Stakeholder Pressures and Corporate Practice of Environmental Responsibility: Evidence of Corporate Environmental Reporting and Investment in China

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ABSTRACT

The mainstream research on institutional strategies related to corporate social responsibility focuses on the context of developed economies, whereas limited attention has been paid to the relevance of these strategies in developing countries (Marquis & Raynard, 2015). China is a fast-rising transitional and developing economy, where market mechanisms are incomplete and formal institutions (e.g., legal infrastructure) are underdeveloped. Therefore, western theories related to institutional strategies might not be applicable in China. As firms globalise, it is important to understand how firms strategically handle different types of stakeholder pressures using various relational strategies (one group of institutional strategies) to survive in an institutional context like China.

This thesis examines corporate relational strategies associated with the practice of Corporate Environmental Responsibility (CER) in China, which has been continuously promoted by the Chinese government over the last 20 years. This thesis is comprised of three related studies examining CER practice in China. Article 1 reviews both English and Chinese literature on corporate social responsibility (CSR). Then it constructs a general framework for CER practice that can be adapted for different contexts and further develops an extended CER framework for the Chinese context. This article contributes to the CSR literature by, first, showing the organisational journey a firm can take towards environmental sustainability through proactive CER commitments to address legitimacy pressures from key stakeholders and, second, by demonstrating how to adapt a general CER framework to a different institutional context.

Given that the Chinese government is the primary stakeholder that drives CER activities in China, Article 2 investigates when and why firms employ substantive or symbolic strategies under the pressure imposed by the government regarding substantive reporting. Drawing on the extended framework developed in Article 1, this article proposes a model to test hypotheses related to the impact of political connections and levels of political monitoring on firm environmental reporting. Using a sample of 306 Chinese listed companies during the period 2014 – 2015, this study finds that a firm's political connections can buffer the firm from the need to pursue a substantive reporting strategy. Moreover, compared with state-owned enterprises (SOEs), private firms are more likely to employ substantive reporting strategies when they are subject to high levels of political monitoring. Article 2 adds a political perspective to the CSR literature by showing that a

firm's political ties and levels of political monitoring have different impacts on its preference for symbolic or substantive reporting strategies.

Article 3 examines whether and how organisational visibility (company characteristic) and environmental reporting (CER- based relational strategy) influence shareholders' valuation of corporate environmental investment. Using a sample of 367 firm-years listed on the Shanghai stock exchange during the period 2016-2019, higher levels of public attention (one dimension of organisational visibility) and monetary environmental reporting are found to be associated with lower short-term negative effects of environmental investment on firm value. Further analyses show that for firms making large environmental investments, both dimensions of visibility (i.e., public attention and analyst coverage) and substantive emissions reporting are related to a lower negative effect of environmental investment on firm value. In this regard, Article 3 enhances our understanding of the theoretical links between corporate environmental efforts and firm value creation as illustrated in the extended CER framework produced by Article 1. It adds to the literature by showing that substantive environmental reporting, or strategies that focus on improving organisational visibility, are useful relational strategies to handle stakeholder pressures by enhancing shareholder management, which in turn positively leverages shareholders' evaluation of firm environmental investment.

In summary, this thesis adds to the literature on corporate institutional strategies in China by demonstrating how the idiosyncrasies of the Chinese institutional context can be incorporated into a framework for studying Chinese CER-based institutional strategies. Moreover, the three articles jointly contribute to the understanding of CER practice in China by showing the effects of CER-based relational strategies that firms undertake to address legitimacy pressures from different stakeholders.

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ABBREVIATIONS

CDI	Commission for Discipline Inspection
CE	Circular Economy
CSMAR	China Stock Market and Accounting Research
CEO	Chief Executive Officer
CER	Corporate Environmental Responsibility
CPC	Communist Party of China
CSR	Corporate Social Responsibility
CSRCMI	CSR Capability Maturity Index
CSRC	China Securities Regulatory Commission
EMS	Environmental Management System
EPB	Environmental Protection Bureau
ESG	Environmental, Social and Governance
ETS	Emissions Trading Scheme
EU	European Union
FDA	Food and Drug Administration
GDP	Gross Domestic Product
ISEA	Institute of Social and Ethical Accountability
MEP	Ministry of Environmental Protection
MEE	Ministry of Environment and Ecology
MIIT	Ministry of Industry and Information Technology
NDRC	National Development and Reform Commission
NGO	Non-governmental Organisation
OLS	Ordinary Least Squares
SDG	Sustainable Development Goal
SEA	Strategic Environmental Assessment
SEPA	State Environmental Protection Administration
SOE	State-owned Enterprise
SRA	Securities Regulatory Authority
SSC	South-South Cooperation
SSE	Shanghai Stock Exchange
SZSE	Shenzhen Stock Exchange
UN	United Nations
VIF	Variance Inflation Factor
WTO	World Trade Organisation

CHAPTER 1 INTRODUCTION

This thesis examines the effects of CER-based relational strategies (e.g., environmental reporting) that firms use to handle legitimacy pressures from various stakeholders in China.[1] The research consists of three individual studies reported in three articles. Article 1 develops a framework of CER that considers pressures from various stakeholders. Articles 2 and 3 focus on two key stakeholders, the government and shareholders, respectively. Specifically, Article 2 examines when and why firms employ symbolic or substantive reporting strategies to tackle the pressures from government agencies regarding substantive environmental reporting. Article 3 investigates the effects of relational strategies (i.e., environmental reporting and strategies to improve organisational visibility) that firms adopt to influence shareholders' valuation of firm environmental investment.

This chapter provides an overview of the thesis in three sections. Section 1 reviews the research context and identifies the gaps that contribute to the motivation. Section 2 outlines the motivation and the research objectives. Section 3 summarises the three articles that serve the research objectives in terms of research settings, findings and contributions. Section 4 describes the structure of the thesis.

1. Research contextual review

1.1 The essence of relational strategies in developing economies

According to North (1991, p. 87), institutions refer to "humanly devised constraints that structure political, economic and social interaction". While a large body of research focuses on how institutional change influences organisational behaviour (Greenwood et al., 2011), less attention has been paid to investigating how organisations tactically interact with their institutional environment in order to strengthen their competitive advantage. Many studies have suggested that the effective management of socio-political and cultural institutions is crucial to both business survival and financial success (Hillman & Hitt, 1999; Marquis & Qian, 2014; Seelos & Mair, 2007). That is, to sustain their long-

[1] CER stands for corporate environmental responsibility. A firm uses relational strategy to manage its relationships with key stakeholders. These concepts are defined in Section 1 of this chapter.

term viability, business organisations employ institutional strategies to leverage and shape their socio-political environments (Marquis & Raynard, 2015).

One group of institutional strategies are relational strategies, which aim to manage relationships with the government and other key stakeholders (Marquis & Qian, 2014; Zhao, 2012). Not only can effective relational strategies improve an organisation's competitive position, but they can also reduce the uncertainty of resource exchanges (Casciaro & Piskorski, 2005). In general, relational strategies address issues related to stakeholder management, resource dependence and organisation-government relationship (Marquis & Raynard, 2015), and almost all the relational strategies are developed based on the notion that organisations need social approval and legitimacy to survive and succeed (Scott et al., 2000). Here, legitimacy refers to a state that "the actions of an entity are appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995, p.574). In this regard, the core objective of relational strategies is to establish and maintain legitimacy with key stakeholders, such as the government and shareholders.

However, the mainstream research on relational strategies has generally targeted developed countries, with limited attention paid to the strategies employed in developing countries where market structures are weaker and legal infrastructures are underdeveloped (Zhao, 2012; Marquis & Raynard, 2015). In the context of developing markets, for example, in the BRICS countries (Brazil, Russia, India, China and South Africa), the political and regulatory environment is often not transparent, and the government generally has a high level of control over key factors of production and business resources (Marquis, Zhang, & Zhou, 2011; Zhao, 2012). Thus, certain relational strategies that are effective in developed markets might not work in a developing economy due to the institutional misalignment between these two types of contexts (Peng et al, 2008). In this regard, the effective management of organisation-government relationships is particularly critical for an organisation to establish or maintain its legitimacy with the government, which may in turn secure its certainty of resource acquisition and favourable policy status (Peng & Heath, 1996; Peng & Luo, 2000).

1.2 CSR or CER commitments as relational strategies

Increasingly organisations, as members of society, are expected by the public to take the responsibility for better social conditions (Zhao, 2012). In both developed and developing countries corporate social responsibility (CSR) articulates an organisation's needs in

relation to obtaining political and social recognition. In this regard, strategically committing to CSR practice is deemed to be an institutional strategy that helps organisations receive favourable support from the government and local community (Brown 2003; Ward 2004).

CSR can be defined as activities related to taking care of social-environmental welfare (Zhao, 2012), and corporate environmental responsibility (CER) is one dimension of CSR that focuses on environmental issues (Wang, 2016). CER is often examined separately because business organisations, especially those in environmentally sensitive industries, are significantly implicated in environmental issues such as toxic emissions and climate change (Timpere, 2008). As a result, the public increasingly demands business organisations to adopt better CER practices by incorporating environmental concerns into their operations (Alrazi, de Villiers, & van Staden, 2015).

CER is associated with two important concepts: corporate environmental accountability and legitimacy (Alrazi, de Villiers, & van Staden, 2015). Accountability entails two crucial facets: doing the right thing (performance) and giving an account of it (disclosure) (Gray, Owen, & Adams, 1996). On the one hand, a business organisation is accountable for its performance to stakeholders; on the other hand, an organisation needs to manage its relationships with stakeholders whereby it can legitimise its performance. In this regard, stakeholder pressures can drive an organisation to undertake relational strategies to satisfy its legitimacy needs. These strategies, for example, could be CER commitments such as environmental reporting and investment. However, whether CER-based strategies help increase firm value still needs further examination (Pekovic, Grolleau, & Mzoughi, 2018).

1.3 China: ideal context to examine variations of organisational strategies

As a developing country, China is also a transitional economy, characterised by a shift from a centrally planned economy to a mixed economy, where free markets coexist with government intervention. Even though in China the market mechanisms are incomplete, and the legal system is still rudimentary (Zhao, 2012; Marquis & Qian, 2014), the features of a transitional economy are apparent: “increased privatisation, the changing role of government, and legal and institutional reforms” (Marquis & Raynard, 2015, p. 297).

As the second-largest economy in the world, China has experienced rapid co-evolution of society and economy in the last forty years. Not only have these evolutions attracted

tremendous interest from international investors and managers, but also they have driven firms in China to engage in both economic and social development by undertaking effective institutional strategies (Hoskisson et al., 2000; Luo, 2006). However, as mentioned earlier, some effective institutional strategies in developed market contexts might be ill-suited for a developing economy like China due to the institutional differences between the different contexts (Peng et al., 2008; Zhao, 2012). Given that the theoretical development of organisational strategies in the context of fast-rising developing economies has not kept in step with developed economies (Davis & Marquis, 2005), the Chinese context provides fertile ground for organisational studies to examine variations of institutional strategies and their impact due to China's idiosyncratic conditions as a transitional and developing economy.

Since CSR and CER are politically embedded in the sense that the government promotes CSR via coercive and normative processes (Sharfman, Shaft, & Tihanyi, 2004), in China, CSR and CER commitments function as relational strategies assisting firms to maintain good relationships with the central and regional governments for their ease of accessing bank loans, getting licenses and tax relief etc. (Su & He, 2010).[2] Therefore, it is important to understand how business organisations use CSR/CER-related strategies to achieve legitimacy from the government and whether these strategies help them improve firm value. Yet, research on these issues is limited due to the lack of theoretical frameworks, which fully incorporate the various influential factors influencing the organisational journey towards environmental and social sustainability under various stakeholder pressures.

In summary, the above review suggests several gaps that contribute to the motivation for this study. First, research on the relational strategies of organisations operating in developing countries has received less attention than in developed countries. Second, a firm's tactical commitments to CSR or CER practice can serve as relational strategies to manage its relationships with key stakeholders, such as the government and shareholders. In particular, how firms apply these strategies to shape their institutional environment in developing countries deserves more investigation. Finally, the effectiveness of relational strategies may vary with pressures from different stakeholders. Research on the effects of CSR/CER-related strategies on firm value in developing economies is limited; China, as

[2] Governments engage in coercive processes to set rules and use normative processes to create norms and standards of legitimacy (Dobbin & Sutton 1998).

a fast-rising transitional and developing economy, is an ideal context to study relational strategies that organisations employ to shape their socio-political environments. In this regard, a comprehensive framework for the Chinese context is expected to reflect an organisational journey towards sustainability by encompassing stakeholder pressures, CSR/CER practices and other key elements.

