater reputation for environmental care and by improving their public relations (KPMG, 1997). Whether or not voluntary environmental disclosure in the annual report is a critical role that provides value relevant information, is an interesting and important research area for emerging markets.

The aim of this research is to explore the value relevance of voluntary environmental disclosures (VED) in the annual report through evidence from a fast growing developing country, China. This study expects to contribute to the knowledge about the association between market value and both qualitative and quantitative environmental information in the annual report in fast developing countries based on a large sample of firm data during consecutive years. In addition, it is an up-to-date empirical research on quality and quantity of voluntary environmental disclosure and its value relevance under both cross-sectional and time-series data of the Chinese market in English. Furthermore, the research provides useful information for various stakeholders: for Investors, this empirical study adds to their knowledge and understanding about the function of environmental disclosure in the annual report and assists their investment decision making in the Chinese stock market; For Managers, it helps them to realise whether or not voluntary environmental disclosure increases a firm's market value and thus decide on their own company's disclosure practices; Scholars would further comprehend the Chinese stock market and disclosure development; this research uncovers the issues of

environmental disclosure in the annual report of Chinese listed companies, which assists Regulators in enforcing compliance with regulations about disclosure practice in future. An efficient stock market built by the government in China is expected by the authors. Finally, it enhances understanding in terms of qualitative and quantitative VED and the Ohlson's (1995) model.

The remainder of this paper proceeds as follows. Previous research on value relevance of social and/or environmental disclosure is reviewed in the next section. Section 5.3 discusses the theory and the research hypothesis of the relationship between environmental disclosure and the market value of the firm. Section 5.4 explains sample, variables and methodology. The empirical results are provided in Section 5.5. The final section concludes the findings, contribution, and limitations of this research.

5.2 LITERATURE REVIEW

5.2.1 Prior research on value relevance of environmental performance/disclosure

Developing on an important research area in voluntary disclosure and its determinants which has been studied since the 1970s, many researchers have started to explore the value relevance of voluntary disclosure. Carnevale *et al.* (2009) outlined that 'an accounting value is defined as value-relevant if it has predicted association with equity market values' (p.4). These previous studies mainly examined the effect of voluntary disclosure on cost of capital (e.g., Botosan, 1997; Zhang and Ding, 2006; Francis *et al.*, 2008; Plumlee *et al.*, 2010), share returns or/and future earnings (e.g., Lang and Lundholm, 1996; Gelb and Zarowin, 2002; Lundholm and Myers, 2002; Murray *et al.*, 2006; Banghøj and Plenborg, 2008), share price (e.g., Gelb and Zarowin, 2002; Clarkson

et al., 2010; de Klerk and de Villiers, 2012; de Klerk *et al.*, 2012), and market value of equity / Tobin's Q (e.g., Trueman, 1986; Keasey and McGuinness, 2008; Murcia and Santos, 2010; Uyar and Kiliç, 2012). Corporate governance disclosure, financial disclosure, and (social and) environmental disclosure are normally paid more attention in value relevance research. Prior studies of voluntary disclosure mainly focused on US corporations (Zarb, 2007 and Hassan *et al.*, 2009). Banghøj and Plenborg (2008) argued that the results from the US cannot be generalised to other countries, because disclosure practices vary substantially across different countries (Hope, 2003). Thus, recent researches have been extended into Europe and Asia. There is a summary table which describes recent research on the value relevance of environmental / CSR disclosure or environmental performance as shown table 5.1.

Table 5.1

Empirical research on the value relevance of environmental / CSR performance /disclosure

Author(s)& Date	Dependent Variable	Independent Variables	Sample Size &Type, and Time of Observation	Analysis & General Results
Hassel <i>et al.</i> (2005)	Market value (MV) of equity	Environmental performance (EP), book value (BV) of equity, net income	71 firms listed on the stock exchange in Sweden between June 30, 1998 and September 2000, which include 337 firm-quarter observations	<u>Ohlson (1995) model regression</u> General Result - environmental performance negatively impacts on the market value on firms.
Murray <i>et al.</i> (2006)	Share returns	Environmental disclosure	Top 100 UK companies during the period from 1988 to 1997	<u>The regression analysis</u> General Result - no direct relationship between SED and share returns.
Cormier and Magnan (2007)	1 - Market to book premium 2 - ER 3 - Stock price	Environmental Reporting (ER), equity, earnings, media exposure, size, age of asset, industry	France - 237 firm-year observations (6 years prior to 1998); Germany - 308 firm-year observations (7 years prior to 1998); Canada - 580 firm-year observations (6 years prior to 1998)	<u>OLS regression and 3SLS regression</u> General Result - a moderating influence from ER to a firm's earning in Germany. ER does not significantly impact on the stock market valuation of firm earnings in Canada and France.
Ragothaman and Carr (2008)	Tobin's Q	Environmental information disclosure, number of employees, return on assets, price earnings ratio, audit opinion	90 companies based on COMPUSTAT in the year 2000	<u>Multivariate regression</u> General Results - waste variable negatively impacts on firm value.

Moneva and Cuellar (2009)	MV of Equity	Environmental disclosure, BV of equity, the discounted value of residual earning, industry, firm size	124 Spanish companies listed on the Madrid Stock Exchange between 1996 and 2004	<u>Ohlson (1995) model regression</u> General Result - a significant market valuation of financial environmental disclosure, but not of non-financial.
Semenova <i>et al.</i> (2009)	MV of Equity	Environmental and social performance, BV of equity, net income, Sales growth, firm age, industry dummies	Swedish SIX 300 companies between 2005 and 2008	<u>Ohlson (1995) model OLS regression and panel data approach</u> General Result - environmental and social performance is value relevant and a significantly positive relation between MV of equity and EP
Gallego-Álvarez <i>et al.</i> (2010)	Value creation	Social and environmental practices, marketing, size, ROA, sector	120 biggest European companies	<u>Logistic regression and linear regression</u> General Result - shareholder value creation is positively affected by social and environmental practices
Jacobs <i>et al.</i> (2010)	Market value of firm	Announcements of Corporate Environmental Initiatives (CEIs) and announcements of Environmental Awards and Certifications (EACs)	340 unique companies between 1986 and 1991	<u>Ordinary least squares regression</u> General Result - the market is not significantly influenced by the aggregated CEI and EAS announcements, but a significant market response was found by certain CEI and EAC subcategories

Murcia and Santos (2010)	Social-environmental disclosure	Tobin's Q, size, sector, origin of control, profitability, leverage, corporate governance, stocking issuing, growth, concentration of control, auditing firm, internationalisation	The top 100 largest non-financial listed companies in Brazil between 2006 and 2008.	<u>Panel Model</u> General Result - A significantly positive effect on firm value (Tobin's Q) was also found between social-environmental disclosure and total disclosure.
Schadewitz and Niskala (2010)	MV of equity	Responsibility reporting, BV of equity, accounting earnings	All listed Finnish firms that have adopted GRI during the years 2002-2005	<u>Ohlson (1995) model regression</u> General Result - communication via GRI responsibility reporting is an important explanatory factor for a firm's market value.
Wu and Shen (2010)	Tobin's Q	Voluntary environmental disclosure (VED), size, ROA, debt lever, growth of revenue	145 listed chemical firms from 2008 stock market in China	<u>Multivariate regression</u> General Results - environmental disclosure cannot impact firm value significantly.
Moroney <i>et al.</i> (2011)	Voluntary environmental disclosure	Tobin's Q, environmental assurance, professional accountant assurer, J-F coefficient, FIN, ROA, leverage, size, asset newness, capital intensity	The top 500 listed companies on the Australian Securities Exchange	<u>Linear regression</u> General Results - Tobin's Q is negatively associated with voluntary environmental disclosure.
Carnevale <i>et al.</i> (2012)	Stock price	Corporate social reporting, BV per share, earnings per share,	130 banks from all European-listed bank in the Euro-12 zone between the 2nd quarter of 2002 and the 2nd quarter of 2008	<u>Panel data regression</u> General Results - social reporting is value relevant in some countries, and positively influences the stock price; but other countries show a significantly negative relationship.

de Klerk and de Villiers (2012)	1 - Share price 2 - MV of equity	Corporate responsibility reporting (CRR), BV of equity, net income, industry	The top 100 South African companies between 2007 and 2008	<u>A modified Ohlson model regression</u> General Results - higher share prices associate with higher levels of CRR.
Xu et al. (2012)	1 - Abnormal Return (AR) 2 - CAR Accumulative abnormal return	Disclosure of environmental violation events (EVEs), pollution type, disclosure origin, intensity, modernisation levels, ownership, characteristics of the ultimate owners, size	EVEs of 57 Chinese firms covering 12 industries in 2010	<u>Multivariate regression analysis</u> General Results - In contrast with similar events in other countries, average reduction in market value impacted by events in China is much lower.
Iatridis (2013)	1 - Stock price 2 - MA of equity divided by BV of equity	Environmental disclosure, (lagged) BV per share, lagged abnormal earnings per share, net income shared by BV, total amount of hazardous waste produced /net sales, EP, company reports initiatives	529 Malaysian listed companies from beverages, chemical, food production, forestry and paper, industrial metal and mining industries during the period of 2005 - 2011	<u>The OLS regression analysis</u> General Results - High quality environmental disclosures are value relevant and improve investor perceptions.

Murray *et al.* (2006) investigated whether or not the financial market cares about social and environmental disclosure (SED) based on data from the “Top 100” UK companies (*the Times* 1,000) during a period from 1988 to 1997. The CSEAR database of UK companies was used to collect the social and environmental information component. The authors employed a series of statistical tests, which include the Pearson correlation coefficients, Chi-squared test and a general linear model, to explore the role played by SED on the financial market. The finding indicated no direct relationship between SED and share returns.

Similarly, Moneva and Cuellar (2009) explored the value relevance of environmental disclosure focusing on both financial and non-financial elements because of mixed results in the relationship between financial performance and environmental disclosure in previous studies. They employed the framework of the Ohlson (1995) model and 124 Spanish companies listed on the Madrid Stock Exchange between 1996 and 2004. In this study, the environmental variable was measured through the environmental information in corporations' annual reports. They classified this information into five aspects: 'the disclosure of a formal environmental policy'; 'the disclosure of formal environmental management systems'; 'the disclosure of environmental assets'; 'the disclosure of environmental expenditures'; and 'the disclosure of environmental liabilities and contingencies' (p.445). The former two belong to non-financial environmental disclosure and the others are financial environmental disclosure. Ultimately, they did not find significant value relevance of non-financial environmental disclosure, but they did for financial environmental information.

Just as the empirical results based on two types of environmental disclosure research differed, Cormier and Magnan (2007) also got differing findings from three countries which are Canada, France and Germany. The sample of this study included 237 firm-year observations from the French stock market during 6 years prior to 1998; 308 firm-year observations of German listed companies during 7 years prior to 1998; and 580 firm-year observations chosen from Canada during 6 years prior to 1998. The pooled cross-sectional OLS regression and 3SLS regression were developed to test the contribution of environmental reporting on the market-to-book premium and control endogeneity in their research. Thereafter, the auditors used the stock price as the dependent variable to replace the original one in order to do an additional sensitivity analysis. This international perspective research found a moderating influence from environmental reporting to firm

earnings in Germany. However, environmental information did not significantly impact on the stock market value of firm earnings in Canada and France.

Carnevale *et al.* (2012) also did cross-country analysis of the effect from corporate social reporting (SR) in banks on the firm value. The sample for this study included 130 European-listed banks in the Euro-12 zone between the 2nd quarter of 2002 and the 2nd quarter of 2008. SR was measured based on the Global Reporting Initiative guidelines (GRI). Book value per share (BPS) and earnings per share (EPS), which are traditional determinants affecting the stock price, were used as accounting variables to assist with looking for the relationship between SR and firm's market value. In this study, both direct and indirect influences from SR publication to the stock market were explored. The results showed that social reporting is value relevant in some countries, and positively influences the stock price; but the others showed a significantly negative relationship between social reporting and market value in other European banks.

Moreover, Semenova *et al.* (2009), Gallego-Álvarez *et al.* (2010), Murcia and Santos (2010), Schadewitz and Niskala (2010), de Klerk and de Villiers (2012), Uyar and Kiliç (2012), and Iatridis (2013) found a significantly positive link between disclosure level and firm value, while Hassel *et al.* (2005), Ragothaman and Carr (2008), Jacobs *et al.* (2010), and Moroney *et al.* (2011) found a significantly negative association.