2. Motivation and objectives

Based on the discussion in the last section, these are the main reasons that motivate this research.

First, with its dramatic economic advance since 1978, China has been criticised for seeking national economic growth at the expense of a deteriorating environment. The environmental concerns in China, for example, heavy carbon emissions and smog, have increasingly captured international attention (Marquis, Zhou, & Zhang, 2011). In response to the call for better environmental responsibility from international societies, the Chinese government has issued a series of environmental laws and CER guidance designed to improve environmental performance at the national, regional, and firm levels. These efforts are in harmony with the Sustainable Development Goals (SDGs).[3] Yet, there has been no theoretical framework developed providing a roadmap for business organisations in China to achieve sustainability in response to various stakeholder pressures related to CER practices. A framework is important to understand how the CER-based relational strategies adopted help firms achieve legitimacy from their stakeholders.

Second, given that CSR or CER is politically embedded by nature in China given the predominant role of the Chinese government, CER-based relational strategies are primarily about obtaining or maintaining legitimacy granted by the central and local governments. Research has found that corporate environmental reporting is a relational strategy that helps a firm legitimise its environmental performance with stakeholders, therefore, it is important to examine how corporate environmental reporting strategies vary with firms' different political ties and legitimacy pressures. Marquis and Qian (2014) examined how Chinese firms strategically respond to the government's request for better CSR through various CSR reporting strategies, however, it is necessary to separately

[3] The Sustainable Development Goals (SDGs) are included in the international sustainable development agenda to 2030 ("the SDG 2030 Agenda"), see details in Appendix A1.

examine the CER reporting in-depth given the growing importance of environmental impact in China. This is because, regarding the quality of disclosures, CSR reporting is not equivalent to CER reporting, as firms may selectively report environmental and social information to maintain their social-environmental legitimacy position (Marquis, Toffel, & Zhou, 2016). Moreover, research has found that a firm may disentangle environmental responsibility from social responsibility (Broadstock et al., 2018). Consequently, a firm's environmental disclosures are unlikely to be commensurate with its CSR disclosures in terms of reporting substantiveness.

Finally, with the development of market liberalisation in China, more and more state-owned enterprises (SOE) have been listed on the Chinese Stock Exchanges after undertaking the shareholding reforms promoted by the central government. Given that the basic goal of most listed companies is to maximise shareholders' wealth, it is vital to understand how a firm's shareholders evaluate its environmental investments, and whether and how a firm's relational strategies, for example, environmental reporting, influence its shareholders' valuation of firm value. So far, research findings for the effects of shareholder pressure on corporate environmental efforts are mixed in different contexts. Therefore, the relationship between corporate environmental investment and firm value, as well as the effects of key moderators on this relationship in the Chinese context, deserve further investigation.

Accordingly, the overarching aim of this thesis is to examine the effects of CER-based relational strategies focusing more on corporate environmental reporting strategies, which firms use to handle legitimacy pressures from various stakeholders in China. To serve this purpose, three objectives are set as follows; each of them is addressed by an individual article:

The first objective is to construct a comprehensive framework for the Chinese context, incorporating key factors that influence a firm's CER practice and performance. This framework will also depict how stakeholder pressures drive a firm to pursue CER practices for better environmental accountability towards achieving legitimacy with these stakeholders (Article 1).

The second objective is to examine when and why a Chinese firm employs a symbolic or substantive strategy of environmental reporting under various legitimacy pressures imposed by different Chinese government agencies (Article 2).

The third objective is to examine whether and how environmental reporting and organisational visibility influence shareholders' views on a firm's environmental investment. According to the literature on institutional studies, strategies associated with corporate reporting and visibility management are critical for businesses to leverage their institutional context (Marquis & Qian, 2014; Greenwood et al., 2011) (Article 3).

3. Research settings, findings, and contributions

3.1 Article 1: A framework for the practice of corporate environmental responsibility in China

A version of this article was published in a special issue of the *Journal of Cleaner Production* on the adoption of Sustainable Development Goals (SDGs). Therefore, this article also examines China's contribution to the international SDG 2030 Agenda. The reference of this article is as follows:

Qin, Y., Harrison, J., & Chen, L. (2019). A Framework for the Practice of Corporate Environmental Responsibility in China. *Journal of Cleaner Production*.

Since most existing CER frameworks are based on free-market mechanisms, they are not fully applicable in mixed economies due to the different institutional contexts. To address this gap, first, this paper constructs a general framework for CER research applicable to both free-market and mixed economies, using multiple lenses that incorporate institutional theory, stakeholder theory, legitimacy theory and environmental externality theory. Second, based on a Chinese and English literature review of CER issues in China, this paper incorporates findings of Chinese indigenous research into the general framework thus developing an extended framework for the Chinese context.

This article contributes to the CER literature by providing a general framework for CER research that can be adapted for both free-market and mixed economies. Moreover, the extended framework adds to the Chinese CER literature by synthesising influential factors on CER practice and performance, which in turn provides a conceptual model for policymakers to promote national environmental champions at a micro level, for example, in relation to the implementation of China's SDG 2030 Agenda. In addition, the construction of the Chinese CER framework illustrates how the general framework can

be modified for a mixed economy where the institutional supports for CER are significantly different from those in a free market economy.

3.2 Article 2: Corporate environmental reporting in China: symbolic versus substantive strategies

Prior research has found that organisational environmental reporting strategy is associated with corporate ownership. This study, therefore, examines how these associations are affected by corporate political connections and political monitoring, which are relevant to the study of reporting behaviour according to the literature on political strategies. Political strategies are a sub-category of relational strategies and are used by organisations to manage their relationships with government agencies. Drawing on the extended framework developed in Article 1, this paper proposes a model and develops hypothesises on the moderating effects of political connection and political monitoring on the relationship between corporate ownership and the act of corporate environmental reporting or the substantiveness of environmental disclosures. Using a sample of 306 Chinese listed companies during the period 2014 - 2015, this research finds that firms with more political connections are more likely to disclose environmental information than their counterparts, though these disclosures might not be substantive. Compared with state-owned enterprises, private firms are more likely to report environmental data driven by legitimacy pressures from the government; moreover, private firms are also more likely to employ substantive reporting if they have perceived high levels of decoupling risk under the monitoring of multiple government agencies or the communist party.[4]

This paper contributes to the CSR and CER literature by adding a political perspective showing that the way in which ownership affects corporate reporting strategy varies with the type of pressure imposed by different government agencies. Moreover, it enriches the literature of organisational studies by demonstrating that firms with different types and levels of political ties (i.e., state ownership and political connections) may undertake different reporting strategies when they face different levels of institutional forces, specifically, coercive pressures from various governmental agencies.

[4] In this thesis, decoupling risk refers to the risk that a firm's behaviour that departs from the government expectations is exposed.

3.3 Article 3: Corporate Environmental Investment and Firm Value: The Moderating Effects of Organisational Visibility and Environmental Reporting

As environmental concerns in China grow there is increasing emphasis on the role business investment plays in creating positive environmental outcomes. However, research on the economic consequence of corporate environmental investment in China remains limited. According to the literature on institutional studies, two important factors are likely to influence a firm's investment decision-making: one is organisational visibility, an important company characteristic shaped by firm legitimacy pressures; another is environmental reporting, a key strategy a firm can use to legitimise its environmental efforts. Therefore, this article examines how these factors influence the relationship between environmental investment and firm value.

Based on a sample of 367 firm-years listed on the Shanghai stock exchange during the period 2016-2019, the regression results found that in the short term, higher levels of environmental investment were associated with lower firm value. However, higher levels of public attention (one dimension of organisational visibility) and monetary environmental reporting are associated with lower short-term negative effects of environmental investment on firm value. Further analyses show that for firms making large environmental investments, both dimensions of visibility (i.e., public attention and analyst coverage) and substantive emissions reporting are related to lower negative effects of environmental investment on firm value.

This article contributes to the understanding of the theoretical links between corporate environmental efforts and firm value creation as illustrated in the extended CER framework produced by Article 1. Specifically, both organisational visibility and environmental reporting can positively influence shareholders' valuation of corporate environmental investment. This is particularly the case for firms making large environmental investments. These findings suggest that a firm's substantive environmental reporting, or strategies that focus on improving organisational visibility, are useful relational strategies to enhance its shareholder management that in turn leverages shareholders' evaluation in favour of this firm.

4. Structure of the thesis

Chapters 2, 3 and 4 present Articles 1, 2 and 3 respectively. Each article includes a separate literature review and a separate methodology.[5]

Chapter 5 offers a conclusion of the whole thesis by bringing together the highlights of the Chinese CER framework in Article 1 and the key findings of Articles 2 and 3. First, it discusses how the framework in Article 1 and the findings of Articles 2 and 3 collaboratively serve the overarching aim of this thesis. Second, it summarises the theoretical and practical contributions. Third, it identifies the research limitations and areas for future research. Last, it makes final comments on this thesis.

[5] Regarding research methodology, in Article 1, the frameworks were constructed based on both English and Chinese literature reviews in the area of CER and CSR practices. Article 2 applied a logit regression model and several ordinary least squares (OLS) regression models to perform hypothesis tests. In Article 3, multiple OLS regressions were employed to test hypotheses.

CHAPTER 2 ARTICLE 1

A framework for the practice of corporate environmental responsibility in China[6]

1. Introduction

In 2015, the Sustainable Development Goals (SDGs) were adopted as an international sustainable development agenda to 2030 ("the SDG 2030 Agenda"). The SDGs aim to "end poverty, protect the planet and ensure that all people enjoy peace and prosperity" (UNDP, 2018a). Because a deteriorating environment and depleted resources have led to various social and economic issues such as health problems, unemployment, and economic depression (Lv et al., 2018; Pope III et al., 2002), environmental challenges form a key obstacle to achieving the worldwide SDGs. In this regard, six of the seventeen SDG goals directly relate to environmental protection and promotion (goals 6, 7, 12, 13, 14 and 15, as detailed in Appendix A1).

Though the achievement of environmental SDGs primarily lies with national governments, it cannot succeed without a concerted effort by businesses and other stakeholders (Adams, 2017). Thus, business organisations increasingly have been called upon to contribute to the environmental SDGs through effective corporate environmental responsibility (CER) practice for better environmental performance (UNDP, 2018a). As a minimum, for business survival and sustainability, firms need to satisfy their stakeholders regarding their environmental performance to receive or retain environmental legitimacy.

Given that the environmental SDGs are mainly promoted at a macro level, there have been limited frameworks that are capable of linking these SDGs to corporate environmental behaviours. One objective of this paper is to construct a general framework to identify an organisational journey towards corporate environmental sustainability, achieved by improving environmental performance through CER endeavours. Because the improved environmental performance accelerates the process of implementing

[6] This article has been published in a slightly revised version. The reference is as follow:
Qin, Y., Harrison, J., & Chen, L. (2019). A Framework for the Practice of Corporate Environmental Responsibility in China. *Journal of Cleaner Production*.

environmental SDGs, this framework illustrates a conceptual model that would be helpful for policymakers to promote the implementation of the SDGs at a micro-level.

In addition, this paper extends a general framework for CER research in the Chinese context. This is motivated by two reasons. First, as the largest overall carbon emitter in the world, China is subject to significant attention given its global importance in achieving environmental SDGs. A recent BP energy report showed that in 2017, China contributed the highest percentage (27.6%) of global carbon emissions, and its annual growth rate of emissions from 2006 to 2016 was 3.2% (BP, 2018, p. 49). In response to the growing environmental complaints from local communities, in 2006, the Chinese government enacted a new corporate law stating that all companies should take responsibility for social and environmental issues. In 2014, the Chinese central government officially warned that China's environment can no longer withstand damage caused by business activities (Long and Lin, 2018). Thus, Chinese firms are now faced with increasing demands for greater environmental responsibility. Accordingly, it is essential to have a comprehensive framework looking at the organisational journey for a Chinese firm to achieve environmental sustainability through CER endeavours.

Second, there are limited CER frameworks in the literature that consider the challenges faced by firms operating in mixed economies. Most existing CER frameworks are based on western theories, which are rooted in free markets applied to developed countries (e.g., Alrazi et al., 2015). These frameworks emphasise firms' voluntary CER practices, as they assume that firms' CER behaviours are shaped by market mechanisms, legal systems and public environmental norms that have been well-established in a free market economy. China, however, is the largest developing country and transitional economy in the world, where the market mechanisms are often inefficient and related legal systems are incomplete (Ye and Zhao, 2016).[7] In China, CER behaviour is primarily driven by the government who plays a dominant role in environmental supervision and management. This suggests that the CER frameworks based on western theories are not fully applicable in China. Moreover, the existing CER frameworks for the Chinese context have identified some factors that influence corporate environmental efforts and thus drive corporate environmental performance (e.g., Bai et al., 2015). However, these frameworks are limited in their application given that they have not comprehensively reflected the

[7] Transitional economy vs mixed economy: a transitional economy refers to "an economy which is changing from a centrally planned economy to a market economy" (Feige et al., 1994). It is a mixed economy by nature.

determinants of firms' CER behaviour. Some frameworks have identified key stakeholders and described their roles in CER practice (e.g., Wang, 2016), but they are not designed to explain the difference in a firm's CER effort driven by different institutional forces. Therefore, the construction of a comprehensive Chinese CER framework can demonstrate how the general framework is modified for different contexts, especially for a transitional or mixed economy that has a different institutional background from free-market economies.