In detail, Uyar and Kiliç (2012) examined whether or not voluntary disclosure practices are value-relevant in the capital market based on 129 manufacturing firms listed on the Turkish Istanbul Stock Exchange in 2010. They found that more voluntary information disclosed by companies means higher market capitalisation by multiple regression analysis. In their study, Uyar and Kiliç (2012) pointed out that voluntary disclosure could

help to reduce the information asymmetry between owners and managers and therefore add firm value.

Semenova *et al.* (2009) explored the value relevance of environmental and social performance, focusing on SIX 300 companies listed on the OMX Stockholm in Sweden from 2005 to 2008. They used the pooled cross-section time series data and the panel data approach based on the Ohlson (1995) model in their paper. It is worth mentioning that the authors deflate all accounting and market-based variables by TA_{t-1} for controlling size differences. Their findings indicated that the stock market responds to environmental and social performance and that there is a significant and positive association between environmental disclosure and market value of equity. Their study contributed to the intangible determinants of stock returns in the research area.

Gallego-Álvarez *et al.* (2010) supplied proof that shareholder value creation is positively affected by social and environmental practices through empirical evidence of the 120 biggest European companies. That value creation was measured by two variables: reputation and value creation. The former one was collected from the Fortune website and financial data was obtained by the Forbes website. Shareholder value creation was gauged by the ratio: the difference between the outcome of market value minus capital in 2008 and the outcome of market value minus capital in 2006, divided by the 2006 outcome (of subtracting capital from market value). The study employed both logistic regression and linear regression to find that social and environmental practices, especially those related to improving a firm's image, are an effective marketing tool to enhance shareholder value creation.

Schadewitz and Niskala (2010) employed the Ohlson (1995) model regression to examine the effect of communication via responsibility reporting (RR) on firm value.

The sample of this study was collected from all listed Finnish firms that have adopted GRI during the years 2002-2005. The finding indicated that RR is one part of a corporation's communication tools for information asymmetry reduction between shareholders and managers. In addition, communication via RR was proved as a significant explanatory element for the value of the firm.

A significantly positive effect on firm value (Tobin's Q) was found from social-environmental disclosure and total disclosure respectively based on Panel data analysis in the study of Murcia and Santos (2010). Content analysis was employed for voluntary disclosure measurement. The framework of disclosure involved 92 items which are separated into economic parts (43) and social-environmental parts (49). They tested corporate voluntary disclosure and its determinants in Brazil based on the top 100 largest non-financial listed companies between 2006 and 2008. They concluded that "good" quality companies in Brazil reveal more information, and explained this situation as that firms 'do that to screen themselves and avoid the risk of being evaluated by the market as a "lemon"' (p.19).

The reaction of the stock market to firms' corporate responsibility reporting (CRR) was investigated by de Klerk and de Villiers (2012) using the evidence of the top 100 South African companies between 2007 and 2008. In this paper, corporate responsibility reporting was explained as information dealing with corporations' ethical, economic, social, and environmental impact. The KPMG dataset and the McGregor BFA database were used in order to collect firms' CRR and financial data respectively. In the research on the value relevance of CRR, a modified Ohlson model developed by Hassel *et al.* (2005) was chosen by the auditors. Based on the agency theory, they argued that CRR decreases the information asymmetry between insiders (managers) and outsiders

(shareholders), and thus influences investors' investment appreciation. The finding indicated that a higher level of CRR improves share prices.

Iatridis (2013) examined whether or not environmental disclosures are value relevant and how they impact on investor perceptions based on 529 Malaysian listed companies during the period 2005-2011. The author employed two models, the Ohlson (1995) valuation equation and another model based on Cormier and Magnan (2007, p.617), to measure the value relevance and found that high quality environmental disclosures effectively influence firm value and investors' perceptions. They suggested that firms would be motivated to enhance voluntary environmental disclosure in order to impress stakeholders and decrease scepticism.

In Contrast, Hassel *et al.* (2005) investigated the value relevance of environmental performance based on the residual income valuation model developed by Ohlson (1995) and 337 firm-quarter observations from the stock exchange in Sweden between June 30, 1998 and September 2000, and they found a negative impact from environmental performance on the market value of firms. They concluded that their finding is consistent with the cost-concerned school which deemed environmental investments merely increasing costs and resulting in reduced earnings and firm value.

Similarly, Moroney *et al.* (2011) found that Tobin's Q negatively associates with voluntary environmental disclosure through studying a sample of the top 500 companies listed on the Australian Securities Exchange. In this study, they mainly researched quality of voluntary environmental disclosure and its determinants. Thus, environmental information was the dependent variable which was measured by an index based on the GRI. Tobin's Q was used as an independent variable to detect the relationship between environmental reporting and firm value.

In addition, Ragothaman and Carr (2008) examined the effect from environmental disclosure on shareholder returns based on 90 firms out of the top 100 corporate air polluters from the COMPUSTAT database. In addition to environmental information disclosure, in this study, number of employees (size), return on assets, price earnings ratio (growth), audit opinion (corporate governance) were also applied as independent variables to explore their association with firm value measured by Tobin's Q. They developed a regression model and performed some robustness tests for the research question, and then found that the waste disposal variable (bad environmental information) reduce firm value. In other words, there is a negative relationship between shareholder return and (bad) environmental information disclosure.

Jacobs *et al.* (2010) examined the role of environmental performance played in the market value of the firm, using a sample of 780 announcements spanning 340 unique companies between 1986 and 1991. These 780 announcements consisted of two sets of data: 417 announcements of Corporate Environmental Initiatives (CEIs) and 363 announcements of Environmental Awards and Certifications (EACs). The event study methodology is employed in the paper to test the market response to announcements of environmental performance by ordinary least squares regression. The results indicated that the market is not significantly influenced by the aggregated CEI and EAS announcements, but a significant market response was found by certain CEI and EAC subcategories. For example, they found a significantly negative association between voluntary emission reductions and market value whereas there was a significant positive relationship between ISO 14001 certifications and market reaction. Therefore, they asserted that 'the market is selective in reacting to announcements of environmental performance with certain types of announcements even valued negatively' (p.430) In

summary, these previous empirical studies above have given mixed results on the value relevance of CSR/environmental performance /disclosure.

In the Chinese market, Keasey and McGuinness (2008) and Ronnie Lo (2009) investigated the connection between firm value and voluntary disclosure (forecast earnings disclosure and corporate governance disclosure respectively) in Hong Kong. The former research found a significantly positive relationship between Tobin's Q and forecast earnings disclosure while the latter found that corporate disclosure just significantly and positively links to market valuation for small companies, but does not for medium and large companies. In their studies, it described Hong Kong's unique position in China. Firms in Hong Kong have a strong legal investor-protection regime which was influenced by Anglo-Saxon common law tradition from the UK before 1997. In other words, there are many differences in firm performance and voluntary disclosure practice between Hong Kong and the mainland of China.

Cheung *et al.* (2010) examined whether or not disclosure influences the market for Chinese listed companies based on data from the Chinese stock market during the period 2004-2007. The results revealed that the market value is significantly and positively affected by company transparency. Then they split the transparency index into voluntary and mandatory disclosure indexes to re-apply the regression and found that the market value merely associates with the voluntary disclosure index.

In the recent study of environmental disclosure in China, the reaction of the stock market to disclosure of environmental violation events (EVEs) was tested by Xu *et al.* (2012). The method of event study was employed to examine the stock market's responses to 57 EVEs in the year 2010. Daily abnormal return (AR) and accumulative abnormal return (CAR) were calculated in an event window. These EVEs from 57 Chinese firms were

revealed by the Ministry of Environmental Protection of China and the media. Based on multivariate analysis, the findings showed that river pollution made by firms with a disperse ownership, appearing market reaction after more than 20 days before and after the announcement day. In addition, in contrast with similar events in other countries, average reduction in market value effected by EVEs is much lower. The auditors indicated that, currently, negative EVEs weakly impact market value in China.

Wu and Shen (2010) also employed a sample from the Chinese stock market to explore the relationship between environmental disclosure and firm value. They mentioned that environmental disclosure would not necessarily add firm value when the firm merely reveals good news and hides bad news. In the study, the authors applied the Global Reporting Initiative sustainability reporting guidelines for environmental disclosure measurement and Tobin's Q for firm value measurement. They did not find any evidence to prove that environmental disclosure significantly impact firm value based on 145 listed chemical firms from the 2008 Chinese stock market. Their study merely focused on the chemical industry which cannot reflect the value relevance of VED in the whole Chinese market. Hence, this paper would contribute to this area by examining the value relevance of VED in mainland China using a large sample of Chinese listed companies which covers 12 industries.

5.2.2 The gap in previous research

There are some limitations in the previous studies on environmental disclosure and its value relevance as below. First, mixed results of the empirical research occur in the value relevance studies. These problems are produced because of two broad reasons:

differences in disclosure measurement and variation in valuation models used. In the measurement of environmental disclosure, this paper applies the method which integrates mechanistic content analysis approach (disclosure volumes and/or frequencies) (e.g., Ness and Mirza, 1991; Wilmshurst and Frost, 2000; Campbell, 2003) and interpretative approach (meaning and understanding of disclosure) (e.g., Buhr and Reiter, 2006; Coupland, 2006) to reduce errors of research results. In the valuation model, the Ohlson (1995) model is regarded as ‘best-known conceptual model of value relevance analysis’ (Carnevale *et al.*, 2009). According to experience of previous studies and the actual status of China, the regression in this research is developed based on a modified Ohlson’s (1995) model.

Second, value relevance of disclosure practice has been widely studied in the developed market. In the developing market, there is a growing body of research on corporate social responsibility / environmental disclosure and its value relevance. For example, Murcia and Santos (2010) observed corporate voluntary disclosure and its determinants in Brazil based on the top 100 largest non-financial listed companies between 2006 and 2008. A significantly positive effect on firm value (Tobin’s Q) was found from social-environmental disclosure and total disclosure respectively. They concluded that “good” quality companies in Brazil reveal more information, and explained this situation as that firms ‘do that to screen themselves and avoid the risk of being evaluated by the market as a “lemon”’ (p.19). The reaction of the stock market to firms’ corporate responsibility reporting (CRR) was investigated by de Klerk and de Villiers (2012) through the evidence of the top 100 South African companies between 2007 and 2008. The finding indicated that a higher level of CRR improves share prices. Iatridis (2013) examined whether or not environmental disclosures are value relevant and how they impact investor perceptions based on 529 Malaysian listed companies (from the beverages,

chemical, food productions, forestry and paper, industrial metals and mining industries) during the period 2005-2011. They found that high quality environmental disclosures effectively influence firm value and investors' perceptions. These three countries have a common basis, in that they are all former colonies of European countries, either the UK or Portugal. Their legal system, culture and economic development were influenced by European countries. China is different, in that it is a very fast growing developing socialist country. 'Relatively high levels of collectivism and power distance, and strong uncertainty avoidance' are features exhibited in this socialist country (Ronnie Lo, 2009, p.7). This author asserted that 'societal values of high collectivism and large power distance suggest a tendency for the members of a society to adhere to rules and regulations, conform to peer norms, follow the guidance from leaders, and refrain from risk-taking due to uncertainties'. Based on these properties of society, Chinese companies would tend to reduce transparency and reveal less voluntary information in the annual report in comparison to European countries. The Chinese stock market has been developing rapidly since the Shanghai and Shenzhen Stock Exchanges were set up in the early 1990s. According to Zeng (2012), the Chinese stock market experienced unprecedented development and had become the largest in developing countries by 2001; and by December 2010, market capitalisation of the Shanghai Stock Exchange had become the 5th largest in the world. However, in contrast with the UK and the US, the two Chinese stock markets are underdeveloped and strongly affected by state policies (Liu, 2009). The main reason is that, following reform, China's economy has been growing rapidly in the last three decades, but the development of the Chinese legal and political system is still lagging behind the changes in the economy, because the government needs to protect the rights and status of Chinese Communism and keep its communist ideology. Under this market circumstance, information asymmetry exists

between the state, controlling shareholders, minority shareholders, and the agencies. It leads to Chinese stock markets being highly speculative and volatile (Morck *et al.*, 2000). At beginning of China's economic reform, many codes and practices of corporate governance and reporting regulation were borrowed from developed countries. On 7th January, 2001, the "Code of Corporate Governance for Listed Companies in China" was issued by the China Securities Regulatory Commission (CSRC) and the State Economic and Trade Commission. In 2006, 38 Chinese accounting standards for business enterprises, which involved 22 newly-promulgated and 16 revised accounting standards, were issued with the assistance of Deloitte, one of the Big-4 international CPA firms (Liu, 2009). The new accounting standards cover all topics of International Financial Reporting Standards (IFRSs). This research would explore the development of environmental disclosure and its value relevance under the effect of the "Code of Corporate Governance for Listed Companies in China" and the new accounting standards. Although China is similar to most developing countries with a low level of reporting practices and an information environment which is not transparent, the uniqueness of China and its stock market environment under the nation's distinct political, legal, and economic context means that research on the value relevance of its environmental disclosure is important.