The structure of this paper is as follows. Section 2 describes the methodology of constructing the general framework and the Chinese CER frameworks. Section 3 explains environmental externalities and public goods theory and then discusses three theoretical perspectives of environmental economics and their applications in environmental supervision and governance. Section 4 defines key concepts related to CER and describes the institutional theory, stakeholder theory and legitimacy theory, as well as their applications in CER practice. Section 5 reviews the general CER literature and then constructs a general CER framework. This section also considers differences in CER practice between developed countries and developing countries. Section 6 discusses China's efforts toward meeting the environmental SDGs, and then describes Chinese environmental policies and the national environmental supervision and management system. Drawing on the general framework, Section 7 analyses the key drivers for Chinese CER practice and then constructs an extended framework for the Chinese context. Section 8 concludes and discusses possible opportunities for further studies.

2. Methodology of framework construction

To develop a CER framework for the Chinese context, a general CER framework was constructed based on the literature examining CER practices in various countries in the world. Then, drawing on the Chinese literature examining environmental management and practice at both country and firm levels, this framework was adapted for the Chinese context providing an extension more applicable to the developing country context.

Specifically, literature reviews on the above two streams of academic literature were employed to identify CER drivers and causal links between components in the general and Chinese context frameworks. As a starting point, to construct the general framework, corporate social responsibility (CSR) and CER literature review papers were identified from the period 2014 - 2019, using the Google Scholar, Business Source Premier, Jstor

and Scopus databases. From the search results, 128 papers in journals with high ranking or high Impact Factors were downloaded and analysed.[8] These papers were evaluated to identify studies associated with CER drivers, CER outcomes, and relationships between CER efforts and corporate environmental performance. Applying this snowballing process to each article of interest, 73 additional papers were identified and collected. Thus, the number of papers in the first cut was 201. Key findings of each selected paper were recorded to map general CER issues, which were finally categorised as the components to construct the general CER framework.

A similar procedure was applied to the literature review on CER issues in the Chinese context. The items in each category of the general framework were searched in the above databases with a restriction of "China" or "Chinese" in search windows. The number of papers in the second cut was 129 (high ranking/impacting: 83; identified via snowballing procedure: 46). To integrate findings from Chinese indigenous research, the searched terms used in the English databases were translated into Chinese and applied using the "China Academic Journals" electronic database, which was identified as the most popular Chinese academic research database. This process resulted in 35 Chinese articles. Applying the snowballing approach to the search results, additional Chinese-specific features were identified and classified to extend the general framework for the Chinese context.

In the end, 178 English articles and 24 Chinese papers were selected to construct the general and extended CER frameworks.

3. Theoretical perspectives of environmental economics

To identify the drivers for a firm to pursue the environmental practice, it is essential to understand the nature of environmental resources and who the major stakeholders for environmental supervision and governance are in the region where a firm is operating.

This section explains several important concepts and theories from the perspective of environmental economics.

[8] In the first cut, a journal was considered as per two criteria: either it was ranked as A or A* on the ABDC journal list, or its Impact factor was greater than five, given that the Impact Factors of most top accounting journals are less than five.

3.1 Environmental externality and public goods theory

Economic theories developed over the last 100 years have sought to explain the public nature of environmental resources and the incentives for their over-use and depletion. Table 2.1 summarises the key theories discussed in this section that focus on the problems inherent in the sustainable use of environmental resources. Each is discussed further below.

Table 2. 1 Key economic theories explaining the nature of environmental resources

Theory	Author	Key Concepts	Key Environmental Implications
Theory of externalities	Pigou (1920)	Spill-over effects Positive/ negative externalities	The use of environmental resources imposes costs on external parties.
Public Goods theory	Samuelson (1954)	• Public goods features: non-rivalry (use by one does not affect the use by another) and non-excludability (all can use) • Free-riding incentives • Use of government policy to counter market failures	Environmental resources are public goods that create free-riding incentives for their consumption.
Non-competitive environmental resource theory	Hardin (2000)	Environmental resources are not public goods but are part of the "commons", that is, shared public resources with non-excludability, but not non-rivalry.	Overuse of environmental resources leads to environmental depletion.

English economist Arthur Pigou developed the theory of externalities. The theory addresses cases where some of the costs or benefits of an activity "spill over" onto third parties (Pigou, 1920). When it is a cost imposed on an unrelated third party, it is called a negative externality. When a third party enjoys the benefit from an activity to which it is not directly committed, the benefit is called a positive externality. Most environmental issues have negative externalities because they impose costs on unrelated parties that are "external" to the producers and consumers of the products generating the negative environmental impact.

In addition to the characteristic of an externality, most environmental resources, for example, water, air, virgin forest, and wildlife, have the features of "non-rivalry" and "non-excludability". Therefore, they are classified as public goods (Samuelson, 1954). As a result, individuals and firms generally have "free-riding" incentives to enjoy the free

use of environmental resources. According to the public goods theory, public goods, such as environmental resources, are considered a source of market failure, in the sense that the free-market mechanism cannot ensure an efficient allocation of public goods. In this case, governmental intervention is called for by the public to ensure a reasonable allocation of public goods for social benefits, through regulation, taxation, and subsidies (Hepburn, 2010; Lumenlearning, 2018).

The theory of public goods applies to the sphere of environmental protection in the following way. While individuals and firms seek free-riding opportunities to discharge their environmental responsibilities, governments often put environmental policies in place to restrict pollution and resource exploitation, or to encourage individuals and firms to promote environmental quality. Because business activities are strongly associated with many environmental issues, the government plays a dominant role in driving environmental practice, particularly in a transitional or a mixed economy where the free-market mechanisms are inefficient and perhaps rudimentary. Therefore, from the perspective of environmental economics, the role of the government is vital in terms of internalising the externality of environmental consumption (Hepburn, 2010; Lyon and Maxwell, 2004; Reinhardt and Stavins, 2010; Zhu, 2017). In addition, research has also found that social communities and non-governmental organisations (NGOs) are increasingly acting beyond the legislative processes and are directly engaged as champions against polluting companies (Baron, 2001; Lyon and Maxwell, 2008).

However, the view of “non-competitive environmental resources” is challenged due to the growing scarcity of pure environmental conditions such as fresh air. Without the assumption of “non-rivalry”, environmental resources are not public goods, instead, they are more like “commons” with “non-excludability”. Hardin (2000) asserts that the over-use of environmental resources will lead to the “tragedy of the commons”, in other words, the shared environmental resources will be used up if individual users act for their self-interests.

In essence, any negative externality, whether arising from public goods or the “tragedy of the commons”, could be the cause of market failure and result in a loss of social benefits.

3.2 Environmental supervision and governance

To avoid the "tragedy of the commons", economists have provided a variety of solutions. Pigovian Tax and the Coase Theorem are the underpinning theories for environmental regulation, corresponding to environmental taxation and the emission trading mechanism. Ostrom's (2000) proposition of polycentric co-governance is fundamental to the construction of a nationwide environmental governance system comprised of multiple decision-making bodies including the government, firm, and social community (or non-governmental organisation (NGO)). These theories are summarised in Table 2.2 and are discussed further below.

Table 2. 2 Key economic theories providing solutions to environmental market failures

Theory	Author	Key Concepts	Environmental Policy Mechanisms
Pigovian Tax	Pigou (1920)	Externalities are the difference between private and public marginal costs and benefits	• Environmental taxes on firms creating negative externalities should be equal to the social cost of those externalities • Environmental subsidies should be provided to firms creating positive externalities to incentivise the production of more public goods
Coase Theorem	Coase (1960)	• Externalities create transaction costs due to the high cost of measuring their impact • The creation of property rights eliminates market failures for public goods	The creation of emission rights/ permits and the use of an emissions market will increase the cost of environmental resource consumption
Ostrom's Proposition of Polycentric Co-governance	Ostrom (2000)	International "commons" require polycentric governance (multiple independent centres of decision-making).	The creation of environmental governance groups that include international bodies, governments, and local communities and organisations are needed to manage the use and protection of environmental resources

Pigou studied externalities from the perspective of welfare economics. He conceptualised an externality as the difference between private marginal cost/benefit and social marginal cost/benefit. Once identified the difference could then be eliminated. In the presence of

negative externalities, the social cost of a market activity is not covered by the private cost of the activity. In such a case, the market outcome is not efficient and may lead to over-consumption of the product. In Pigou's view, governmental intervention plays the key role to correct an undesirable or inefficient market outcome caused by externalities. To achieve Pareto optimality, the central government should levy a tax against those firms or individuals for their negative externalities and do so by setting the tax amount equal to the social costs caused by the negative externalities; this tax is termed a Pigovian tax (Baumol, 1972).

Pigovian Tax has been widely applied around the world. The most typical application is in environmental taxation. The rationale of environmental taxation is to internalise the social costs of environmental issues into the polluters' private costs and thus eliminate the negative externalities. The government levies taxes against polluting companies where the tax amount is equal to the social costs of pollution control and emission reduction. In the presence of positive externalities, the government pays subsidies to the firms that have produced more social benefits, in order to spur more production of public goods. Thus, environmental taxes encompass both tax charges against pollutants and tax benefits for taxpayers who invest in green projects.

Currently, environmental taxation is the most important means of governmental intervention on environmental issues in developed countries. These countries have extensively imposed air pollution taxes (carbon dioxide tax, sulphur dioxide tax), water pollution tax, solid waste tax, and noise tax. Statistics show that the Organisation for Economic Co-operation and Development (OECD) countries' environmental tax revenue is on average 2% of gross domestic product (GDP) and 6% of total tax revenue (Chen & Xu, 2011).

Coase, the founder of new institutional economics, had a different view from Pigou's externality theory. In his opinion, the root of externality comes from transaction costs. The phenomenon that an externality cannot be priced is attributed to the huge costs of measuring the price. Coase also believed that, if property rights are clearly defined and the market transaction costs are zero, it is possible to achieve a Pareto efficient outcome through bargaining for the trade of the externality between the party who produces the externality and the party who is affected by it. The redistribution of property rights only affects the income distribution between the parties and does not affect the efficiency of a voluntary allocation. Thus, there is no market failure and hence no demand for

governmental intervention. The existence of the externality does not necessarily become a basis of governmental intervention, while governmental intervention per se has costs and this may cause inefficiency in resource allocation (Coase, 1960).

According to the Coase Theorem, environmental issues are primarily due to ambiguous divisions of property rights related to environmental resources. Therefore, a clear definition of property rights is the key to resolving issues of environmental emissions and the "tragedy of the commons". Based on this, in 1968, Dales proposed the concept of "emission right" and designed a trading system for emission rights, whereby the government allocates or sells emission permits to firms that can subsequently trade them in an emission market. Thus, the total costs of emission reduction are minimised, and resource allocation is optimised (Dale, 1968). For example, the United States has effectively controlled the SO_2 emission level through its emission markets established in the 1990s (Hitaj & Stocking, 2016). Motivated by this, in 2011, the Chinese government initiated several emission trading markets that have been on trial in seven regions. On 16th July 2021, China officially launched a national emissions trading scheme (ETS).

In regard to managing the commons, however, Ostrom (2000) found that at the international level, neither governmental intervention nor market force could successfully enable individuals or firms to consume natural resources in a sustainable and constructive way. In contrast, many communities have successfully managed certain resources for a long time, by applying institutional arrangements other than governmental policies and market mechanisms. Based on a large number of case studies, Ostrom (2000) proposed that in addition to the command-and-control intervention and market-driven approach, there is a third option of environmental governance, namely polycentric governance on common resources.

According to Ostrom, both Pigou's governmental intervention and Coase's market mechanism are essentially about monocentric governance. The theory of polycentric governance emphasises that there may be multiple independent centres in a decision-making system. Unlike the monocentric governance model, there are no individuals or groups in a polycentric governance system acting as the ultimate or omnipotent authority over the law. In other words, none of the decision-making centres could break the power structure with overwhelming authority in a polycentric governance system, where government, firm and social community or NGO coordinate and cooperate to form a governance network through multi-sectoral, multi-layer and multi-type communications.

In this regard, the consumers of public resources can effectively achieve self-governance, as long as they have solutions on institutional supply, credible commitment and mutual supervision (Ostrom, 2000; 2015).

With the increasing level of natural resource depletion and environmental degradation in the world, Ostrom's theory of governing the commons has captured global attention. Along with the evolution of environmental management to environmental governance, at the international level, social communities and organisations have been increasingly concerned about environmental issues and participating in environmental supervision. Thus, the emphasis of environmental governance on the involvement of multiple parties in the environmental decision-making system is in harmony with Ostrom's proposition.

It is worth noting that Ostrom's proposition of "governing the commons" is not a substitute for the Pigovian tax or the Coase theorem. It is complementary to the existing theories of collective action organised by external parties (Ostrom, 2000). In practice, Ostrom's proposition provides an alternative to the environmental supervision and governance model, especially in the situation of both government failure and market failure (Hepburn, 2010; Shen & Huang, 2018).

Taken together, from the perspectives of environmental economics, most environmental resources are public goods or "the commons", government, social communities (or NGOs) and firms play different roles in managing or governing these resources for global sustainable development. Given that most environmental issues are strongly associated with firms' production activities, to achieve the macro-objective of worldwide sustainability, firms are subject to greater CER to improve corporate environmental performance. In this regard, CER practice is also a means to internalise environmental externalities, functioning at a micro-level.

4. CER-related theories and stakeholders

4.1 CER concept and related components

The term corporate environmental responsibility (CER) is one of three facets within the scope of corporate social responsibility (CSR). Wang (2016) defined CER as follows: "CER improves CSR for pollution prevention and cleaner production" (Wang, 2016, p.96). However, due to its increasing level of importance, it is usually considered a separate element (Timpere, 2008). Yet, there is no widely accepted definition of either

CSR or CER (Burritt & Schaltegger, 2010; Schalteggar, Gibassier & Zvezdov, 2013). While some academics consider that CSR and CER are more related to the impact of business activities on the environment and society (Burritt & Welch, 1997; Mitnick, 2000; Wood, 1991), others consider that CSR and CER are simply about "sacrificing profits in the social interest" (Elhauge, 2005; Hepburn, 2010; Reinhardt & Stavins, 2010). Given the existence of a logic such that environmental protection characteristically opposes economic growth (Friedman, 1962; Hepburn, 2010; Marquis, Zhang, & Zhou, 2011; Walley & Whitehead, 1994), the latter definition seems to be more appropriate to the discussion using the lens of public goods. This is supported by the conclusion of Reinhardt and Stavins (2010), who suggested that a firm's CER efforts are always a complement to, rather than a substitute for, governmental intervention on environmental protection issues.

In contrast, Porter and Van der Linde (1995) argue that most environmental issues can be considered the result of productive inefficiency. This is because, during the process of production, environmental resources are not used efficiently. According to Porter and Van de Linde (1995), a firm can improve its productive efficiency through effective environmental management and strategic investments in cleaner production. The environmental investments can ultimately generate economic benefits for the firm (Rouse, van Staden & Tresadern, 2014), or add non-financial value because "world demand is putting a higher value on resource-efficient products" (Porter & Van der Linde, 1995, p. 127). Porter and Kramer (2019) further remarked that in order to achieve sustainable economic success, firms must link their business to society and jointly create shared value, which implies "creating economic value in a way that also creates value for society by addressing its needs and challenges" (p. 324). However, based on a survey of 3,618 Germany companies in 2010, Rexhäuser and Rammer (2014) found that only those environmental innovations that improve resource efficiency can add financial value to firms. This suggests that firms tend to invest in environmental projects that enhance financial values, whether voluntarily adopted or driven by regulations.

Statistics show that from 2006 to 2017, the European Union's (EU) national environmental protection expenditure increased each year by 2% on average. Companies in EU countries contributed over 50% of the national environmental expenditure with environmental investment included, and the contribution percentage remained stable (eurostat, 2018). This indicates that in the past decade, EU companies constantly invested in environmental projects. Similarly, a recent report suggests that in India, firms have

increasingly invested in CSR activities (Sharma, 2018), while around 6% of the CSR expenditure was spent on CER activities from 2014 to 2017 (Vinod, Sai & Sivakumar, 2018). This implies that in both developed and developing countries, business organisations have viewed environmental expenditures as both their responsibility and investment, which in turn can contribute to firm value (Chen, Yu, & Hu, 2018; El Ghoul et al, 2018).

According to Alrazi, de Villiers and van Staden (2015), two important concepts are associated with CER: corporate environmental accountability and corporate environmental legitimacy. The Institute of Social and Ethical Accountability (ISEA) states that the scope of accountability includes transparency (the responsibility to account), responsiveness (the responsibility for acts and omissions), and compliance (the responsibility to obey settled standards) (ISEA, 1999). Because of this, in this paper, corporate environmental accountability is defined as a concept incorporating, at the firm level, both environmental performance and environmental disclosure. In other words, corporate environmental accountability is defined as the combination of how well a firm operates towards the natural environment and how substantive the reports are that the firm uses to externally disclose its environmental performance to its stakeholders.

The implications of corporate environmental accountability are in harmony with the public goods theory. According to Reinhardt and Stavins (2010), a firm can directly increase social benefit by producing more public goods, such as investment in environmental protection projects and reduction in carbon emissions; these can be viewed as efforts for better environmental performance. Alternatively, a firm can indirectly contribute to social welfare through better environmental information disclosures, i.e., reporting more substantive environmental information for governments to formulate effective policies.

Regarding the term "legitimacy", Bansal and Clelland (2004, p. 94) define environmental legitimacy as "the generalised perception or assumption that a firm's environmental performance is desirable, proper, or appropriate". That is to say when a firm's environmental performance satisfies its stakeholders' expectations, its environmental legitimacy is secured.

Because firms operate in society by means of social contracts (Shocker & Sethi, 1973), the requirement for corporate environmental accountability and legitimacy is

intensifying. A social contract is deemed to offer firms legal standing, resources and labour. In return, firms are expected to be accountable to their stakeholders for their environmental performance, and at the same time, to secure legitimacy by pursuing socially acceptable goals (Ashforth & Gibbs, 1990; Woodward, Edwards & Birkin, 1996). However, given that different stakeholders have different expectations for corporate environmental performance and behaviour, there are a number of social contacts connected with different stakeholders (Deegan and Blomquist, 2006). It has been argued that the contract with the primary stakeholder group, which holds the highest level of power, legitimacy and urgency, is the most crucial source of legitimacy for a firm (Deegan, 2006). For example, in the Chinese context, the primary stakeholder is the government, given its control over firms' ability to operate. Moreover, firms also need to legitimise their environmental performance with other stakeholders such as social communities and environmental NGOs, because increasingly, they play important roles in environmental supervision and governance systems (Baron, 2001; Lyon & Maxwell, 2008).

4.2 Institutional theory, stakeholder theory and legitimacy theory

Institutional theory, stakeholder theory and legitimacy theory, are often applied in CER and corporate sustainable development research (Bai, Sarkis, & Dou, 2015; Hoque, 2010; Yang, Craig, & Farley, 2015), particularly in the context of public sector or mixed economies where public companies or SOEs operate (Hoque, 2010).

Unlike private firms, public companies or SOEs do not always focus on profit maximisation. As required by the government, they often invest in non-profit projects for social benefits, such as job creation, charitable donation and consumer welfare (Matsumura, 1998; Shleifer & Vishny, 1994; Zeckhauser et al., 1989, pp. 12–14). Therefore, they are required to evidence their accountability to the government and the public. In this regard, environmental reporting is considered a legitimising strategy for their environmental performance and thus, becomes an objective of institutional practice for SOEs or public companies (Hoque, 2010). Table 2.3 summarises the key theories discussed in this section that focus on their application in organisational behaviour towards CER practice. Each is discussed further below.

Table 2. 3 A summary of institutional theory, stakeholder theory and legitimacy theory

Theory	Key reference	Key Concepts	Application in CER research
Institutional theory	DiMaggio and Powell (1983)	Coercive pressure Normative pressure Mimetic pressure	Three isomorphic forces may shape firms' CER behaviour in terms of complying with regulations (coercive) or standards and norms (normative) or benchmarking against competitors (mimetic).
Stakeholder theory	Freeman (1994)	Primary and secondary stakeholders	For survival and growth, firms must be accountable to their stakeholders for their performance, in particular, the primary stakeholders.
Legitimacy theory	Deegan (2006)	Legitimacy granted by different stakeholders	For survival and growth, firms need to legitimise their performance to satisfy their stakeholders.

According to institutional theory, there are three types of isomorphic drivers that might influence a firm's environmental practices, namely coercive, normative and mimetic (DiMaggio & Powell, 1983).[9] Coercive pressure is imposed by firms' administrative or regulatory authorities that force them to take a course of action; a typical example of these authorities is the government. Normative pressure comes from social groups that take for granted acceptable patterns of organisational behaviour (Burns, & Scapens, 2000; Scapens, 2006). For example, industrial associations push firms to standardise or professionalise their operations via institutional entrepreneurs (e.g., accountants), who can mobilise resources to create new institutions or convert existing ones (Sharma, Lawrence, & Lowe, 2010; 2014); the media may shape corporate environmental behaviours to follow environmental norms. Mimetic pressure perceived by a firm is from its peers, for example, its competitors, who drive the firm to benchmark or follow their practices (Dacin, 1997; Haveman, 1993; Liu et al., 2010a).

[9] Institutional isomorphism is an essential feature of institutional theory. Therefore, "some texts even treat institutional isomorphism almost synonymously with the neo-institutional perspective on organisations." (Karlsson, 2007) Thus, this paper uses the term Institutional Theory in line with the managerial literature whereas the sociologist literature refers to Institutional Isomorphism Theory.

In relation to some institutional pressures, stakeholder theory and legitimacy theory suggest that a firm, for its survival and sustainable development, must be accountable to and satisfy its stakeholders, especially the primary stakeholder(s), for its environmental performance (Deegan, 2006; Donaldson & Preston, 1995; Freeman, 1994; Frooman, 1999). Research has shown that corporate sustainable development strategies are influenced by a range of stakeholders, such as the government, NGOs, social communities and the media (Du et al., 2015; ISEA, 1999; Marquis & Raynard, 2015; Patten, 2002a). Therefore, stakeholder pressures are a major force that drives firms to pursue CER activities. Furthermore, different stakeholders have different impacts on a firm's CER practice, as they relate to the firm through different social contracts (Müller, Vermeulen, & Glasbergen, 2009).

4.3 Stakeholder pressure on corporate environmental practice

Because a firm is accountable to stakeholders for its environmental performance and CER behaviour, it is essential to understand the roles of different stakeholders in the environmental supervision and governance system in the region where the firm is operating. This helps identify the key drivers for a firm to pursue CER activities.

Many researchers classify stakeholders into external and internal groups. External stakeholders include the government, consumers, NGOs, social communities, shareholders, creditors, industrial associations, competitors or industrial peers, and suppliers. Internal stakeholders consist of corporate managers and employees (Dong, Burritt, & Qian, 2014; Liu & Anbumozhi, 2009; Lu & Abeysekera, 2014). Research suggests that the government and social communities (or NGOs) are the major drivers for a firm to pursue CER practice (Luo, Lan, & Tang, 2012). Therefore, the range of external stakeholder groups is very wide when considering how to analyse the impacts of different stakeholders on firms' CER practices. In this regard, based on institutional theory, this paper categorises stakeholders as institutional and business-related groups for CER issues (see Table 2.4).