Third, value relevance research is divided into two types, which include event studies and association studies (long-term relationships), based on two distinctive characteristics (Beaver, 2002 and Beisland, 2009). Event studies typically test whether the firm-specific information events affect stochastic behaviours of share prices (Strong, 1992). It considers to what extent the effect of information released results in price movements over short periods of time, which may be as short as one or two days. Association studies mainly explore how the market reacts to disclosure practice during relatively long

periods, which are normally from several months to years. These two types of value relevant research on environmental disclosure have been attempted using the evidence of Chinese listed companies in the studies of Xu *et al.* (2012) and Wu and Shen (2010) respectively. Xu *et al.* (2012) analysed the reaction of the stock market to the disclosure of environmental violation events (EVEs). The method of event study was employed to examine the stock market's responses to 57 EVEs in the year 2010. Daily abnormal return (AR) and accumulative abnormal return (CAR) were calculated in an event window. These EVEs of 57 Chinese firms were revealed by the Ministry of Environmental Protection of China and the media. Based on multivariate analysis, the findings outlined that river pollution made by firms with a disperse ownership, appearing to show a market reaction after more than 20 days before and after the announcement day. In addition, compared with similar events in other countries, average reduction in market value impacted by EVEs is much lower in China. The auditors indicated that, currently, negative EVEs weakly impacts market value in China. Wu and Shen (2010) also employed a sample from Chinese stock market to explore the relationship between environmental disclosure and firm value. They mentioned that environmental disclosure would not necessarily add firm value when the firm merely reveals good news and hides bad news. In the study, the authors applied the Global Reporting Initiative sustainability reporting guidelines for environmental disclosure measurement and Tobin's Q for firm value measurement. They did not find any evidence to prove that environmental disclosure significantly impacts firm value based on 145 listed chemical firms from the 2008 Chinese stock markets. Their study merely focused on the chemical industry in a single year which lacks time-series analysis and cannot reflect value relevance of VED in the whole Chinese market. Due to the limitations of previous research on the association studies of value relevance, this research examines the data of 2,850 firm-year

observations during the period 2009-2011 covering 12 industries based on the Chinese market.

5.3 THEORY AND RESEARCH HYPOTHESIS

This paper develops a research hypothesis based on signalling theory and the concept of information asymmetry. Signalling theory has been widely employed in previous studies to explore why voluntary disclosure is revealed by companies to stakeholders (Uyar and Kiliç, 2012). This theory suggests that voluntary disclosure would be implemented with the aim of signalling good news to stakeholders (Oliveira *et al.*, 2006). Gordon *et al.*, (2010) indicated that voluntary information revealed in the annual report gives the marketplace many signals, which are expected to improve the stock market value of a firm. Investors may interpret these signals as useful information which relates to the firm's prospect for development and future value. Clarkson *et al.* (2008) and Iatridis (2013) indicated that voluntary environmental information is disclosed by companies which tend to use less environmentally harmful practices. In China, this situation is more serious, because almost all companies merely report favourable environmental information to build their firms' reputation, reduce shareholders' concern, and obtain economic benefit. Wu and Shen (2010) outlined that environmental disclosure would not necessarily add firm value when the firm reveals good news and hides bad news. However, Holm and Rikhardsson (2008) argued that positive information would create market value for a firm when investors take the information into account to make their investment decisions. In addition, Ragothaman and Lau (2000) stated that a good reputation of the company could be translated from good environmental performance (information) which enhances investor trust. On the other hand, Semenova *et al.*, (2009)

mentioned that environmental performance (information) is regarded as an intangible asset, which is reflected as goodwill in the stock market. Similarly, in the study of Miles and Covin (2000), environmental performance (disclosure) is deemed as becoming a significant component of a firm's reputation which is regarded as an intangible asset that associates to market and financial performance. A superior reputation is a source of strategic advantage which improves a firm's long term ability to create value (Caves and Porter, 1977). To sum up, good environmental disclosure revealed by a company supplies good signals in the stock market that can increase a firm's reputation, which is recognised as an intangible asset (such as goodwill). This can enhance investors' confidence and improve their appreciation of the firm when making investment decisions, and thus add market value to the firm.

In the concept of information asymmetry, Cormier and Magnan (2007) outlined that 'interactions between a firm's disclosure strategy and its stock market value are most often described in terms of information asymmetries between investors and managers' (p.614). Better quality disclosure reduces the information asymmetry between them (Kim and Verrecchia, 1994) and thus decreases agency cost which enhances firm value. As stated by Huang and Zhang (2012), greater disclosure could influence shareholder value through a reduced level of information asymmetry. In particular, Cormier et al. (2011) provided evidence to support the effect of environmental disclosure on decreasing information asymmetry and indicated that a potential benefit for a company when management reveals good information is to reduce information asymmetry. Therefore, it is hypothesised that:

Hypothesis 5 Voluntary environmental information disclosed by companies is value relevant, which increases the value of the firm.

5.4 DATA AND METHODOLOGY

5.4.1 Sample

The sample of this research is collected from both the Shenzhen Stock Exchange (SZSE) and Shanghai Stock Exchange (SHSE) in the Chinese market. There are 2,850 valid firm-year observations for 3 consecutive years from 2009 to 2011. It excludes the firms in the financial sector (such as, bank and other financial firms) which have a separate disclosure requirement, and ST/*ST/S*ST firms with problems in finance. The valid sample covers 12 industry sectors. In this paper, the CCER database and the CSMAR database are utilised for financial data collection and annual reports from both the SZSE and the SHSE are adopted for environmental disclosure collection. In the process of this investigation, some incorrect data from these two databases have already been amended in order to improve the accuracy of the research.

5.4.2 Dependent variable measurement

Previous research has varyingly revealed that increased disclosure would decrease (increase) cost of capital and hence enhance (reduce) firm value, however, there is a lack of direct empirical evidence in the relationship between disclosure practice and firm value (Hassan *et al.*, 2009; Al-Akraa and Alib, 2012). Moreover, Clarkson *et al.* (2010) researched whether or not environmental disclosure plays a part in impacting on the cost of equity capital and firm valuation. Their findings demonstrated that voluntary environmental disclosure effectively influences firm value, but does not for the cost of

equity capital. Hassan *et al.* (2009) suggested that the ratio of market-to-book value of equity (MTBR) ‘shows whether securities are undervalued or overvalued ... if the ratio is greater than (less than) one then the firm is overvalued (undervalued)’ (p.91). In contrast with the logarithm of the market equity, Fama and French (1992) and Berk (1995) indicated that the logarithm of the ratio of book-to-market value is a more powerful and better measure in explaining average returns and compounded expected return. Thus, LnMTBR is employed in this research to measure the value relevance as Hassan *et al.* (2009). Market value of equity is measured as the number of outstanding shares at the end of year multiplied by share price of the stock at the end of year.

- ❖ LnMTBR = the natural logarithm of the ratio (market value of equity / book value of equity)

5.4.3 Model development

The Ohlson (1995) model is the ‘best-known conceptual model of value relevance analysis’ (Carnevale *et al.*, 2009):

$$\text{❖ } MV_t = \alpha_0 BV_t + \alpha_1 AE_t + \alpha_2 v_t$$

Where MV_t is market value of equity at time t , BV_t is book value of equity at time t , AE_t is abnormal earnings for period t (which is measured as the difference between net income and opening book value of equity multiplied by the required rate of return), and v_t is other non-accounting value-relevant information (Hassel *et al.*, 2005). However, in the calculation of abnormal earnings, there is a problematic value in that the required rate of return is unobtainable (de Klerk and de Villiers, 2012). Thus, researchers used net

income to replace abnormal earnings in the studies (e.g. Hassel *et al.*, 2005; Semenova *et al.*, 2009; de Klerk and de Villiers, 2012).

Ohlson's (1995) model supplies a framework which 'is fully articulated in that it relates the value of the firm to the information provided in the income statement (earnings), the balance sheet (book value of equity), and other value-relevant information' (Berry and Wright, 2001, p745). Carnevale *et al.* (2012) indicated that book value (per share) and earnings (per share) traditionally influence the market value (stock price). It is a very popular model applied in research on the value relevance of voluntary disclosure (e.g., Hassel *et al.*, 2005; Liu and Liu, 2007; Moneva and Cuellar, 2009; Semenova *et al.*, 2009; Schadewitz and Niskala, 2010; de Klerk and de Villiers, 2012; Iatridis, 2013).

'In order to mitigate the problems that might result from the appearance of potential scale effects in the estimation of price models, the variables have been divided by the total assets of the firm at the beginning of period (TA_{t-1})' (Moneva and Cuellar, 2009, p448). Similarly, Semenova *et al.* (2009) also deflate all accounting and market-based variables by TA_{t-1} for controlling size differences. Moreover, De Klerk and de Villiers (2012) utilised variables divided by opening book value to control the size.

Based on the Ohlson (1995) model, size-control factor, and previous researches (e.g., Hassan *et al.*, 2009; Uyar and Kiliç, 2012; Iatridis, 2013), the regression model in this paper is given as:

$$\begin{aligned} \text{LnMTBR} = & \beta_0 + \beta_1 \text{VED} + \beta_2 \text{Ln}(1/\text{BVOE}) + \beta_3 \text{LnROE} + \beta_4 \\ & \text{SCSIZE} + \beta_5 \text{LnGROWTH} + \beta_6 \text{INDUSTRY} + \varepsilon \end{aligned}$$

Where LnMTBR is the natural logarithm of the ratio of market value of equity to book value of equity at the end of year; VED is the voluntary environmental disclosure index;

BVOE is the book value at end of the financial year; LnROE is the natural logarithm of the ratio of net profit to book value of equity at the end of year; SCSIZE is the natural logarithm of the ratio of total assets to book value of equity at the end of year; LnGROWTH is the natural logarithm of the ratio of sales in current year to sales in the previous year; INDUSTRY is the dummy variable for environmentally sensitive firms, coded as 1 for if the firm belongs to an environmentally sensitive industry and 0 otherwise.

5.4.4 Robustness test

The research employs Tobin's Q and Share return in order to measure the robustness of the empirical test. The regression model is adopted as below:

$$\text{Tobin's Q (or } R_{i,t}) = \beta_0 + \beta_1 \text{VED} + \beta_2 \text{FSIZE} + \beta_3 \text{ROE} + \beta_4 \text{BEDT} + \beta_5 \text{GROWTH} + \beta_6 \text{INDUSTRY} + \varepsilon$$

Where Tobin's Q = market value of assets / book value of assets (where market value of assets is measured by book value of assets minus book value of common equity and then adding market value of the common equity) (Chen *et al.*, 2010); Share return ($R_{i,t}$) = $\ln(P_{i,t}/P_{i,t-1})$; VED is the voluntary environmental disclosure index; FSIZE is the natural logarithm of the firm's total assets in RMB at the end of year; ROE is profitability: return on shareholders' equity; DEBT is the leverage ratio of total liabilities divided by total assets at the end of year; GROWTH is the ratio of sales in the current year to sales in the previous year; INDUSTRY is the dummy variable for environmentally sensitive firms, coded as 1 for if the firm belongs to an environmentally sensitive industry and 0 otherwise.

5.5 RESULTS

5.5.1 Descriptive Statistics of the variables

Table 5.2 provides the descriptive statistics on the independent and dependent variables based on 2,850 firm-year observations during a period between 2009 and 2011. Dependent variable LnMTBR is measured by the natural logarithm of the ratio (market value of equity / book value of equity), which shows a minimum score of -0.85 and a maximum of 3.36 with a mean value of 1.18. A normal distribution of this independent variable is shown in figure 5.1. There are two types of environmental disclosure: the quantity of environmental disclosure (DISCQuantity) and the quality of environmental disclosure (DISCQuality) in this study. The table displays that the minimum scores of both DISCQuantity and DISCQuality are 0, which indicates that there are some Chinese listed companies without environmental disclosure. The maximum scores (64 for DISCQuantity and 24 for DISCQuality) and mean values (9.5 for DISCQuantity and 5.92 for DISCQuality) express that both qualitative and quantitative environmental disclosure is quite insufficient in the annual reports of most Chinese listed companies. The skewness value of 2.00 in DISCQuantity implies that some but few companies disclose comparatively sufficient quantitative environmental information in the annual report. In this research, it is worth mentioning that there are just 145 observations without any environmental disclosure out of a total of 2,850 valid observations. It shows that almost 95 per cent of Chinese listed companies reveal at least some environmental information.