Table 2. 4 Stakeholder Groups and Their Pressure on Firms' CER Decision-making

Stakeholder groups	Stakeholders	Pressure on CER practice
Institutional group	Governments Social communities & NGOs Media Industrial associations Competitors/ industrial peers	Institutional influences on firms' CER decision-making
Business-related group	Consumers Suppliers Investors Lenders (banks) Managers Employees	Direct connections with business activities

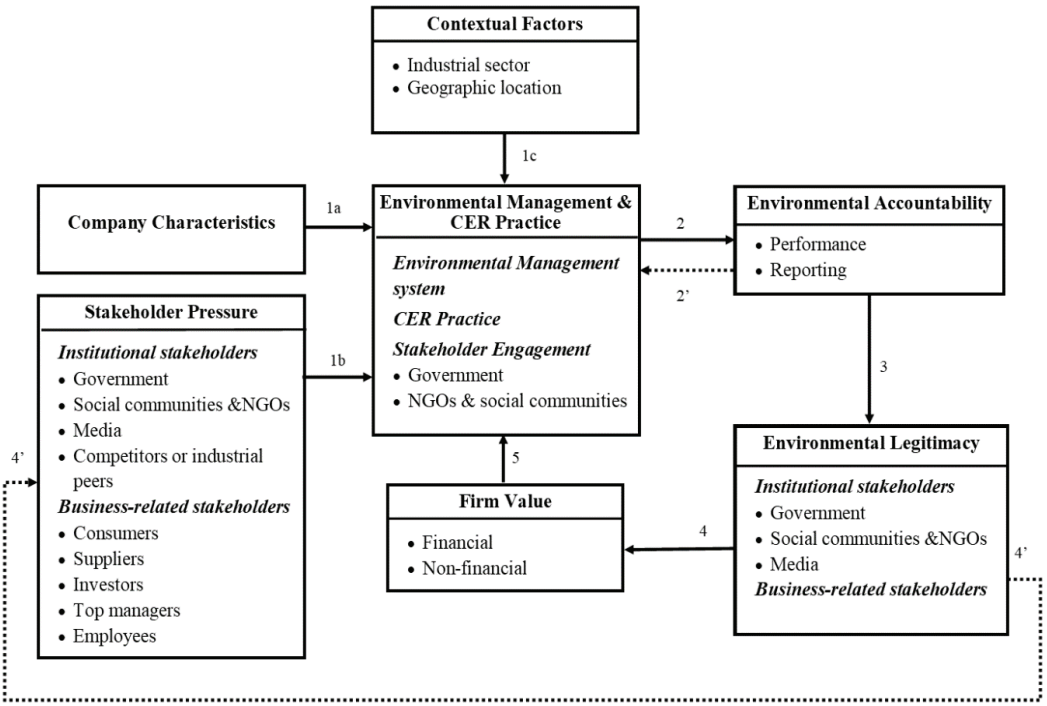
Institutional stakeholders refer to those who have an institutional influence on a firm's decision-making for CER activities, for example, government, social communities and NGOs, media and competitors.[10] They generally have no direct association with firms' business and financial status. In contrast, business-related stakeholders have direct connections with corporate business activities, such as consumers, suppliers, investors (e.g., shareholders), managers and employees. Institutional stakeholders can exercise their regulatory power over a firm or engage the media to publicise a firm's environmental performance and behaviour, whereas business-related stakeholders can generally affect a firm's financial status.

[10] The institutional influences refer to the coercive, normative or mimetic pressures imposed by stakeholders (see Section 4.2)

5. A general framework for CER practice

Based on a general literature review of corporate environmental accountability and legitimacy in both free market and mixed economies, a general framework for CER practice has been developed (see Figure 2.1). This framework describes the relationships between determinants (company characteristics, stakeholder pressure and contextual factors), environmental management and CER practice, environmental accountability, environmental legitimacy and firm value. Figure 2.1 and the relevant literature on which it is based are described in detail in the following sections.

Figure 2. 1 A general framework for CER Practice



Note: *only the most important factors are listed in this framework, and the contents in the categories. Note for environmental accountability and firm value, these are subject to change for different contexts.*

5.1 Determinants of corporate environmental efforts

The determining factors that influence environmental management and CER practice are categorised into company characteristics, stakeholder pressure and contextual factors (González-Benito & González-Benito, 2006).

5.1.1 Company Characteristics

Company characteristics that influence CER practice may vary across different contexts. Therefore, the general framework does not provide a detailed list of these characteristics. Instead, the following discussion details research identifying types of company characteristics that may be relevant. Research has identified that general company features influence corporate environmental practice, for example, company size, organisational visibility, internationalisation level, position in the value chain, a company's financial status, organisational culture and corporate governance. Large companies have more resources available to achieve environmental goals (Boesso & Kumar, 2007; Patten, 2002a). Highly visible firms are normally subject to more public pressure thus they are more likely to commit themselves to CER practices (Du et al., 2015; Marquis & Qian, 2014). Multinational firms attach more importance to environmental accountability as they increasingly encounter pressure from global markets over environmental issues (Hitt, Hoskisson & Kim, 1997; Prakash & Potoski, 2006). CER issues are progressively relevant in supply chains due to the involvement of various suppliers whose goods directly affect the reputation of purchasing companies (Hoejmose, Roehrich, & Grosvold, 2014); companies with a position closer to end consumers are more likely to have more involvement in CER activities (Walker, Di Sisto, & Mcbain, 2008). Companies with better financial performance have more resources to improve environmental performance, and more effective control over financial risks (Brammer & Pavelin, 2006; Karim, Lacina & Rutledge, 2006; Seifert, Morris, & Bartkus, 2004).

Organisational culture is shaped by top management through effective communication of shared values within the organisation. Evidence has shown that a lack of organisational culture may hinder corporate environmental performance (Judge & Elenkov, 2005).

The literature also suggests that corporate governance and, specifically, the independence of the board of directors, the size of the board of directors, board gender diversity and the ownership structure all can impact corporate environmental performance and disclosure behaviours (De Villiers, Naiker, & Van Staden, 2011; Haniffa & Cooke, 2005; Liu, 2018).

5.1.2 Stakeholder Pressure

Firms with higher levels of stakeholder pressure on corporate environmental practice are likely to be more proactive in CER activities. Thus, stakeholder pressure is identified as the second category of determinants in the framework; stakeholders are divided into

institutional and business-related groups. The general framework only lists the most important stakeholders applying to multiple contexts.

Institutional stakeholders, the government, social communities and NGOs, the media and competitors are included in this framework. This is because most environmental resources are public goods with negative externalities, corporate environmental performance is more related to social benefits, and hence subject to the supervision from government and society (Darrell & Schwartz, 1997). In this regard, media coverage features as an important measure of a community's concern for organisational performance (Brown and Deegan, 1998); highly exposed firms are more likely to disclose more information and improve environmental performance and prevent the dissemination of negative environmental performance information (Marquis & Qian, 2014; Aerts & Cormier, 2009). Though the media can generally reflect social concerns, the independence of the media might be in question if it is controlled, even partially, by the government. Therefore, the media is identified as a separate stakeholder from social communities. Of note, the stakeholder "industrial associations" is not included because there has been limited research looking at its impact on CER practice. In contrast, however, industrial competitors or peers can drive a firm to improve environmental performance against the best industry performers to gain competitive advantages (Mirvis, 2011; Zeng et al., 2012). This force is particularly significant in a free market economy (Jean et al., 2016).

For business-related stakeholders, consumers, suppliers, investors, top managers and employees are highlighted in this framework. Many consumers, especially those in developed countries, have been found to value and prefer green products (Carter & Carter, 1998; Porter & Van der Linde, 1995). Suppliers are important because maintaining a green project partnership in the supply chain requires a mutual willingness to be familiar with each other's operations in order to apply technologies for cleaner production (Geffen & Rothenberg, 2000; Vachon & Klassen, 2006). Shareholders and other investors have been found to react negatively to poor environmental performers (Flammer, 2013) and to welcome more transparent environmental disclosures (De Villiers & Van Staden, 2010). Top managers and employees are internal drivers for a company to pursue CER practice. Research suggests that CER-related strategies supported by top management are more likely to enhance corporate sustainable development (Glennie & Lodhia, 2013; Xin, 2014). If employees are motivated or have perceived managerial support to commit to CER activities, they are more likely to try environmental initiatives and in turn promote corporate environmental performance (Ramus & Steger, 2000).

5.1.3 Contextual Factors

The contextual factors in this framework are defined as influences that are beyond a firm's control. Given that both environmental management and practice relate to corporate environmental reporting or performance, to form this component, it is sensible to consider non-controllable variables that influence corporate environmental performance and reporting behaviour. In this regard, the industry sector and geographical location are identified and included.

According to Banerjee, Iyer and Kashyap (2003), industry type can moderate the impacts from regulators, the public and competitors on firms' environmental practices. The influence of the industry sector on CER practice is out of firms' control because pollution or emission propensity differs from industry to industry, and firms need to follow regulated monitoring procedures (Bewley & Li, 2000; Cormier & Gordon, 2001; Dawkins & Fraas, 2011). In particular, corporate emission discharge levels have to meet industrial standards; firms in environmentally sensitive industries (e.g., chemicals, mining and oil) are subject to more scrutiny from the government and social communities (Summerhays & de Villiers, 2012).

With respect to geographical location, research has shown that firms located close to major cities have higher levels of engagement in social and environmental activities compared to firms located in rural areas. This is because, in large cities, environmental and social norms and values are concentrated and thus can be transmitted to firms effectively (Husted, Jamali, & Saffar, 2016; Tang, Yang, & Boehe, 2018). Moreover, cross-country studies suggest that country of origin is a contextual factor to influence corporate environmental efforts, as its impact can be decomposed into sub-factors, being national culture,[11] economic development level, legal and enforcement system, and industrial structure. The influences of these sub-factors are described as follows.

Williams (1999) conducted a comprehensive study looking at the influence of national factors on corporate environmental reporting in seven Asia-Pacific countries. The findings suggest that in countries having a culture with a high level of uncertainty avoidance and masculinity, firms tend to disclose less environmental information.[12] In

[11] To differentiate from the "organisational culture" listed in "company characteristics", national culture refers to culture or religion of the country or research context.
[12] Uncertainty avoidance refers to a society's tolerance for uncertain situations. Masculinity stands for "a society in which social gender roles are clearly distinct: Men are supposed to be assertive, tough, and focused on material success" (Hofstede, 2001, p. 297).

regard to cultural influence on corporate environmental behaviour, Hackert et al. (2012) and Husted (2005) found that national culture affects corporate environmental management initiatives. Furthermore, Song, Montabon and Xu (2018) note that all cultural dimensions can influence a firm's adoption of environmental management practice, which is an intervening mechanism between national culture and corporate environmental performance. Their findings also show that firms in high power distance and high masculinity cultures have more effective environmental management systems overall.[13]

Studies have found other factors may also influence corporate environmental reporting behaviour, such as the national economic development level (Gamble et al., 1996; Williams, 1999; Xiao et al., 2005), and the legal system and law enforcement (Adnana, van Staden, & Hay, 2010; Buhr & Freedman, 2001; Ho & Taylor, 2007; Kolk & Perego, 2010; Simnett et al., 2009). They are not separately included as contextual factors because their influences on corporate environmental practice vary across firms' geographical locations and industry sectors.

The term industrial structure refers to "the composition of a country's economic activity, the production of human material provisions" (Atikian, 2013, p.14). Because industries are typically categorised into agriculture, manufacturing and services sectors, the industrial structure is normally demonstrated using the percentages of these three major sectors in a country's GDP. Given research has found that corporate environmental practice and performance are driven by normative pressure from industrial professional institutes (King & Lenox, 2000), it is reasonable to argue that the national industrial structure influences a firm's CER practice, functioning via the firm's geographical location and industrial sector.

5.1.4 Links from Determinants to other Components

Based on the literature, causal links from the above determinants are shown with corporate environmental management and CER practice (see arrows 1a, 1b, and 1c in Figure 2.1). That is, these factors influence the practices of firms, which subsequently impact corporate environmental accountability (arrow 2 in Figure 2.1).

[13] According to Hofstede (1980), power distance means the degree to which ordinary individuals accept unequal distribution of power in a society. Individualism refers to the extent of individuality within a society.

5.2 Environmental management and CER practice

To promote environmental accountability, at the firm level, an environmental management system (EMS) and a strategy to engage stakeholders are essential. The EMS aims to increase compliance and decrease negative environmental impact (Sroufe, 2003). Research suggests that not only does an EMS help design, manage, implement and monitor environmental policies (Melnyk et al., 2003), but it also assists top management in developing an environmental mission statement or setting up a separate committee to handle environmental issues (Henriques & Sadorsky, 1999; Mistry, Sharma, & Low, 2014). Research has also shown that an EMS can eventually benefit a firm by strengthening its environmental performance and reporting (Frost & Seamer, 2002; Iraldo, Testa, & Frey, 2009; Sharma et al., 2017; Wisner, Epstein, & Bagozzi, 2006).

A number of studies suggest that proactive CER practice can improve corporate environmental performance and reporting (Chiou et al., 2011; Sezen & Çankaya, 2013). Examples of CER practice include cleaner production, green supply chain management, effective environmental information disclosure, eco-design and innovation and strategic environmental assessment.

In addition to the EMS and CER practice, stakeholder engagement has captured increasing attention in the literature (Sharma & Kelly, 2014). Dialogue with stakeholders can enable a firm to detect environmental problems associated with business activities by bringing in new expertise and technologies (Adams, 2017; Burchell & Cook, 2006). In essence, an effective stakeholder engagement can strengthen the trust relationships between a firm and its stakeholders, and subsequently mitigate environmental risks through collaboration (Burchell & Cook, 2006; Gao & Zhang, 2006).