The mean value of INDUSTRY (0.63) and the median value (1) indicate that Chinese listed companies tend to belong to environmentally sensitive industries. Table 5.3 summarises the mean values of variables by industries. It clearly shows that firms in

environmentally sensitive industries place a relatively high value on both quantity and quality environmental disclosure. In detail, the Mining industry discloses the largest volume (19.720) and highest quality level (10.040) of environmental information in the annual report, and which is then followed by Manufacturing (DISCQuantity = 10.535; DISCQuality = 6.721), Water, electricity, and gas (DISCQuantity = 16.008; DISCQuality = 9.016), and Construction (DISCQuantity = 10.182; DISCQuality = 5.924). It proves that the firms in environmentally sensitive industries give more attention to both quantity and quality of environmental information practice in the annual report to remit concern from the public.

Table 5.2

Descriptive Statistics of the variables

Variables	Mean (Median)	Standard Deviation	Minimum (Maximum)	Skewness	Kurtosis
Panel A: Dependent					
LnMTBR	1.18 (1.19)	0.61	-0.85 (3.36)	0.04	2.92
Tobin's Q	2.56 (2.08)	1.60	0.78 (15.11)	2.34	11.20
R _{i,t}	0.09 (-0.002)	0.61	-1.76 (1.81)	0.23	2.25
Panel B: Independent					
DISCQuantity	9.50 (6.00)	10.23	0.00 (64.00)	2.00	7.62
DISCQuality	5.92 (5.00)	4.35	0.00 (24.00)	0.94	3.73
Ln(1/BVOE)	-21.25 (-21.10)	1.09	-26.96 (-18.56)	-0.92	4.64
LnROE	-2.51 (-2.37)	0.83	-8.25 (-0.82)	-1.27	5.82
SCSIZE	0.74 (0.68)	0.41	0.01 (3.11)	0.80	4.00
LnGROWTH	0.16 (0.15)	0.28	-1.59 (1.86)	0.23	10.17
FSIZE	21.99 (21.82)	1.21	19.24 (27.75)	0.84	4.14
ROE	0.11 (0.09)	0.07	0.00 (0.44)	0.98	4.13
DEBT	0.49 (0.49)	0.19	0.01 (0.96)	-0.20	2.35
GROWTH	1.23 (1.16)	0.42	0.20 (6.42)	4.59	41.81
INDUSTRY	0.63 (1.00)	0.48	0.00 (1.00)	-0.55	1.31

Figure 5.1

Dependent variable distribution

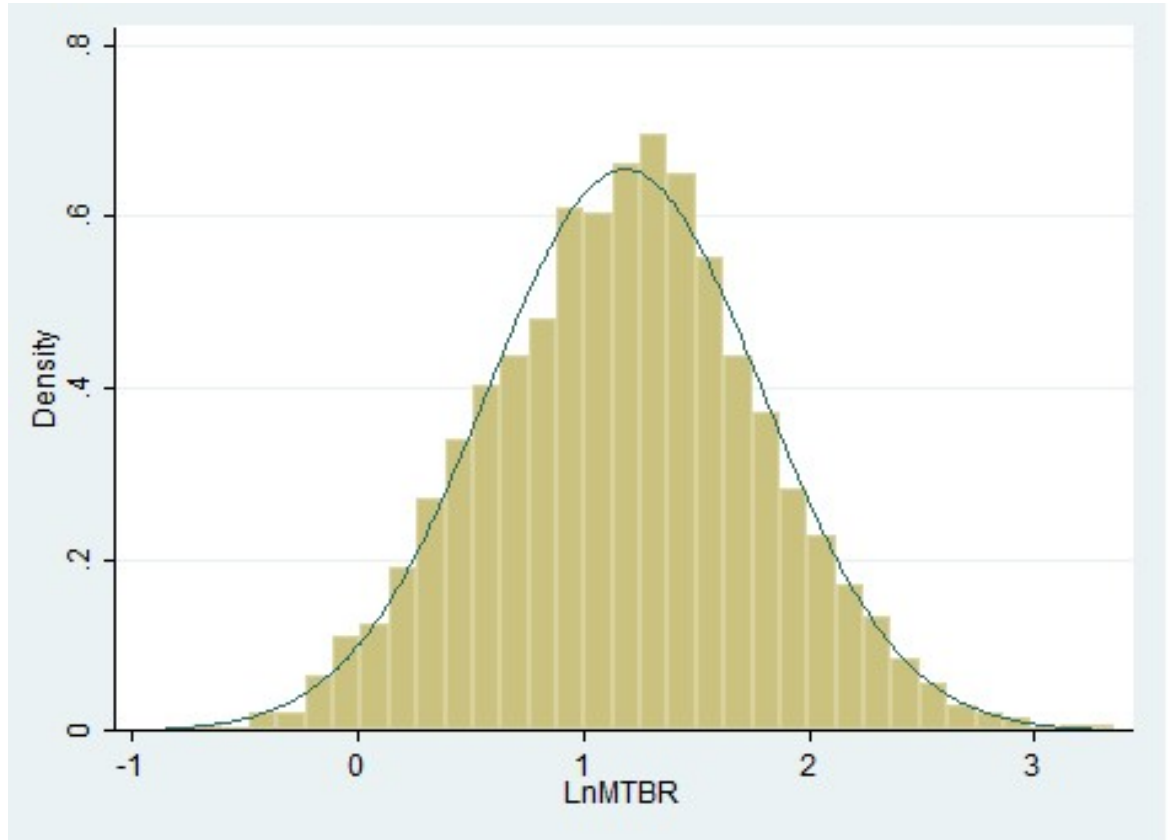


Table 5.3

Variable mean values by industry

Variable	No obs	S.D. of	S.D. of	DISCQuantity	DISCQuality	LnMTBR	Tobin's Q	R _{i,t}	Ln(1/BVOE)	ROE	ROA	SCSIZE	GROWTH	LEVERAGE	FSIZE	INDUSTRY
		DISCQuantity	DISCQuality													
Agriculture, forestry, animal husbandry and fisheries	57	8.776	3.525	9.895	4.965	1.503	3.105	0.086	-20.698	0.092	0.048	0.652	1.214	0.128	21.349	0
Mining	75	12.907	4.528	19.720	10.040	1.369	3.013	0.088	-23.099	0.171	0.094	0.620	1.283	0.345	23.719	1
Manufacturing	1536	10.046	4.282	10.535	6.721	1.259	2.759	0.116	-21.078	0.106	0.058	0.673	1.217	0.169	21.751	1
Water, electricity, and gas	129	12.070	4.644	16.008	9.016	0.825	1.767	0.097	-21.823	0.089	0.039	0.941	1.220	0.912	22.764	1
Construction	66	11.993	4.291	10.182	5.924	1.008	1.666	0.036	-21.605	0.124	0.032	1.388	1.270	0.454	22.993	1
Transport and storage	147	11.397	4.173	9.395	5.381	0.735	1.918	0.021	-21.953	0.097	0.058	0.584	1.213	0.439	22.537	0
Communication	195	8.184	3.058	4.656	2.979	1.382	3.481	0.070	-20.951	0.098	0.062	0.529	1.229	0.064	21.480	0
Retail/trade	213	6.100	2.996	3.737	2.953	1.238	2.297	0.078	-21.001	0.118	0.048	0.929	1.227	0.205	21.930	0
Real estate	222	7.606	3.479	6.288	4.176	0.846	1.615	0.038	-21.672	0.105	0.036	1.070	1.306	0.592	22.741	0
Services sectors	90	9.860	3.583	8.100	4.756	1.257	2.585	0.116	-20.907	0.093	0.050	0.744	1.276	0.211	21.651	0
Media and culture	27	2.736	1.797	2.556	2.333	1.226	2.668	0.069	-21.452	0.098	0.062	0.522	1.122	0.237	21.974	0
Comprehensive industry	93	8.640	3.620	8.860	5.699	1.096	2.178	0.109	-21.329	0.091	0.039	0.841	1.207	0.401	22.170	0

5.5.2 Multicollinearity

This paper employs Pearson's Correlation to explore the relationship between firm value, company characteristics, and environmental disclosure. The results are shown in Table 5.4. Although there is a correlation value of 0.8128 between DISCQuantity and DISCQuality, these two dependent variables do not appear in the same regression. Thus, this high correlation between them is not considered in multicollinearity. The highest correlation coefficient is 0.3255 between DISCQuality and INDUSTRY in this paper. Harmful levels of multicollinearity could be present when the correlation coefficient reaches ± 0.8 or ± 0.9 (Farrar and Glauber, 1967). It accords with the view of Hossain et al (1995), which claims collinearity does not occur when the correlation coefficient is less than 0.8. Thus, there is no unacceptable level of multicollinearity between the independent and control variables. Moreover, Moroney et al. (2011) and Leng and Ding (2011) mentioned that very low tolerance levels (approaching zero) or very high variance inflation factors (VIF) would suggest that multicollinearity may be a concern. When the VIF value exceeds 10, it would indicate a threat of multicollinearity (Neter et al., 1983; Pallant, 2007; Wang, et al., 2012). In this study, the top value of VIF scores is 1.27 for DISCQuality as showed in Table 5.6, which is well below the VIF value of 10. Therefore, multicollinearity is not a concern in this research.

Table 5.4**Correlation coefficients of key variables**

	LnMTBR	DISCQuantity	DISCQuality	Ln(1/BVOE)	LnROE	SCSIZE	LnGROWTH	INDUSTRY
LnMTBR	1							
DISCQuantity	-0.1258	1						
DISCQuality	-0.1567	0.8125	1					
Ln(1/BVOE)	0.5092	-0.3111	-0.3013	1				
LnROE	0.2629	0.0191	0.0077	-0.1638	1			
SCSIZE	-0.1285	0.0730	0.0654	-0.1096	0.0136	1		
LnGROWTH	0.0511	0.0166	0.0339	-0.0890	0.2362	0.1136	1	
INDUSTRY	0.0864	0.2311	0.3255	0.0221	0.0132	-0.0823	0.0196	1

Note: N=2850 observations

LnMTBR is the natural logarithm of the ratio of market value of equity to book value of equity at the end of year; *VED* is voluntary environmental disclosure index; *BVOE* is the book value at financial year; *LnROE* is the natural logarithm of the ration of net profit to book value of equity at the end of year; *SCSIZE* is the natural logarithm of the ratio of total assets to book value of equity at the end of year; *LnGROWTH* is the natural logarithm of the ratio of sales in current year to sales in the previous year; *INDUSTRY* is dummy variable for environmentally sensitive firms, coded as 1 for the firm belongs to environmentally sensitive industry and 0 otherwise

5.5.3 Endogeneity test

Endogeneity problems have been addressed in previous value-relevant studies (e.g., Chen *et al.*, 2010; Jo and Harjoto, 2011; Ntim *et al.*, 2012) in order to avoid any impact from them upon empirical findings. Greene (1993) pointed out that the relationship between CSR and firm value should be overstated if the endogeneity problem is not controlled in the research. Ntim *et al.* (2012), referring to the studies of Wooldridge (2002) and Larcker and Rusticus (2010), explained that a variable, generally, is classified as endogenous if it is correlated with the error term, and if it arises mainly from omitted variable bias and simultaneity (p.98). In the study on the value relevance of corporate governance disclosure, Ntim *et al.* (2012) employed a number of ways, which included lagged corporate governance disclosure practices (independent variables) from the firm value (dependent variable) and two stage least squares (2SLS), to address the potential endogeneity problems. In the research of Jo and Harjoto (2011), Heckman's two-stage estimation and the instrumental variable (IV) method are employed to correct the specification for endogeneity and explore the effect of CSR activities on firm value.