Of note, there are interactions between some elements within this component. First, it is expected that stakeholder engagement can strengthen both the EMS and CER practice in an organisation. For example, getting the government engaged can help a firm better understand government policies, allowing it to pursue more effective strategies for environmental management. Second, engaging communities and NGOs can increase the efficiency of a firm's EMS in terms of environmental decision-making and environmental risk control and, thus, strengthen its CER practice (Bi & Wang, 2018). Finally, it is reasonable to premise that a firm with effective EMS and CER practice is more likely to engage its stakeholders, given that stakeholder satisfaction is essential for the firm to secure its legitimacy.

5.3 Environmental accountability

Given that good environmental performance and reporting (i.e., environmental accountability) are essential to achieving environmental legitimacy (Deegan, 2006), companies need to ensure that certain mechanisms and strategies are in place to manage their environmental accountability. As such, arrow 2 in Figure 2.1 depicts the causal link from environmental management and CER practice to environmental accountability. However, environmental reporting may strengthen the EMS and CER practice, because, in the process of environmental reporting, firms can identify their strengths and weaknesses in environmental management and consequently develop plans and strategies to improve accountability (shown by arrow 2' with a dotted line).[14]

Of note, a large number of studies have examined the relationship between environmental performance and reporting, but the results are mixed. Often, corporate environmental reports focus more on positive environmental practices and lack quantitative environmental data (Aerts & Cormier, 2009; Cho, Roberts, & Patten, 2010; Clarkson et al., 2008).

Research also has provided details about the interaction between environmental performance and reporting. First, good-performing firms tend to disclose more environmental information to maintain their environmentally friendly images (Clarkson et al., 2008; Meng et al., 2014; Zhao, 2012), while some poor-performing firms disclose extensive environmental information to legitimise their performance (Hughes, Anderson, & Golden, 2001; Luo, 2019; Patten, 2002b). Second, corporate environmental disclosures can help management identify and resolve critical environmental issues (Annandale, Morrison-Saunders, & Bouma, 2004). In addition, the public and shareholders may estimate a firm's environmental performance based on its environmental disclosures in past years and this can drive the firm to improve its environmental performance (Al-Tuwaijri et al., 2004).

5.4 Environmental legitimacy and firm value

Environmental legitimacy is a firm's ultimate objective for its CER efforts. This can be secured only when stakeholders perceive that the firm's environmental performance is satisfactory (Donaldson & Preston, 1995). To this end, firms need to demonstrate appropriate environmental performance with consistent disclosures. The causal

[14] An arrow with an apostrophe is used to show an antecedent association in this paper.

relationship between environmental accountability and legitimacy is represented by arrow 3 in Figure 2.1.

The achievement of environmental legitimacy helps a firm obtain trust relationships with stakeholders. Some academics consider trust relationships as a source of trust capital, which can generate financial (i.e., economic growth and cost savings) or non-financial (reputation, business potential etc.) value. For example, a good relationship with the government can help a firm reduce political costs and get more business resources such as land and labour (Marquis & Qian, 2014). The trust from consumers can maintain or enhance a firm's reputation and bring potential business opportunities, thus strengthening its financial performance in terms of cost-saving, competitive advantage, productive efficiency and share market performance (Burnett & Hansen, 2008; Christmann, 2000; Hoejmose, Roehrich, & Grosvold, 2014; Moneva and Cuellar, 2009; Wagner & Schaltegger, 2004). The relationship between environmental legitimacy and firm value is shown by arrow 4 in Figure 2.1. Moreover, if a firm's investments in CER practices can produce firm value, then it is reasonable to propose that the firm is motivated to input more environmental effort. The causal link from firm value to environmental management and CER practice is shown by arrow 5.

If a firm fails to achieve environmental legitimacy, unsatisfied stakeholders may impose pressure on firms forcing them to improve environmental accountability (represented by arrow 4' with a dotted line in Figure 2.1). For example, poor environmental performance and disclosure may attract the attention of the government and social communities. As a result, governmental agencies may issue enforcement notes to polluters for environmental improvement or levy an environmental tax. Social communities may engage in litigation or urge the media to highlight the polluters' actions in order to push them to discharge their environmental responsibilities. Unhappy consumers may boycott the polluters' products and subsequently affect their financial status, which is key to business survival.

5.5 Framework summary

Based on multiple theoretical perspectives, a general framework (Figure 2.1) has been developed to exhibit the organisational journey towards corporate environmental sustainability. To achieve corporate environmental goals, an organisation needs to improve its environmental performance and show accountability to its stakeholders through appropriate reporting. In doing this, the firm can legitimise its environmental

performance with its stakeholders and ultimately increase firm value to ensure sustainable development (legitimacy theory and stakeholder theory).

There are a number of determinants that impact corporate environmental management and practice: company characteristics, stakeholder pressure and contextual factors. Corporate characteristics and contextual factors were identified from the CER literature in both free market and mixed economies. Applying environmental externality theory and institutional theory, institutional stakeholders related to CER practice were identified; in addition, business-related stakeholders were also recognised and included in the framework.

The general framework also demonstrates links and interactions between elements within the framework: company characteristics, stakeholder pressure and contextual factors can influence firms' behaviour in terms of environmental management and CER practice, and hence impact firms' environmental accountability and legitimacy. Good environmental performance would help a firm secure its legitimacy which can, in turn, bring in firm value. Failure to achieve legitimacy with stakeholders may risk a firm going bankrupt or a decline in business.

Of note, as mentioned earlier, the achievement of environmental SDGs primarily lies with national governments, who in turn incorporate these SDGs into national environmental regulations and policies. The media generally welcome SDG-related champions and the public enjoy the benefits associated with the achievement of the SDGs; therefore, they are willing to be part of the environmental governance system to capture organisational or individual behaviours related to the SDGs. Thus, the implementation of SDGs can be promoted at the firm level through stakeholder pressures and ultimately be achieved via firms' CER practice.

5.6 Discussion

Given that the general framework was developed based on CER literature in both developed countries with free markets, and developing countries with mixed economies, theoretically, it can be modified for CER research in various contexts. However, there are a number of characteristics that differ between developed and developing countries; and these differences should be addressed when generalising this framework. CER issues in developed and developing countries are compared and discussed as follows.

Most literature on corporate social or environmental responsibility focuses on developed economies operating in Western democracies. These countries are characterised by free-market economies with advanced infrastructure, high GDP with lower levels of growth and government control. Typically, there are high levels of public interest in social and environmental issues. In contrast, developing countries are characterised by mixed economies with higher levels of economic growth, often at the expense of the environment, lower GDP and less developed infrastructure. In addition, they may have higher levels of governmental control and less developed democracies. Often the media is subject to government control and as a result, the level of public scrutiny on environmental issues is, generally, lower. Researchers argue that more focus on developing countries is needed as differences in environmental disclosure practices are related to differences in socio-cultural environments, religions, and levels of economic development (Ali, Frynas & Mahmood, 2017; Ali & Frynas, 2018).

Notable examples of developing economies include the BRIC countries (Brazil, Russia, India and China), parts of South-East Asia (e.g., Indonesia, Malaysia) and some larger African countries (e.g., South Africa). Many of these developing economies have much higher levels of poverty, human rights violations, corruption, and inequality (Belal & Momin, 2009), coupled with weaker or absent government and institutional systems (Jamali & Karam, 2018), which create additional challenges for those trying to improve corporate environmental responsibility.

The rapid pace of economic development in these countries places greater stress on the balance between economic growth and environmental protection than in developed countries (Sumiani, Haslinda & Lehman, 2007). High levels of economic growth are usually accompanied by rapid increases in urban populations, vehicle ownership and emissions. In addition, the environment is often significantly adversely affected by the development of power-generating facilities, such as hydroelectric dams and fossil fuel power plants, and by deforestation and mining required to provide resources for industrial processes. Rapid increases in heavy industry are often associated with poor water treatment processes and increases in air pollution. Together, these changes can result in a rapid loss of natural environments required to fuel this economic growth.

The research examining developing economies has identified that corporate responses to corporate social and environmental responsibility issues are largely the result of external pressures from international-based or listed parent companies, international markets and

international agencies (Belal & Momin, 2009; Islam & Deegan, 2007). Furthermore, in contrast to developed countries, companies in developing countries perceive relatively little pressure from the public and are more influenced by powerful stakeholder groups and, in particular, those with international standing (Ali, Frynas & Mahmood, 2017; Belal, 2007; Islam & Deegan, 2007). Research has also found there may be different cultural contexts and weaker institutional environments, which can lead to illegal financial outflows of natural resources from poor countries to rich countries. Accordingly, the priorities for developing countries may be on government regulation to prevent companies from misusing natural resources (Dobers & Halme, 2009).

While economic and environmental concerns differ between developing and developed countries, some consistencies have been found in relation to corporate social and environmental disclosures. In particular, company characteristics such as company size, industry sector, and financial performance are important in driving the level of environmental governance in all countries, with highly visible companies disclosing higher levels of information (Ali, Frynas & Mahmood, 2017). However, levels of disclosure are generally lower in developing countries, suggesting a greater role for regulation (de Villiers, 2003) to improve disclosure in the absence of public pressure. Further, "CSR-promoting institutions", such as non-governmental organisations and international environmental standard-setting organisations, have been identified as crucial to enhancing the capacity of companies (Ali & Frynas, 2018).

Taken together, the level of CER effort in a country is significantly associated with its institutional environment. The institutional forces are associated with institutional stakeholders (see Figure 2.1). In the context of a transitional or mixed economy, the government may have a high-level impact on CER behaviour whereas social communities and NGOs have limited influence on firms' environmental efforts. Therefore, to examine corporate CER behaviours in a specific context, the component of company characteristics and stakeholder groups are the key elements subject to investigation and change.

To demonstrate how this framework is generalised for a mixed economy such as China, Section 6 reviews the Chinese context to gather relevant information and in Section 7, this framework is adapted and extended to specifically, analyse CER issues in China.

6. Chinese context

This section reviews China's efforts towards achieving the environmental SDGs and then discusses China's key environmental policies and initiatives and describes the current status of national environmental supervision and management. Stakeholders in the Chinese national environmental governance system are introduced and their roles are described.

6.1 SDGs and China's efforts

In its efforts to tackle climate change and other global sustainability issues, in 2015, the United Nations (UN) launched the 2030 Agenda for Sustainable Development. The SDG 2030 Agenda, which applies to and must be implemented by all UN member states, includes 17 SDGs and 169 specific targets that cover various issues including the economy, social affairs, and environment.

To facilitate the global implementation of the SDGs, the UN adopted a framework to review countries' progress towards the goals. The framework has been refined and adjusted over time (Sachs et al., 2018; Sachs et al., 2019). Since 2016, the Sustainable Development Solutions Network, jointly with the Bertelsmann Stiftung foundation, has annually published the SDG Index and Dashboards Report. The 2021 report (i.e., Sachs et al., 2021), shows Finland, Sweden, and Denmark at the top of the SDG index, and the Central African Republic, South Sudan, and Chad are ranked last among the 165 countries included in the index. It appears that low-income countries overall have poor performance, particularly those in Sub-Saharan Africa that are affected by conflicts or struggling to end extreme poverty. Of more concern, however, the report shows that no country is fully on track to achieve every SDG. For example, with respect to SDG 12 (responsible consumption and production), high-income countries and OECD countries have performance lower than expected, many of which even generate high-level environmental spill-overs that undermine other countries' efforts to achieve their SDGs (Sachs et al., 2021). The report thus concludes that national performance benchmarked against each SDG varies across countries in terms of national conditions, characteristics, capabilities, and priority settings in the implementation of the SDGs.

With regards to national implementation mechanisms for the SDGs, by the end of 2021, almost all the G20 countries have officially promised to implement the SDGs and have adopted (or plan to adopt) an action plan, apart from the United States. Regarding the

incremental financing needs for the SDGs, however, only a few countries have included SDGs in their national budgets: Argentina, Canada, Germany, Japan, and Mexico (Sachs et al., 2021). Therefore, there is a large variation among G20 countries in how central governments embrace the SDGs and how to translate them into institutional mechanisms.