In this empirical chapter, single-equation instrumental-variables regression with a 2SLS estimator has been adopted to conduct the endogeneity test. The research distinguishes independent variables as endogenous variables and control variables as exogenous variables, and then employs lagged independent variables as instrumental variables to run the single-equation instrumental-variables regression. The result of Hausman Test in this study shows that F value is equal to 0.027261 (with $p = 0.8689$) and 0.85748 (with $p = 0.3546$) for the tests of the impact on firm value from environmental disclosure quantity and quality. An insignificant F value (>0.05) suggests the study does not have an

endogeneity problem and vice versa. Thus, endogeneity problems are not considered to be relevant in this research.

5.5.4 Results of empirical testing

The empirical results of the association study on the value relevance of environmental disclosure (both quality and quantity) are tested by the STATA 10.0. This paper employs Ordinary least squares (OLS) regression and Panel data to explore the relationship between firm value and environmental disclosure in the same year as shown in Table 5.5 and Table 5.7, and the effect on firm value by 1-year lagged environmental disclosure is as shown in Table 5.6 and Table 5.8. In the OLS regression, Tables 5.5 and 5.6 reveal adjusted R-square of 0.392, 0.391, 0.418 and 0.417, respectively, which explains more than 39 per cent of the variation in the firm value level. The F value of them with significance at $p=0.000$, lower than 0.001, means that these regression models are statistically significant (Leng and Ding, 2011).

Table 5.5

The relationship between firm value and environmental disclosure

Variable	OLS Regression Quantity of VED			VIF	OLS Regression Quality of VED			VIF
	Coeff.	Robust	Std. Err.		Coeff.	Robust	Std. Err.	
INTERCEPT	8.589 ***	(0.205)			8.426 ***	(0.205)		
DISCQuantity	0.002 **	(0.001)	1.19					
DISCQuality					-0.001	(0.002)	1.26	
Ln(1/BVOE)	0.318 ***	(0.010)	1.16		0.310 ***	(0.010)	1.16	
LnROE	0.256 ***	(0.014)	1.08		0.254 ***	(0.014)	1.09	
SCSIZE	-0.107 ***	(0.026)	1.04		-0.102 ***	(0.026)	1.04	
LnGROWTH	0.056 *	(0.034)	1.08		0.055	(0.034)	1.08	
INDUSTRY	0.068 ***	(0.019)	1.08		0.084 ***	(0.020)	1.15	
Adj R-squared	0.392		Adj R-squared		0.391			
N	2850				2850			

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

LnMTBR is the natural logarithm of the ratio of market value of equity to book value of equity at the end of year; *VED* is the voluntary environmental disclosure index; *BVOE* is the book value at end of financial year; *LnROE* is the natural logarithm of the ratio of net profit to book value of equity at the end of year; *SCSIZE* is the natural logarithm of the ratio of total assets to book value of equity at the end of year; *LnGROWTH* is the natural logarithm of the ratio of sales in the current year to sales in the previous year; *INDUSTRY* is a dummy variable for environmentally sensitive firms, coded as 1 for where the firm belongs to an environmentally sensitive industry and 0 otherwise

Table 5.6

The relationship between firm value and 1-year lagged environmental disclosure

Variable	OLS Regression Quantity of VED			VIF	OLS Regression Quality of VED			VIF
	Coeff.	Robust	Std. Err.		Coeff.	Robust	Std. Err.	
INTERCEPT	8.484 ***	(0.207)			8.336 ***	(0.207)		
DISCQuantity	0.002 *	(0.001)	1.19					
DISCQuality					-0.002	(0.002)	1.27	
Ln(1/BVOE)	0.323 ***	(0.010)	1.16		0.316 ***	(0.010)	1.17	
LnROE	0.246 ***	(0.013)	1.11		0.244 ***	(0.013)	1.12	
SCSIZE	-0.119 ***	(0.026)	1.04		-0.115 ***	(0.026)	1.05	
LnGROWTH	0.272 ***	(0.038)	1.09		0.277 ***	(0.038)	1.09	
INDUSTRY	0.098 ***	(0.019)	1.08		0.112 ***	(0.020)	1.15	
Adj R-squared	0.418		Adj R-squared		0.417			
N	2850				2850			

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

LnMTBR is the natural logarithm of the ratio of market value of equity to book value of equity at the end of year; *VED* is the voluntary environmental disclosure index; *BVOE* is the book value at the end of the financial year; *LnROE* is the natural logarithm of the ratio of net profit to book value of equity at the end of year; *SCSIZE* is the natural logarithm of the ratio of total assets to book value of equity at the end of year; *LnGROWTH* is the natural logarithm of the ratio of sales in the current year to sales in the previous year; *INDUSTRY* is a dummy variable for environmentally sensitive firms, coded as 1 for where the firm belongs to an environmentally sensitive industry and 0 otherwise

From these two tables, it can be seen that quantity of environmental disclosure has positive regression coefficients which are significant at the 0.05 level and 0.1 level, respectively. It means that quantitative environmental disclosure effectively influences on firm value. It indicates that, in the same year, quantity of environmental disclosure is more value relevant, than it is with 1-year lagged disclosure. However, there is no significant value relevance of qualitative environment disclosure found either in the same year or in the 1-year lagged calculations. In addition, all of the other dependent variables are significant at the 0.01 level in both tables, except LnGROWTH in Table 5.5. It

implies that firm growth is not closely related with firm value in the same year based on cross-sectional data during the period 2009-2011.

This research also employs panel data using the information from the same three-year period (from 2009 to 2011) by fixed and random effect models (with and without industry effects) to do the Hausman test as shown in Tables 5.7 and 5.8. Wang *et al.* (2012) explained that purpose of the Hausman test is to find whether the intercept item should be conducted using the fixed or random effect model. The figures in parentheses are standard errors robust to heteroscedasticity. The significant values in Table 5.7 (280.88 with $p=0.000$, 343.52 with $p=0.000$, 480.24 with $p=0.000$, and 459.14 with $p=0.000$) and Table 5.8 (480.74 with $p=0.000$, 439.54 with $p=0.000$, 497.85 with $p=0.000$, and 497.85 with $p=0.000$) for the Hausmen test indicate that the random effect estimators are inconsistent and fixed effect estimates are more appropriate. In contrast to the pooled data, the difference in panel data shows a positively significant association at the 0.01 level between firm value and environmental disclosure (both quantity and quality) in the same year based on the fixed effect estimates. It denotes that both quantitative and qualitative environmental disclosure is value relevant, which assists to add to firm value, based on time series analysis. However, there is no evidence found to support any effect on firm value by 1-year lagged qualitative environmental disclosure in the fixed effect estimates, which is the same as the finding in OLS regression by pooled cross-sectional data. To sum up, quantitative environmental disclosure is positively value relevant in the market, and it also influences the firm value in the next year. In contrast, qualitative environmental disclosure merely relates with firm value in the same year, but it does not affect the market value of the companies in the following year. The findings of this empirical chapter are consistent with the principle of signalling theory and the concept of information asymmetry that good environmental disclosure in the annual

reports gives good signals in the stock market. It effectively influences on the market value of the firm by enhancing investors' confidence, improving their appreciation of the firm, and reducing information asymmetry between managers and investors. Based on Chinese evidence, good environmental disclosure with good signals more means positive information rather than high level of information. One typical feature of Chinese environmental disclosure is that all information is just "good news" and no "bad news" revealed, which is decided by the property of Chinese society that strong uncertainty avoidance.

Table 5.7

Panel data: the relationship between firm value and environmental disclosure

Panel A

Quantity of VED									
Variable	Fixed			Random			Random		
	Coeff.	Robust	Std. Err.	Coeff.	Robust	Std. Err.	Coeff.	Robust	Std. Err.
INTERCEPT	23.47	***	(0.963)	10.235	***	(0.263)	10.501	***	(0.270)
DISCQuantity	0.003	***	(0.001)	0.005	***	(0.001)	0.005	***	(0.001)
Ln(1/BVOE)	1.019	***	(0.045)	0.401	***	(0.012)	0.408	***	(0.012)
LnROE	0.131	***	(0.015)	0.215	***	(0.015)	0.211	***	(0.015)
SCSIZE	-0.472	***	(0.062)	-0.092	***	(0.031)	-0.054		(0.033)
LnGROWTH	0.131	***	(0.027)	0.021		(0.027)	0.020		(0.027)
INDUSTRY				0.052	*	(0.029)	-0.169		(0.128)
Industry effect	No			No			Yes***		
Hausman				280.88	***		343.52	***	
Number of observations	2850			2850			2850		

Panel B

Quality of VED									
Variable	Fixed			Random			Random		
	Coeff.	Robust	Std. Err.	Coeff.	Robust	Std. Err.	Coeff.	Robust	Std. Err.
INTERCEPT	23.606	***	(0.957)	10.144	***	(0.265)	10.430	***	(0.271)
DISCQuality	0.007	***	(0.002)	0.007	***	(0.002)	0.007	***	(0.002)
Ln(1/BVOE)	1.026	***	(0.045)	0.397	***	(0.012)	0.404	***	(0.012)
LnROE	0.131	***	(0.015)	0.216	***	(0.015)	0.213	***	(0.015)
SCSIZE	-0.481	***	(0.062)	-0.091	***	(0.031)	-0.051		(0.033)
LnGROWTH	0.130	***	(0.027)	0.016		(0.027)	0.015		(0.027)
INDUSTRY				0.056	*	(0.029)	0.626	***	(0.130)
Industry effect	No			No			Yes***		
Hausman				480.24	***		459.14	***	
Number of observations	2850			2850			2850		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

LnMTBR is the natural logarithm of the ratio of market value of equity to book value of equity at the end of year; *VED* is the voluntary environmental disclosure index; *BVOE* is the book value at the end of the financial year; *LnROE* is the natural logarithm of the ratio of net profit to book value of equity at the end of year; *SCSIZE* is the natural logarithm of the ratio of total assets to book value of equity at the end of year; *LnGROWTH* is the natural logarithm of the ratio of sales in the current year to sales in the previous year; *INDUSTRY* is a dummy variable for environmentally sensitive firms, coded as 1 for where the firm belongs to an environmentally sensitive industry and 0 otherwise

Table 5.8

Panel data: the relationship between firm value and 1-year lagged environmental disclosure

Panel A

Quantity of VED									
Variable	Fixed			Random			Random		
	Coeff.	Robust	Std. Err.	Coeff.	Robust	Std. Err.	Coeff.	Robust	Std. Err.
INTERCEPT	28.01	***	(0.804)	10.853	***	(0.302)	11.209	***	(0.310)
DISCQuantity	0.003	***	(0.001)	0.005	***	(0.001)	0.005	***	(0.001)
Ln(1/BVOE)	1.237	***	(0.037)	0.442	***	(0.014)	0.451	***	(0.014)
LnROE	0.117	***	(0.011)	0.201	***	(0.013)	0.199	***	(0.012)
SCSIZE	-0.455	***	(0.056)	-0.070	**	(0.031)	-0.041		(0.033)
LnGROWTH	0.243	***	(0.027)	0.253	***	(0.028)	0.251	***	(0.028)
INDUSTRY				0.082	***	(0.031)	-0.158		(0.135)
Industry effect	No			No			Yes***		
Hausman				480.74	***		439.54	***	
Number of observations	2850			2850			2850		

Panel B

Quality of VED									
Variable	Fixed			Random			Random		
	Coeff.	Robust	Std. Err.	Coeff.	Robust	Std. Err.	Coeff.	Robust	Std. Err.
INTERCEPT	28.205	***	(0.806)	10.739	***	(0.302)	11.122	***	(0.310)
DISCQuality	0.003		(0.002)	0.006	***	(0.002)	0.006	**	(0.002)
Ln(1/BVOE)	1.245	***	(0.037)	0.436	***	(0.014)	0.445	***	(0.014)
LnROE	0.117	***	(0.011)	0.203	***	(0.013)	0.200	***	(0.013)
SCSIZE	-0.464	***	(0.056)	-0.067	**	(0.031)	-0.038		(0.034)
LnGROWTH	0.247	***	(0.027)	0.260	***	(0.028)	0.257	***	(0.028)
INDUSTRY				0.090	***	(0.032)	-0.171		(0.138)
Industry effect	No			No			Yes***		
Hausman				497.85	***		497.85	***	
Number of observations	2850			2850			2850		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

LnMTBR is the natural logarithm of the ratio of market value of equity to book value of equity at the end of year; *VED* is the voluntary environmental disclosure index; *BVOE* is the book value at the end of the financial year; *LnROE* is the natural logarithm of the ratio of net profit to book value of equity at the end of year; *SCSIZE* is the natural logarithm of the ratio of total assets to book value of equity at the end of year; *LnGROWTH* is the natural logarithm of the ratio of sales in the current year to sales in the previous year; *INDUSTRY* is a dummy variable for environmentally sensitive firms, coded as 1 for where the firm belongs to an environmentally sensitive industry and 0 otherwise

In this paper, profitability (LnROE/ROE) and book value of equity (Ln(BVOE)) are found significantly at the 0.01 level to correlate with the value of the firm by both pooled data and panel data, which accords with the framework supplied by Ohlson's (1995) model. The value of the firm is reflected by a combination of information which refers to the income statement (profits/earnings), the balance sheet (book value of equity), and other value-relevant information (Berry and Wright, 2001). Therefore, the regression in this paper is confirmed well. Under the time series data, the growth of the firm (LnGROWTH) is found to be an important determinate which affects the market value positively. It reflects there is a dynamic market reaction to the fast growth of firms and vice versa. In other words, fast growing firms would attract more funding from investors. Those slow and negative growing firms should therefore utilise other methods to add to their market value, such as increasing environmental disclosure.

Firm size (SCSIZE), a control variable, is found to impact on dependent variables (LnMTBR) significantly and negatively in this study. It is inconsistent with the finding of Hassan *et al.* (2009). They argued that a large-size firm is expected to have a high level of firm value and indicated that a significantly positive link between firm size and firm value is found based on evidence from the emerging capital market of Egypt. However, the result in this paper accords with the empirical study of Wu and Shen (2010), which investigated the relationship between environmental disclosure practice and firm value based on 145 listed chemical firms in China. They found that firm size associates with Tobin's Q with a negative regression coefficient which is significant at the 0.01 level. In other words, in the Chinese market, a negative association between firm size and firm value is proved. There are some possible reasons to explain why this phenomenon emerges in the Chinese market which are as follows: 1) In contrast to large firms, there are more growth prospects and also development potential in small companies, which

attract more investor interest; 2) At present, the Chinese stock markets are highly speculative and volatile, which leads to speculative short-term trading as the main market form in China. Large firms with market saturation and steady stock price cannot be favoured by these short-term investors; 3) Lower stock market prices are issued by small companies compared with those of large firms, which are more easily undertaken by a larger range of investors.

5.5.5 Results of Robustness test

Tobin's Q and share return are employed as dependent variables in this paper in order to measure the robustness of the empirical test. We utilise Ordinary least squares (OLS) regression to investigate the value relevance of environmental disclosure based on pooled cross-sectional data. From Table 5.10 Panels A and B, we did not find any evidence to support that quantitative and qualitative environmental disclosures are value relevant for the stock market in the following year. However, in Table 5.9, both quantity and quality of environmental disclosure, with positive regression coefficients which are significant at the 0.01 level, are found to relate with share return in the same year. In addition, there is a negative impact on Tobin's Q found from quality of environmental disclosure. These results reveal that the role of environmental disclosure is very important for share return in the same year, which is the same result as when it used LnMTBR. In addition, the findings indicate that, in the Robustness test, 1-year lagged environmental disclosure has no effect in the stock market. It accords with the results of the association between 1-year lagged qualitative environmental information and the market value of the firm (LnMTBR). There is a faint difference on the role of quantitative environmental disclosure found as a slight impact on share return from 1-year lagged quantity of

information when a significant effect on LnMTBR is shown. Table 5.11 shows the relationship between share return and environmental disclosure by Panel data. In this case, the Hausman test lends support for fixed effect specification. The results indicate that quality of environmental disclosure does not, in effect, provide value relevant information to the market by time series analysis, but quantitative environmental informational does. In these three tables, the findings prove again that there is a significant and negative effect from firm size (FSIZE) on firm value (Tobin's $Q/R_{i,t}$) in Chinese listed companies.

Table 5.9

Panel A: The relationship between Tobin's Q and environmental disclosure

Variable	OLS Regression Quantity of VED			VIF	OLS Regression Quality of VED		
	Coeff.	Robust Std. Err.			Coeff.	Robust Std. Err.	
INTERCEPT	14.683 ***	(0.473)			14.451 ***	(0.469)	
DISCQuantity	0.001	(0.001)	1.19				
DISCQuality					-0.009 *	(0.005)	1.26
FSIZE	-0.543 ***	(0.022)	1.43		-0.530 ***	(0.022)	1.43
ROE	8.478 ***	(0.452)	1.07		8.444 ***	(0.451)	1.07
DEBT	-2.502 ***	(0.150)	1.26		-2.508 ***	(0.150)	1.26
GROWTH	0.055	(0.044)	1.05		0.054	(0.044)	1.05
INDUSTRY	0.090 *	(0.047)	1.08		0.121 **	(0.048)	1.15
Adj R-squared	0.438		Adj R-squared		0.438		
N	2850				2850		

Panel B: The relationship between share return and environmental disclosure

Variable	OLS Regression Quantity of VED			VIF	OLS Regression Quality of VED		
	Coeff.	Robust Std. Err.			Coeff.	Robust Std. Err.	
INTERCEPT	2.643 ***	(0.212)			2.479 ***	(0.214)	
DISCQuantity	0.007 ***	(0.001)	1.19				
DISCQuality					0.010 ***	(0.003)	1.26
FSIZE	-0.127 ***	(0.010)	1.43		-0.119 ***	(0.010)	1.43
ROE	0.916 ***	(0.170)	1.07		0.911 ***	(0.170)	1.07
DEBT	0.292 ***	(0.066)	1.26		0.285 ***	(0.066)	1.26
GROWTH	-0.055	(0.035)	1.05		-0.058	(0.035)	1.05
INDUSTRY	-0.004	(0.023)	1.08		0.002	(0.024)	1.15
Adj R-squared	0.051		Adj R-squared		0.044		
N	2850				2850		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Tobin's Q = market value of assets / book value of assets (where market value of assets is measured by book value of assets minus book value of common equity and then add market value of the common equity); *Share return* ($R_{i,t}$) = $\ln(P_{i,t}/P_{i,t-1})$; *VED* is the voluntary environmental disclosure index; *FSIZE* is the natural logarithm of the firm's total assets in RMB at the end of year; *ROE* is profitability: return on shareholders' equity; *DEBT* is leverage ratio of total liabilities divided by total assets at the end of year; *GROWTH* is the ratio of sales in the current year to sales in the previous year; *INDUSTRY* is a dummy variable for environmentally sensitive firms, coded as 1 for where the firm belongs to an environmentally sensitive industry and 0 otherwise.

Table 5.10

Panel A: The relationship between Tobin's Q and 1-year lagged environmental disclosure

Variable	OLS Regression Quantity of VED			VIF	OLS Regression Quality of VED		
	Coeff.	Robust Std. Err.			Coeff.	Robust Std. Err.	
INTERCEPT	12.582 ***	(0.451)			12.406 ***	(0.449)	
DISCQuantity	0.001	(0.002)	1.19				
DISCQuality					-0.006	(0.005)	1.26
FSIZE	-0.479 ***	(0.021)	1.46		-0.470 ***	(0.021)	1.46
ROE	8.054 ***	(0.445)	1.08		8.020 ***	(0.445)	1.08
DEBT	-1.880 ***	(0.139)	1.30		-1.884 ***	(0.139)	1.30
GROWTH	0.198 ***	(0.051)	1.05		0.199 ***	(0.051)	1.05
INDUSTRY	0.134 ***	(0.045)	1.08		0.157 ***	(0.046)	1.15
Adj R-squared	0.404		Adj R-squared		0.405		
N	2850				2850		

Panel B: The relationship between share return and 1-year lagged environmental disclosure

Variable	OLS Regression Quantity of VED			VIF	OLS Regression Quality of VED		
	Coeff.	Robust Std. Err.			Coeff.	Robust Std. Err.	
INTERCEPT	0.440 ***	(0.135)			0.418 ***	(0.134)	
DISCQuantity	0.001	(0.001)	1.19				
DISCQuality					0.001	(0.002)	1.26
FSIZE	-0.037 ***	(0.006)	1.46		-0.036 ***	(0.006)	1.46
ROE	0.706 ***	(0.109)	1.08		0.705 ***	(0.110)	1.08
DEBT	0.132 ***	(0.039)	1.30		0.131 ***	(0.039)	1.30
GROWTH	0.046 **	(0.020)	1.05		0.046 **	(0.020)	1.05
INDUSTRY	-0.005	(0.014)	1.08		-0.004	(0.015)	1.15
Adj R-squared	0.025		Adj R-squared		0.025		
N	2850				2850		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Tobin's Q = market value of assets / book value of assets (where market value of assets is measured by book value of assets minus book value of common equity and then add market value of the common equity); *Share return* ($R_{i,t}$) = $\ln(P_{i,t}/P_{i,t-1})$; *VED* is the voluntary environmental disclosure index; *FSIZE* is the natural logarithm of the firm's total assets in RMB at the end of year; *ROE* is profitability: return on shareholders' equity; *DEBT* is leverage ratio of total liabilities divided by total assets at the end of year; *GROWTH* is the ratio of sales in the current year to sales in the previous year; *INDUSTRY* is a dummy variable for environmentally sensitive firms, coded as 1 for where the firm belongs to an environmentally sensitive industry and 0 otherwise.

Table 5.11

Panel data: the relationship between share return and environmental disclosure

Panel A

Quantity of VED									
Variable	Fixed			Random			Random		
	Coeff.	Robust	Std. Err.	Coeff.	Robust	Std. Err.	Coeff.	Robust	Std. Err.
INTERCEPT	42.778	***	(1.604)	2.643	***	(0.212)	2.761	***	(0.232)
DISCQuantity	0.005	***	(0.002)	0.007	***	(0.001)	0.007	***	(0.001)
FSIZE	-1.975	***	(0.074)	-0.127	***	(0.010)	-0.136	***	(0.011)
ROE	0.696	**	(0.347)	0.916	***	(0.170)	0.914	***	(0.172)
DEBT	1.108	***	(0.264)	0.292	***	(0.066)	0.311	***	(0.072)
GROWTH	0.085	**	(0.038)	-0.055		(0.035)	-0.054		(0.035)
INDUSTRY				-0.004		(0.023)	0.196	*	(0.106)
Industry effect	No			No			Yes		
Hausman				1299.23	***		1485.80	***	
Number of observations	2850			2850			2850		

Panel B

Quality of VED									
Variable	Fixed			Random			Random		
	Coeff.	Robust	Std. Err.	Coeff.	Robust	Std. Err.	Coeff.	Robust	Std. Err.
INTERCEPT	43.092	***	(1.603)	2.479	***	(0.214)	2.621	***	(0.235)
DISCQuality	0.003		(0.005)	0.010	***	(0.003)	0.009	***	(0.003)
FSIZE	-1.988	***	(0.074)	-0.119	***	(0.010)	-0.128	***	(0.011)
ROE	0.703	**	(0.347)	0.911	***	(0.170)	0.909	***	(0.172)
DEBT	1.093	***	(0.267)	0.285	***	(0.066)	0.310	***	(0.073)
GROWTH	0.085	**	(0.039)	-0.058		(0.035)	-0.057		(0.036)
INDUSTRY				0.002		(0.024)	0.197	*	(0.107)
Industry effect	No			No			Yes		
Hausman				1236.62	***		1406.24	***	
Number of observations	2850			2850			2850		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Share return ($R_{i,t}$) = $\ln(P_{i,t}/P_{i,t-1})$; VED is the voluntary environmental disclosure index; FSIZE is the natural logarithm of the firm's total assets in RMB at the end of year; ROE is profitability: return on shareholders' equity; DEBT is leverage ratio of total liabilities divided by total assets at the end of year; GROWTH is the ratio of sales in the current year to sales in the previous year; INDUSTRY is a dummy variable for environmentally sensitive firms, coded as 1 for where the firm belongs to an environmentally sensitive industry and 0 otherwise.