As the largest developing country and transitional economy in the world, China regards sustainable development as a top priority, and it has fully initiated the implementation of the SDG 2030 Agenda (Li & Zhou, 2016). In 2016, China participated in the UN's first round of voluntary national reviews and played a leading role in urging the G20 to formulate the G20 Action Plan for the Implementation of the SDG 2030 Agenda, which has been highly valued by the international community.[15] As a financial provider of the South-South Cooperation (SSC), China is currently contributing to international cooperation toward the success of the SDGs (UNDP, 2018b).[16] On 19th September 2016, Premier Li Keqiang announced the release of China's National Plan on Implementation of the SDG 2030 Agenda for Sustainable Development (China's SDG 2030 Agenda). The National Plan, available on the website of the Ministry of Foreign Affairs, has translated each target of the SDGs into action plans. This is regarded as an action guide for China to carry out the implementation and provide references to other countries, especially those developing countries in the process of advancing their own implementation mechanisms.[17]

The seventeen SDGs address global challenges related to poverty, inequality, climate, and environmental degradation. Though these goals are interrelated, they can be roughly categorised as social, economic, and environmental indicators (Lv et al., 2018). More than one-third of the SDGs relate to environmental sustainability issues. Specifically, goal 13 targets climate change, which is the most urgent issue that has been called for immediate action by the UN to control worldwide carbon emission levels and energy consumption. Goals 6, 7, 12, 14 and 15 address environmental issues associated with water quality, energy consumption, high-level emissions from production, use of marine resources and terrestrial ecosystems, biodiversity loss, and other environmental degradations (Appendix A1).

[15] See https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1405596.shtml.
[16] South–South Cooperation is about "developing countries working together to find solutions to common development challenges" (UNOSSC, 2017).
[17] https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/W020161014332600482185.pdf.

As the focus of this paper is on environmental issues, only the six environmental SDGs are considered in the discussion of how China's environmental sustainability policies relate to these SDGs (Section 6.2). As these environmental SDGs are generally associated with business activities (Alrazi et al., 2015; Marquis, Zhang, & Zhou, 2011), the achievement of SDGs requires increasing firm-level commitments to CER practices. Section 7.4 discusses how environmental SDGs may influence corporate CER behaviour and practice in the Chinese context.

6.2 Environmental priorities and related policies

With respect to the implementation issues of environmental SDGs in China, the central government has identified the following three key areas as national environmental priorities. First, protecting the environment in terms of preservation and recovery of the ecological system, forests, biological diversity, and building protective barriers for eco-security. Second, tackling climate change and integrating this into national development strategies. Finally, promoting efficient utilisation of resources in terms of promoting energy conservation, sustainable energy and related technologies and products, and constructing mechanisms to improve resource efficiency. Essentially, it is crucial to establish a "clean, low-carbon, safe and efficient" energy system that requires actions to develop a circular economy, and "cultivate awareness of green consumption and promote the lifestyle of thrift" (Ministry of Foreign Affairs, 2019).

There are a number of existing environmental statutes and policies that support the implementation of the environmental SDGs in China. To strengthen the understanding of China's efforts toward achieving the environmental SDGs, the evolution of China's environmental regulations and policies are summarised as follows.

The environmental regulations and policies in China have evolved in three stages, being "end-of-pipe", "whole-process control" and "regional control" (Bai et al., 2015, p.8). During the period of "end-of-pipe" (1973-1992), environmental policies were formulated to control pollution in air and water at the point where the effluent had infiltrated. In 1979, the first environmental protection law of the People's Republic of China was issued. It provided the legal basis to pursue nationwide environmental sustainability. At the stage of "whole-process control" (1993-2005), the central government shifted the focus from end-of-pipe treatment to whole-process control environmental management (Wang, 2010). That is, all production activities related to a process were ensured to be foreseeable and consistently operating at the expected level of environmental performance. During

this period, the circular economy (CE) policy and the Law of Promoting Cleaner Production were issued.

The "regional control" stage represents the most recent period from 2006 onwards. Since 2006, Chinese regional governments have been playing a crucial role in exercising environmental protection policies using flexible regulations and policies. This has enabled regions to differ in how they balance their opposing economic and environmental priorities. Central government exercises control over the regional governments through political centralisation and fiscal decentralisation. In response to the increasingly scarce natural resources, Chinese national development strategies in this period shifted from "raw economic growth" to "more sustainable development" (Marquis, Zhang, & Zhou, 2011, p.53). As a result, a large number of environmental policies were formulated including the provision of subsidies to large firms for environmental innovation and management. In 2009, the Circular Economy Promotion Law was implemented. In 2010, the National People's Congress put forward a proposal for developing a low-carbon economy in China, this effort drove the widespread application of emission trading schemes that have been formally operated since July 2021 after a decade of planning and trials. In 2015, the harshest environmental protection law in Chinese history was enforced. In the same year, the Environmental Protection Tax Law was enacted with enforcement beginning in 2017.

The above environmental policies and related SDGs (listed in Appendix A2) show that apart from the governance-related policies, the remaining laws and regulations support at least one environmental SDG. Therefore, China's environmental policies and laws are inherently consistent with the environmental SDGs.

Of note, the term "circular economy" appears twice in Appendix A2, where CE-related policies and laws were issued in 2004 and 2009. A circular economy refers to an economic model that proposes a "closed-loop" of resource flows in the economy (Boulding, 1966). It focuses on minimising waste and making the most use of resources. In alignment with the principle of sustainable development, CE emphasises cleaner production and comprehensive utilisation of energy and waste (Zhu et al, 2019). In China, as a result of the top-down promotion from the Chinese central government, the CE efforts have a broader scope than in developed countries (McDowall et al., 2017; Su et al., 2013; Zhu et al., 2019); this is reflected by the existence of multiple types of CE policies working together in China.

As a crucial means to achieve national environmental sustainability, for a long time, CE has been promoted by the State Council, which is the top executive body of China's state administration. Moreover, given CE promotion significantly contributes to the achievement of all the environmental SDGs in terms of tackling climate change (SDG 13), resource recycling and waste management (SDGs 6, 12, 14, 15), pollution control and cleaner production (SDGs 6, 12, 14), renewable energy development and energy structure optimisation (SDGs 7, 14, 15) (Su et al., 2013; United Nations, 2018), it is also highlighted in China's SDG 2030 Agenda.

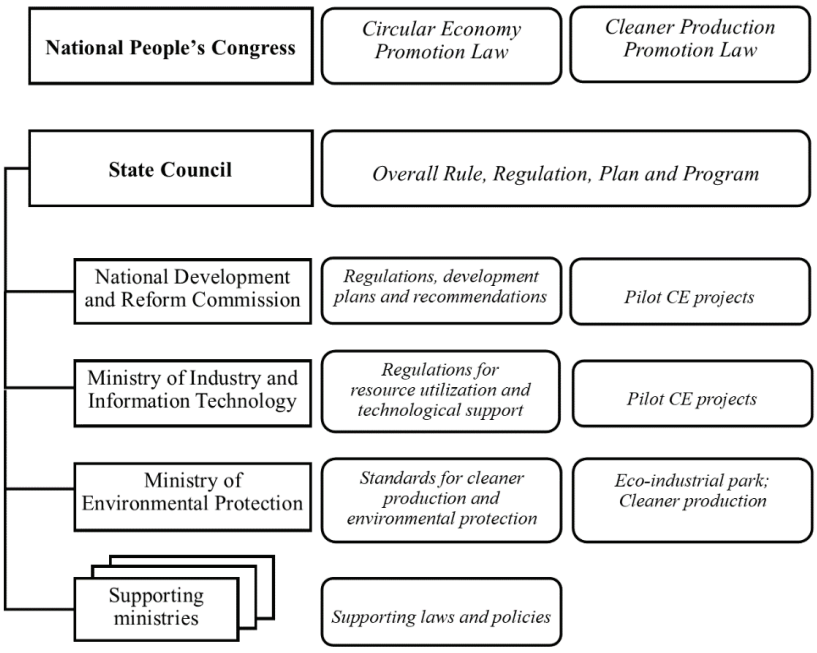
Zhu et al. (2019) have identified four types of CE policies in China: resource-oriented policies for generating more resource flows, production-oriented policies for improving production efficiency and environmental performance, waste policies for waste and pollution control, and use-oriented and life cycle policies, which sometimes conflict with production-oriented policies. This is because use-oriented and life cycle policies do not focus on improving efficiency and environmental performance during production, rather, they focus on extending the lifespan of in-use products thus preventing an extensive increase in production and resource consumption (Zhu et al., 2019).

Figure 2.2 illustrates the operational framework of China's circular economy, where multiple government agencies are involved. The framework displays governmental agencies on the left and correspondingly on the right, lists the major CE-related laws and policies issued. The top-down hierarchical structure demonstrates that on the top are the dominant laws and principles, in the middle are the major operators and regulations, and at the bottom are the supporting agencies and policies. The National People's Congress has enacted CE-related laws, among which, the Circular Economy Promotion Law and the Cleaner Production Promotion Law are the most relevant.[18] The State Council has provided dominant rules and guidelines to its subordinate agencies for the formulation and implementation of detailed CE policies. Three agencies are responsible for CE promotion: The National Development and Reform Commission (NDRC), the Ministry of Industry and Information Technology (MIIT), and the Ministry of Environmental Protection (MEP).[19] Their major responsibilities are also listed in Figure 2.2.

[18] The National People's Congress is the legislature in China.

[19] Of note, the disjointed power on environmental issues was integrated on 12th March 2018, when the Ministry of Ecology and Environment (MEE) was formed to cover all the duties of environmental protection that used to be dispersedly performed by the NDRC, the MEP, and other ministries.

Figure 2. 2 The operational framework of China's circular economy



Extracted from Zhu et al. (2019, p. 114)

With regard to CE practice in China, Figure 2.2 also shows the importance of coordination among governmental agencies at different levels. In fact, this is not an issue for China's CE promotion because, unlike pollution and carbon emission control initiatives, CE does not directly conflict with regional economic growth needs. Instead, it assists local governments in improving efficiencies of production and resource utilisation. Therefore, the Chinese political leaders and the State Council have been continuously promoting the CE, and this political support has helped engage more CE-related agencies and strengthen the coordination between them. As a result, CE policies and projects have been gradually implemented and have contributed to China's economic growth (Su et al., 2013; Zhu et al., 2019). In particular, business organisations involved in pilot CE projects, such as those located in Eco-Industrial Parks, have enjoyed institutional support provided by regional governments and local communities and hence are motivated to improve their circular economy capability and environmental performance (Bellantuono, Carbonara, & Pontrandolfo, 2017; Zeng et al., 2017), and have subsequently contributed to the achievement of environmental SDGs in China.

6.3 Environmental supervision and management system

To achieve environmental sustainability in China, it is seen as essential to establish a national environmental governance system engaging multiple stakeholders, in particular,

social communities and NGOs (Zhu, 2017). As stated in China's SDG 2030 Agenda, it is a "social governance system by the people and for the people", and the governance should be law-based and technically supported. (Ministry of Foreign Affairs, 2019). This is in alignment with Chinese President Xi Jinping's thoughts on the construction of an ecological civilisation in China, which emphasise human dependency on the environment, and value is placed on the ecological environment viz. "clear waters and green mountains are as valuable as mountains of gold and silver" (Song & Hu, 2018).[20] This suggests that an effective environmental governance system in China needs the engagement of social communities and NGOs, given the significant dependency of people's life on the ecological environment.

However, a prerequisite of social engagement is the institutional guarantee for information transparency. This requires effective communication channels and information disclosure mechanisms that are legally regulated. As most environmental issues are related to production activities, business organisations are responsible to disclose their environmental impacts on publicly accessible information platforms, such as newspapers, magazines and websites. Moreover, given that most environmental impacts have negative externalities, regulations on environmental disclosures are essential to ensure public access to environmental information.

There are a number of regulations on corporate environmental reporting in China (see Appendix A2). In 2013, the Ministry of Environmental Protection issued "The Measures for the Self-Monitoring and Information Disclosure by the Enterprises subject to Intensive Monitoring and Control of the State (for Trial Implementation)" and "The Measures for the Pollution Sources Supervisory Monitoring and Information Disclosure by the Enterprises subject to Intensive Monitoring and Control of the State (for Trial Implementation)" regulations, which apply to all enterprises operating in China and are effective on 1st January 2014. In the same year, "Measures for the Disclosure of Environmental Information by Enterprises and Public Institutions" were published, effective on 1st January 2015. For listed companies, in 2006 and 2008 respectively, Shenzhen and Shanghai Stock Exchanges introduced environmental, social and governance (ESG) reporting guidelines. The China Securities Regulatory Commission (CSRC) and the Ministry of Ecology and Environment (MEE) announced that by 2020,

[20] In Chinese, President Xi's original words are "绿水青山就是金山银山".

all Chinese listed companies will be subject to compulsory ESG reporting (Davies, Reineking, & Westgate, 2018).

To comprehend the roles of Chinese institutional stakeholders in the national environmental governance system and how they influence firms' CER behaviour, it is essential to understand the current status of national environmental supervision and management.