5.6 CONCLUSION

China, one of the largest developing countries, is the most populous nation in the world. It is recognised as a country with a pivotal role in global environmental protection (Rowe *et al.*, 2009). In the last three decades, the rapid economic growth has left severe air and water problems in many cities in China. These serious environmental issues have not only increased the attention of the government and residents, it has also attracted many scholars to explore the association between corporations and environmental disclosure in order to assist various stakeholders in realising the effect of environmental disclosure and therefore to contribute to sustainable development. In this empirical paper, signalling theory and the concept of information asymmetry have been developed to explore the market response to quantitative and qualitative environmental disclosure in the annual report through examining evidence from Chinese listed companies between 2009 and 2011. This paper contributes to the association studies (long-term relationships) on value relevance research. It extends the study of Wu and Shen (2010) from 145 listed chemical firms in 2008 to 2,850 firm-year observations during the period 2009-2011 covering 12 different industries. The lack of time-series analysis and the problems of unitary industrial research in their study are improved upon. In addition, this paper employs LnMTBR instead of Tobin's Q to measure firm value based on the Ohlson (1995) model with size-control factors. At the same time, Tobin's Q and share returns are employed to test the robustness of the regression. The findings indicate that quantitative environmental disclosure is positively value relevant in the market, and it also influences the firm value in the next year. In contrast, qualitative environmental disclosure merely relates with the firm value in the same year, but it does not affect the market value of companies in the following year. In other words, quantitative environmental information in the annual report is more effective in the Chinese market than qualitative information.

To some extent, it implies that the quantity of environmental disclosure provides more value relevant information, which is very popular for investors in China, and that quality environmental information is underdeveloped which Chinese listed companies should perhaps pay more attention to. In addition, it is worth mentioning that a negative association is found between firm size and firm value in the Chinese stock market, which is contrary to the view of large-size firms being expected to relate with high firm value. Furthermore, this study denotes that much less environmental information is disclosed in the annual reports of most Chinese listed companies and that China is in a budding stage of development in disclosure practice. The positive value relevance of environmental disclosure is supported by empirical evidence in this paper. Voluntary disclosure practice could mitigate the information asymmetry and attract long-term investment from outside investors, instead of speculative short-term trading, in order to create an efficient stock market. It suggests that firms should reveal more environmental information in the future in order to reduce information asymmetry, improve the firms' signals to stakeholders, and thus increase firm value.

CHAPTER SIX

CONCLUSION

6.1 INTRODUCTION

The focus of this thesis concerns four domains: the Chinese context; corporate governance; environmental disclosure; and its value relevance. The precise natures of the relations between these domains are explored to gain greater clarity. Due to the unique characteristics of Chinese corporate governance, the rapidly growing economy in the last three decades in China, the extremely serious environmental issues faced by the residents and the direction of sustainable development, research on the determinants of environmental disclosure and its value relevance based on empirical evidence of Chinese firms is meaningful and significant.

This thesis expects to contribute to a more comprehensive knowledge of voluntary environmental disclosure in three main areas. First, this study provides an up-to-date commentary on the status of both quantitative and qualitative voluntary environmental disclosures in the annual reports of Chinese listed companies. It also points out that the trend of the increasing development of environmental disclosure in the Chinese market should continue in the future. Second, based on the unique characteristics of ownership structure and board composition in China and the gap in previous research, the effect of these two characteristic mechanisms of corporate governance on environmental information is investigated. In addition, it presents a comparison between the different determinants of quantitative and qualitative environmental disclosures. Third, this thesis

provides an updated research on the value relevance of voluntary environmental disclosures under both cross-sectional and time-series data in order to explore the importance and value of this kind of environmental practice by firms in fast developing countries such as China based on a large sample size during consecutive years.

This thesis achieved in answering the research questions and improved upon the issues relating to the previous research on environmental information disclosure. This concluding chapter summarises the thesis in relation to its main objectives. The following sections provide a synopsis of this research; a summary of research methodology; and a summary of the research findings. Then, the potential implications of these findings are discussed and the recommendations in promoting environmental responsibility and accountability are given. The next section discusses the limitations of this study along with recommendations for future research. It is very important to realise the limitations in the thesis, which could provide guidance and direction for future studies. The final section gives a brief summary of this chapter.

6.2 SYNOPSIS

According to the main research aims, this thesis is divided into three empirical parts. Before these empirical chapters, it distinguished the unique characteristics of corporate governance in China from the UK and the US. It provided a comprehensive definition of corporate governance in both broad and narrow perspectives. Then the differences between China and Western countries were evaluated and analysed, with a focus on the unique characteristics of China which took in five aspects: the corporate governance

model, the development of Corporate Governance Codes, ownership structure, board structure, and the agency problem.

In the first two empirical chapters, it highlighted the gap in the previous studies on the relationship between corporate governance and voluntary environmental disclosure, which supports the motivation and importance of this research. Based on the discussion, analysis and estimation of the theoretical frameworks (legitimacy theory, stakeholder theory, agency theory, and stakeholder-agency theory), the research hypotheses were presented based on the stakeholder-agency theory and the actual status of China.

In the first and the second empirical chapters, the roles of ownership structure and board composition on the quantity and quality of environmental disclosure in the annual reports are examined through the data of 3,690 firm-year observations during the period 2009-2011 covering 12 industries based on the Chinese market.

The third empirical chapter provides an updated research on the value relevance of voluntary environmental disclosures. The limitations of the previous research propel a time-series analysis of the association study on value relevance based on the Chinese evidence because of its uniqueness and its stock market environment under the nation's distinct political, legal, and economic context.

In the third empirical chapter, this thesis developed signalling theory and the concept of information asymmetry to explore the market response to quantitative and qualitative environmental disclosure in the annual report using evidence from Chinese listed companies between 2009 and 2011.

6.3 SUMMARY OF RESEARCH METHODOLOGY

In measurement of environmental disclosure, the research integrated mechanistic content analysis approach and interpretative approach to measure both quantity and quality of disclosure information. In detail, the number of sentences has been chosen as the “unit of analysis” (Gray *et al.*, 1995) to measure the quantity of environmental disclosure; and a score system based on 9 items has been chosen to measure the quality. The reliability of environmental information collection was proved by the reliability test of content analysis based on the measurement of stability and reproducibility (Krippendorff, 2004) and Coefficient alpha (Waltz *et al.*, 1991, p.166).

The primary measurement of value relevance in this research employed lnMTBR, which is a better and more powerful measure in firm value than using the logarithm of market equity alone (Hassan *et al.*, 2009). The equation of lnMTBR is the natural logarithm of the ratio (market value of equity / book value of equity). In this study, market value of equity is measured as the number of outstanding shares at the end of year multiplied by the share price of the stock at the end of year. In the robustness test, Tobin’s Q and Share return were engaged to measure the value relevance. These two popular approaches have been frequently applied in previous value-relevant studies (e.g., Murray *et al.*, 2006; Ragothaman and Carr, 2008; Murcia and Santos, 2010; Wu and Shen, 2010; Moroney *et al.*, 2011).

The Ohlson (1995) model is the ‘best-known conceptual model of value relevance analysis’ (Carnevale *et al.*, 2009). It supplies a framework that ‘is fully articulated in that it relates the value of the firm to the information provided in the income statement (earnings), the balance sheet (book value of equity), and other value-relevant information’ (Berry and Wright, 2001, p745). In previous studies (e.g., Moneva and Cuellar, 2009;

Semenova *et al.*, 2009; De Klerk and de Villiers, 2012), they mentioned that all accounting and market-based variables should be divided by the total assets/equity of the firm at the beginning of the period in order to control the size differences. Therefore, the model of value relevance in this study was developed based on the Ohlson (1995) model with this size-control factor.

The empirical parts emphasised that, although OLS regression is commonly employed in examining the relationship between the extent of social and environmental disclosure and its determinants, there is a limitation in ordinary least squares when the dependent variable is measured by content analysis to generate a part of the sample without any disclosure and hence being scored with a zero value (Salama *et al.*, 2012) whilst the other parts are more than zero. TOBIT formulation supplies a powerful check on the model which has the value of the dependent variable as not less than zero. Therefore, TOBIT and ordered PROBIT regressions were also employed to examine the relationship between the extent of voluntary environmental disclosure and characteristics of corporate governance for minimising any loopholes in regressions. In other words, a robustness test was completed through running these three regressions.

As alluded to above, this study explored the determinants of both quantitative and qualitative environmental disclosure through OLS, TOBIT, and ordered PROBIT regressions. The findings are consistent between OLS and TOBIT regressions, which points to the stability and robustness of the research model. Furthermore, panel data by fixed and random effect models (with and without industry effects) was also employed to do the empirical tests. In contrast with pooled data (cross-sectional data), panel data (time series data) supplied an analysis on measurements of the relationship over time. In the empirical part of value relevance, this study employed Ordinary least squares (OLS)

regression and Panel data to explore the relationship between firms' environmental disclosure and firms' market to book ratio in the same and the subsequent year.

6.4 SUMMARY OF THE RESEARCH FINDINGS

In this research, the features of Chinese corporate governance was found to be mainly a combination of the Anglo-American and continental European models which have formed a mixed model containing Chinese characteristic dual boards, which are controlled by a highly concentrated state-owned ownership structure. A large proportion of shares are untradeable, in the hands of the state, which leads to 'a high level of ownership concentration and a low level of marketability' (Ma *et al.*, 2010). In China, the state holds two significant roles in corporate governance: the controlling shareholder (the main owner) and the political power holder (the main regulator of the corporate sector). The contrary duties between "player" and "judge" are put into a single unit, which means where there are conflicts of interest between the controlling shareholders (the state) and minority shareholders, the state with its political power has the difficulty of deciding whose interest is protected: either its own interest or the fair interest of all shareholders. And then, the agency problems arise at a new level in the relationship between the strong controlling shareholders (the principal) and the weak minority shareholder (the principal); another is between the directors (the agent) and the minority shareholders (the principal). In the other hand, the state's dual role in a good way could increase monitoring to managers and protection for its own rights by its political power. In other words, it gets the state and managers together to protect the state's interest, which means most people's interest, and overlook minority shareholders' interest (minority people's interest). That is a possible reason why China had the rapid economic growth in the last three decades and

avoided the serious impact from the 2007 financial crisis. At present, the state cannot withdraw its control from Chinese corporations, because there is no mechanism in place of this control to prevent managers abusing their power. Although there are still many issues and immature mechanisms in Chinese corporate governance which need to be improved as soon as possible, the government has been making efforts to set up an effective corporate governance system and a mature market.

Following this, the empirical chapters provided an up-to-date commentary on the status of both quantitative and qualitative voluntary environmental disclosures in the annual reports of Chinese listed companies through the manual data collection and its analysis. When the figures were compared with the data revealed by the previous studies, it showed that the developing trend of increasing levels of environmental disclosure did not only keep growing at all times through the years, but also it accelerated by an amazing rate. According to studies of Li and Xiao (2002), Xiao and Hu (2004), and Liu and Anbumozhi (2009), it found an increase in Chinese listed companies with voluntary environmental disclosure as shown by 34 per cent in 2002, 37 per cent in 2003, and approximately 60 per cent in 2006. This study showed a level of 95 per cent of Chinese listed companies with environmental disclosure between 2009 and 2011. However, it is worth mentioning that both qualitative and quantitative environmental disclosure is quite insufficient in the annual reports of most Chinese listed companies, with the exception of a few companies which reveal comparatively sufficient quantitative environmental information. The study reflected that Chinese firms pay more attention to the quantity of environmental disclosure rather than quality, which means that quantity is more important than quality in the minds of the managers. Furthermore, this study found that companies just report 'good news' and hide 'bad news', which is the current status of environmental disclosure practice in the annual reports of Chinese listed companies. The

above abnormal phenomena reflect an unbalanced view of managers and control shareholders on environmental disclosure in China. They just focus on the immediate benefits from quantitative and positive information, and always overlook the meaning of disclosure practices in the annual reports. A good environmental disclosure, which should involve high level of environmental information both “good news” and “bad news”, assists various stakeholders to realise the actual status of companies dealing with environmental issues. It needs to attract attention of the government and the public for its improvement in future.

The empirical results on the relationship between corporate governance and environmental disclosure indicated that environmental disclosure positively relates to state ownership, blockholder ownership, managerial ownership, and size of the supervisory board; that it negatively relates to legal person ownership and foreign share ownership; and it doesn't relate significantly with the proportion of independent directors on the board of directors (IND). In detail, state ownership and a larger size of the supervisory board with an effective monitoring role in the company encourage the firm be engaged in voluntary environmental disclosure. The findings are consistent with the organisational and managerial perspective and the accountability perspective evolved from stakeholder theory. In China, state ownership, which is powerful and where it is important for the managers' positions, meets the requirement in the organisation and managerial perspective. Therefore, the firm would satisfy the information demands of state ownership. In regard to the supervisory board, which is more inclined to the firms rather than aligned with management, it requires the firm to supply disclosures explaining firm's actions to stakeholders and society and reducing information asymmetry, which is accordant with the stakeholder-agency theory and the accountability perspective. However, there was no empirical evidence to support that the IND

effectively acts on environmental disclosure. It reflected an immature mechanism and some remaining problems in Chinese corporate governance at the moment. Furthermore, this research found that large firms in ‘environmentally-sensitive’ industry play a significant and positive role on environmental disclosure practice in the annual report in China. The finding is consistent with many previous studies (e.g., Gray *et al.*, 2001; Brammer and Pavelin, 2008; Liu and Anbumozhi, 2009; Beck *et al.*, 2010; Buniamin, 2010; Salama *et al.*, 2012; Zeng *et al.*, 2012). In other words, the results of these two control variables (LogFSIZE and INDUSTRY) proved that the model and data in this empirical study are effective.

The empirical findings on the value relevance of environmental disclosure indicated that quantitative environmental disclosure is positively value relevant in the market, and it also influences the firm value in the following year. It confirmed well the hypothesis which founded on the signalling theory and the concept of information asymmetry. In detail, good environmental disclosure practice supplies good signals in the stock market that increase firms’ reputation and reduce information asymmetry between investors and managers to enhance investors’ confidence on investment decisions. In contrast, qualitative environmental disclosure merely relates with the firm value in the same year, but it does not affect the next year market value of companies. In other words, quantitative environmental information in the annual report is more effective in the Chinese market than qualitative information. To some extent, it implied that the quantity of environmental disclosure provides more value relevant information which is preferred by investors in China, and the quality of environmental information is underdeveloped which should be paid more attention by Chinese listed companies. In addition, it is worth mentioning that a negative association was found between firm size and the market value

of the firm in the Chinese stock market, which is in opposition to the view of larger-sized firm being expected to relate with high firm value.

To look back at Chinese history, the seeds of capitalism began in the late feudal society. But the communist revolution pushed China to skip over the capitalism and go to a new stage of socialism. After the communists took over the means of production and established its own regime, the government restructured all private-ownership enterprises to SOEs and dedicated making the country self-sufficient. However, in the late Mao's, many state-owned enterprise needed state subsidy because of the natural and man-made disaster. In the 1970s, a new leader, Xiaoping Deng, introduced a form of market economy, but with a centralised, Communist-state orientation for economic development (Tricker, 2012). Compared with Neo-corporatism pursued a more "equitable" division of economic production for members of society, Chinese government utilises the corporatism to reduce the number of challengers and consolidate its own political power. From the above, the government has been engaging in the protection of its one-party dictatorship, whether politically or economically. The findings in this thesis provided evidences to realise the uniqueness of Chinese case. In China, state ownership, which possesses two significant roles in corporate governance: "player" and "judge", holds dominant status and power in the Chinese listed companies, which are important for managers' position. Therefore, managers have to satisfy state ownership's information demands and interests. The empirical results in the relationship between state ownership and environmental disclosure (both quantity and quality) provided it. However, the affiliation of state ownership and managers would impact minority shareholders' interests, which is reflected by the empirical findings of the relationship between foreign ownership and environmental disclosure. Moreover, the role and duty of independent directors are also influenced by this affiliation, as the empirical findings in the

association between the proportion of independent directors and environmental disclosure. On the current situation, the uniqueness of Chinese corporate governance gave the fast economic growing in the last three decades and 2007 financial crisis avoidance, because the state's interests means most of the people's interests. However, in the long run, the unbalanced market economy would hinder the establishment of a fair and effective market in China.

To sum up, this study denoted that there is much less quantity and low level environmental information disclosed in the annual report of most Chinese listed companies, compared to Western countries, and that China is in a budding stage of development in disclosure practice. It suggested that firms should reveal more environmental information in the future to create a win-win situation between themselves and their stakeholders, under the stakeholder-agency framework. Corporate governance (different ownership structures and supervisory board) was found as determinant factor influencing environmental disclosure practice in China. It means that effective corporate governance assists the development of environmental information in the annual reports. In the relationship between firms' market value and firms' disclosure practice, it found that both quantity and quality of environmental disclosures are value relevant. The findings suggested that managers should put more attention to improve environmental information practice in the annual report, which could reduce information asymmetry, improve the firms' signals to stakeholders, and thus increase firm value. In short, improving corporate governance means better environmental disclosure practice, and then increases firms' value and advances economic development.

6.5 POTENTIAL IMPLICATIONS AND RECOMMENDATIONS

This thesis may have potential implications for policy makers and managers. In terms of policy makers, the study provides two potential policy implications. First, the empirical finding discovered that the effect of independent directors on the board of directors on environmental disclosure practice is more useless compared with other characteristics of corporate governance in ownership structure and board component. Moreover, overlapped role between supervisory board and independent directors are big issues in the development of the Chinese corporate governance. It reflects an immature mechanism with some remaining problems in the Chinese market at present. The results inform standard-setters and regulators to strengthen requirements of the code of corporate governance and corporate law in order to improve the role of independent non-executive directors and enhance their power and initiatives. Second, the study indicated that, in contrast with the UK and the US, both the quantity and the quality of environmental information disclosed in China is more scattered, unsystematic, and incomplete. It informs regulators the importance in enforcing compliance with regulations about disclosure practices, especially for qualitative environmental information, in future. A good information environment of voluntary environmental disclosure should be underpinned by an appropriate legal framework.

In terms of managers, the findings provide valuable insights to assist them having effective conversations with various stakeholders. In the third empirical chapter, findings indicated that quantitative environmental information in the annual report is more effective in the Chinese market than qualitative information. To some extent, it implies that the quantity of environmental disclosure provides more value relevant information which is preferred by investors in China. It helps managers to realise how to use

voluntary environmental disclosure satisfying investors and increasing a firm's market value, and thus to decide on their own company's disclosure practices; for scholars and environmental groups, managers should to balance the development of quantitative and qualitative environmental disclosure practice. It could have negative influence if they just pay attention to quantity of environmental information. To sum up, managers should find effective ways to address varies requirements of various shareholders.

6.6 LIMITATIONS AND FUTURE RESEARCH

The research has some limitations that could be addressed in future research. First, the collection of environmental disclosure in this thesis relies solely on the annual report. One of main reasons is that the annual report is a primary information source that is a more publicised and visible document than other information sources (Halme and Huse, 1997) and can be easily accessed (Wilmshurst, and Frost, 2000). In addition, 'the annual report possesses a degree of credibility not associated with other forms of advertising' (Neu *et al.*, 1998, p.269). Although almost all studies research disclosure practices depending on the annual reports, they overlook a wide range of media, such as advertisements, booklets, focus groups, press releases, and employed councils (Gray *et al.*, 2001), which are also employed by the firms to communicate with stakeholders about environmental information. These mediums provide multiplex information about environmental practices, ecological protection, and green development. The wider range of media were not be adopted in this thesis, because a large sample size is applied in the study, which increases the difficulties in collecting manual data from various sources. In addition, these kinds of medium are not currently widely utilised as a dialogue between the majority of firms and their stakeholders. However, these mediums of communication

are likely to be improved and become more widely used in this rapidly changing technological information age. Therefore, the research on this area in future could consider environmental information revealed by the wider range of media. It would enhance the accuracy of the empirical findings. Moreover, further studies could employ integrated environmental disclosure from at least two media to conduct a comparison.

Second, there are only non-financial listed companies employed in the sample to examine the influence from corporate governance on environmental disclosure and the market response to environmental disclosure, because the listed companies in the financial sector are subject to a separate disclosure requirement in China. Consequently, the result may not extend across all listed companies in China. Therefore, the role of ownership structure and board composition on the extent of environmental disclosure and the value relevance of environmental disclosure in financial firms is still an open question, which needs to be considered in further research. The financial crisis of 2007 pushed the financial firms, especially banks, to the forefront of discussion and research again. Caused by the big issues faced by banks, the financial crisis shook the economies of many countries seriously, such as the UK, the US, and Japan. A large rate of unemployment, bankrupt corporations, and increased criminal activity are the main phenomena which were produced by the financial crisis. In contrast, however, the Chinese economy was less impacted by the worldwide slowdown. This situation has increased research interest on Chinese corporate governance and its relationship with corporate social responsibility, which includes environmental practice.

Third, this study investigated the effect of two characteristics of corporate governance (ownership structure and board composition) on disclosure practice. The monitoring role played by other mechanisms, such as family control, auditing committee, and

Chairman/CEO, on environmental information disclosure based on the empirical evidence of Chinese firms has not yet been explored. It expects this to be developed by further studies. Although the previous empirical research received almost consistent results from family control, auditing committee and Chairman/CEO duality related to voluntary disclosure in other countries, the unique characteristics of Chinese corporate governance offers feasibility in this area. It would find different results based on the different mechanisms in Chinese corporate governance.

Fourth, this thesis merely groups environmental information in the annual report into two types, quantity and quality, to investigate its value relevance. It suggests that scholars should further divide the content of environmental disclosure into different aspects, such as information about environmental policy, information about environmental assets and so on, to compare and look for which kind of environmental disclosure effectively influences on the market reaction. In other words, future research could explore in-depth the specific content of environmental disclosure, which would help managers to further understand the preferences of stakeholders and then to dispose environmental practices. Moreover, environmental disclosure is divided into mandatory and voluntary information for research in many studies. There has been a series of regulations and standards on environmental disclosure published by the Chinese government recently. However, at present, Chinese companies are still in an emerging stage of revealing voluntary disclosure because of the large costs of implementation and difficulty of supervision (Chen, 2013). As mentioned above, the Chinese government has been making efforts to set up an effective corporate governance system and a mature market. The regulations and standards have yet to be implemented by pressure from the government in order to achieve a mature market in the future. Therefore, this change provides a motivation to observe environmental disclosure in these two classes in future research.

Finally, based on the manual data collection, this study found that all observed companies merely disclose positive environmental information in the annual reports. It means that the bias created by including only good news from the annual reports in the analysis. However, it is a common phenomenon that firms just reveal good news and hides bad news in Chinese market at present. Regard to this issue, the Chinese government and policy makers need to motivate or compel companies to supply bad environmental information in the annual reports. At the same time, scholars and environmental groups should give firms pressures for more comprehensive environmental disclosure. Future research could pay attention on the development of bad news in the annual reports of Chinese listed companies.

6.7 SUMMARY

This chapter provided a brief summary to conclude the research and findings, which answers and explains the research question addressed above. At the same time, it attempts to implement the major contribution highlighted in the introductory chapter. Under the motivation and main objective of this study, this thesis proved the importance of voluntary environmental disclosure in the annual reports and the determinants of environmental information from the characteristics of corporate governance in Chinese market. According to the empirical findings, there is clear and positive market response to both quantitative and qualitative environmental disclosure in the same year, which is consistent with the hypothesis based on signalling theory and the concept of information asymmetry. However, it indicated that there is a difference in the role between quantity and quality of environmental information revealed in the annual report, in terms of influencing the firm value in the following year. The empirical results confirmed well

that state ownership and a larger size of the supervisory board with an effective monitoring role in the company effectively encourage the firm be engaged in both quantity and quality of voluntary environmental disclosure. However, there was no empirical evidence to support the theory that the IND effectively acts on environmental disclosure. The findings exposed the advantages and disadvantages of the characteristics in Chinese corporate governance for the development of environmental disclosure. Furthermore, this study denoted that much less environmental information is disclosed in the annual reports of most Chinese listed companies compared with those of developed countries, and that China is in a budding stage of development in the disclosure practice. It suggests that firms should reveal more environmental information in the future to reduce information asymmetry, improve the firms' signals to stakeholders, and thus increase firm value in order to obtain a favourable situation for both themselves and their stakeholders under the stakeholder-agency framework.

This thesis also provided the limitations of this study, which include just a single approach (annual reports) for environmental information data collection, and financial firms being overlooked. In addition, it pointed out that future research could explore the monitoring role played by other mechanisms on environmental disclosure other than ownership structure and board composition. Environmental disclosures could be grouped by their content, such as information about environmental policy, information about environmental assets and so on, to look for the different roles of different types of environmental information. These limitations and recommendations mentioned in this thesis would be guidance and direction for future research in this area.

APPENDIX

Country	Emissions (Million Tons)	% Total	Per Person (Tons)
China	7219.2	19.12	5.5
U. S.	6963.8	18.44	23.5
European Union	5047.7	13.37	10.3
Russia	1960.0	5.19	13.7
India	1852.9	4.915	1.7
Japan	1342.7	3.56	10.5
Brazil	1014.1	2.69	5.4
Germany	977.4	2.59	11.9
Others	8242.1	30.13	7.9

Source: World Resources Institute Data

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