China's national environmental supervision and management system has experienced an evolution of governmental regulation, government and market regulation, and co-governance. Importantly, in China's co-governance system, governmental regulation plays a dominant role; the market mechanism functions as a supplement to governmental regulation; social communities and NGOs are involved in the processes of environmental decision-making. Of note, as a civil society actor, environmental NGOs play an increasingly important role in China. Both international and domestic NGOs function as government partners with some political restrictions. Although many NGOs have low social recognition in China, they have obtained increasing domestic support (Liu, Wang, & Wu, 2017). Examples of influential environmental NGOs in China are the World Wildlife Fund, The Nature Conservancy, the Institute of Public and Environmental Affairs and Greenpeace (Volpe, 2018).

When environmental issues emerged in China, there was no national environmental management or governance system. Environmental protection fully depended on businesses. Given that environmental resources are public goods, most business organisations did not and continue not to proactively handle environmental issues. As environmental problems have become increasingly serious in China, the communities and NGOs are ever more concerned with environmental damage. However, because of information asymmetry, local protectionism and weak enforcement of environmental regulations, it used to be hard for NGOs and communities to take effective actions against polluters. With this background, governmental intervention was called for by the public in terms of producing, supplying, allocating and managing environment-related public goods. Thus, the Chinese government began to issue environmental laws and policies in 1979. This environmental management model relying on governmental regulation is termed "a control and managerial model used by the government or governmental agencies, to directly or indirectly interfere in environment-related activities of individuals or firms by formulating and implementing authoritative rules" (Zhao, 2006, p.89).

However, several weaknesses have been identified in relation to the introduction of governmental regulation in China. First, the government in some areas lacked the capability in managing the environment due to funding issues, insufficient knowledge and expertise, institutional failure and/or incomplete information (Hepburn, 2010). Second, there were rent-seeking and omission issues where the environmental management authority was not effectively monitored by social communities and NGOs. Finally, some regional governments were reluctant to listen to communities about environmental issues due to the lack of awareness of the need to engage the public in the process of environmental decision-making. These disadvantages could ultimately lead to government failure in national environmental supervision and management (Zhu, 2017).

In response to perceived government failures in relation to environmental issues, the Chinese government introduced new market regulations in 2014. These new regulations operate on the basis of indirect governmental intervention, given that market-driven environmental governance is dependent on the laws, regulations and policies issued by the government.

However, to achieve energy-saving and emission reduction in China, difficulties have been encountered in relation to the operation of market-driven mechanisms in terms of target setting and the supervisory process. Because China's emission markets were established by the government who indirectly controls the process of market regulation, all the weaknesses of governmental regulation also apply to market regulation. Indeed, the closed supervision chain from the government to a firm is likely to create opportunities for rent-seeking unless social communities and NGOs are included in the environmental supervision and management system (Li et al., 2018; Zhu, 2017). Specifically, some firms may disclose inaccurate environmental information to evade governmental supervision or to defraud the government for environmental policy favours. This results in market failure, or even worse, both government failure and market failure (Hepburn, 2010).

To resolve environmental management issues caused by government failure and market failure, some academics have advocated establishing an environmental co-governance system drawing on Ostrom's polycentric self-governance theory. Such a system would encompass three decision-making centres: government, firm and social community (or NGO). It requires sufficient corporate environmental disclosures and effective social supervision and commitment. This is because first, substantive corporate environmental

disclosures can diminish information asymmetry and hence aid in environmental decision-making. Second, the commitment of NGOs and social communities can break the closed government-firm supervision chain to reduce the risks of rent-seeking and omission, and thus overcome government failure or market failure. Finally, the environmental norms that exist in social societies function as complementary to environmental regulations.[21] In certain circumstances, regional culture, tradition and convention can shape individual and organisational behaviours more effectively than regulations (Weber, 1993; Weber & Gerth, 1953; Zhao, Zhu, & He, 2009). This is particularly relevant in China (Bi et al., 2015; Du et al., 2016) where if firms fail to follow norms, they may then encounter litigation or media exposure initiated by NGOs or social communities (Zhao et al., 2009). In this regard, social supervision and participation can shape firms' CER behaviours.

With this background, the 19th Communist Party of the China National Congress announced in 2017 that China will construct an environmental governance system in which the government plays a dominant role, the market mechanisms function as a supplement to environmental regulations, firms are the major body to pursue CER, and social communities or NGOs will be involved in the processes of environmental decision-making and governance.

At present, in China, the model of government-led environmental co-governance has been partially applied in several regions. Some regional governments have purchased environmental services from NGOs and have engaged social communities in their environmental projects. A typical example of environmental co-governance is known as "co-governance on five waters", which was initiated by the Zhejiang government at the end of 2013. The government purchased environmental services from NGOs and encouraged the public to participate during the process of decision-making for the project. This practice has spread in the country as a valued experience (Cai, 2015).

In essence, the above analysis suggests that the Chinese government plays a dominant role in the national environmental supervision and management system. Social communities and NGOs have been progressively engaged in the environmental governance system. Therefore, government, social communities and NGOs are important

[21] Environmental norms, which are valued by social communities and NGOs, refer to the awareness existing in social societies. Environmental regulations, which are formulated and enforced by the government, consist of command-and-control policies and market mechanisms that handle environmental issues.

institutional stakeholders for a firm to achieve environmental legitimacy; this has been supported by the evidence of firms' motivation to pursue CER-related practices in Eco-Industry Parks (Bellantuono et al., 2017; Zeng et al., 2017).

With regard to the role of the Chinese media, which consists of television, newspapers, radio, magazines and websites, all these forms of media are subject to the supervision of the Chinese government at both the central and regional levels. Thus, with respect to environmental issues, the media controlled by regional governments may postpone reporting or conceal facts for regional interests, even if these are in opposition to central government goals. However, there is a lag effect of governmental control over social media in China because social media provides a platform for ordinary people to post information easily. Research suggests that exposure of environmental damage via social media have been more effective than traditional media in forcing regional governments to resolve environmental issues (Huang & Lu, 2017). Consequently, social media has increasingly become a major resource used by Chinese individuals and communities to explore social issues (Xu, 2018). Thus, the media can be regarded as a separate part of a co-governance system (Appendix A3), due to its constructive role in forming social values and norms: collecting and communicating information in social society and shaping the public's perception.

The interactions between firm and other components in the environmental governance system, being the central government, regional government, social community and NGO, and the media, are illustrated in Appendix A3. Of note, there is a large body of literature on the relationship between the Chinese central and regional governments, which is beyond the scope of this paper. However, given the different impacts of the central and regional governments on CER practice, the roles of central and regional governments should be considered separately in the Chinese CER framework.

7. Toward a CER framework for the Chinese context

Based on the literature on Chinese environmental issues, this section identifies the determining factors of corporate environmental management and practice and explains the typical CER practices in China. Drawing on the general framework (Figure 2.1), an extended CER framework (Figure 2.3) for the Chinese context is constructed and discussed.

7.1 Identification of key CER divers in the Chinese context

7.1.1 Company characteristics that influence CER efforts

Consistent with the general CER literature, certain company characteristics influence corporate environmental management and practice in China. According to the Chinese CER literature, these factors include company size, organisational visibility, financial status, internationalisation level, position in the value chain, organisational culture, corporate governance, corporate ownership and company political connections.

Compared with small and medium firms, large firms are more likely to pursue CER practice in China (Luethge & Han, 2012; Zeng et al., 2010; Zheng & Zhang, 2016; Zhu & Geng, 2001). This is because most large firms are SOEs. With the support of favourable policies, they can get more resources allocated for environmental practice than small and medium companies. Moreover, they are expected to be more socially responsible as they are subject to more public scrutiny for their environmental performance. In contrast, small and medium businesses have been found to lend less effort to corporate environmental management (Zeng et al., 2011).

Organisational visibility generally refers to the degree of public attention that a firm captures due to its reputation or specific features in social societies (Bowen, 2000). Research has found that more visible firms are generally subject to higher levels of public scrutiny over their CER performance, for example, environmental disclosures (Marquis & Toffel, 2012). Thus, driven by various institutional forces, they are more likely to commit themselves to genuine CER activities.

Financial status, specifically, financial performance and cash flows may affect a firm's financial capacity to run costly environmental projects (Lu & Abeysekera, 2014; Marquis & Qian, 2014; Seifert, Morris, & Bartkus, 2004). After joining the World Trade Organisation (WTO) in 2001, Chinese firms have been increasingly engaged in international business. In response to the demands of international stakeholders, Chinese exporters have had to integrate CER practice into their organisational strategies (Zhang et al., 2008; Zhu, Sarkis, & Lai, 2008a).[22] Research suggests that firms with a higher degree of internationalisation have higher levels of environmental management and practice (Lin, Moon, & Yin, 2014; Weber, 2014).

[22] International stakeholders include shareholders, creditors, consumers and business partners.

Given that various firms are incorporated in a supply chain, environmental issues caused by one supplier may affect the supply chain and have negative impacts on other suppliers' images and business (Hu & Yang, 2010; Wu, 2013). Firms situated closer to end consumers are more affected and subject to more scrutiny. As a result, they are likely to undertake more CER activities (Hu & Yang, 2010).

The CER-oriented organisational culture is considered a complement to environmental regulations. A survey of 587 Chinese top managers suggested that organisational culture has a significant and positive impact on CER practice if top management has a positive attitude towards environmental accountability (Xin, 2014). This is because organisational culture is usually a representation of top managers' shared values (Mudrack, 2007).

Some academics have argued that corporate governance influences Chinese corporate environmental practice and performance in various ways (Tan & Yang, 2009; Zeng & Zhang, 2009). Chen and Xu (2011) provide empirical evidence showing that in China, the proportion of independent directors and executive pay is positively associated with CSR or CER practice while the effect of board size is not significant. Overall, research on the relationships between corporate governance dimensions and CER in China remains limited.

In China, corporate ownership has been considered particularly important for CER research. Generally, Chinese firms can be classified into five ownership categories: SOEs, private firms, foreign firms, joint ventures and others. A large number of studies have found that corporate ownership in China influences the achievement of corporate environmental sustainability (Li et al., 2013; Zhang, Yang, & Bi, 2011). Specifically, state ownership drives SOEs to take more social responsibility and thus influences their behaviour in undertaking CER activities (Han, & Zheng, 2016; Li & Zhang, 2010; Li et al., 2013; Zu & Song, 2009).

Recently, research has focused more on the impact of corporate political connections on CER commitment in China (Zhang, 2017). Chen et al. (2017) suggest that a firm's political connections can either enhance or reduce the firm's capability to access business resources that are primarily controlled by the government in China (Li et al., 2008). Presumably, corporate political connections can function as either a helping hand to finance CER-related costs, or a grabbing hand to engage government officials who seek rent from a firm for helping it to escape environmental responsibility. Even though the

mechanism needs further investigation regarding how corporate political connections influence business strategies, Zhang (2017) suggests that a firm's political connections have a positive effect on its CER commitment as these connections can aid the firm in receiving environmental grants, subsidies and tax benefits.

Yet, researchers have not reached a consensus on the above factors, the driving effects may vary across regions and industries (Liu et al., 2010a). For example, firm size might not be a significant CER driver in Central and East China but it may have a significant impact on CER practice in the western region (He et al., 2016). Research has also found that the impact of corporate ownership on firms' social performance is affected by firms' geographic remoteness from the major cities in China. In urban areas, SOEs have better social performance than non-SOEs, whereas in rural areas non-SOEs outperform SOEs in order to attract more business resources (Tang et al., 2018). However, corporate social performance is not necessarily equivalent to corporate environmental performance. Some firms can achieve better social performance through more philanthropic donations.[23] Therefore, additional investigations are needed to examine whether company geographic remoteness mediates the relationship between corporate ownership and environmental performance.

7.1.2 Stakeholder pressure

Most research on Chinese CER issues has identified stakeholders and analysed their environmental influences based on three connected theories: institutional theory, stakeholder theory and legitimacy theory (Bai et al., 2015; Yang, Craig, & Farley, 2015; Marquis & Qian, 2014).

In China, institutional theory can explain many issues relating to the influence of external pressure on business organisations (Yang et al., 2015). With respect to corporate environmental practice, research has found that a firm is impacted by the coercive pressure from the government, the normative pressures from social communities (or NGOs) and the media (Liu et al., 2010a; Luo, Wang, & Zhang, 2017; Zhao et al., 2009), and the mimetic pressures from industrial peers (Zeng et al., 2012). The public goods theory further explains how the government, social communities and NGOs exert pressure on firms' environmental management and practice (Ma, 2015; Zhu, 2017).

[23] Tang et al. (2018) uses Hexun CSR reporting index to measure corporate social performance. One important indicator is the level of philanthropic donations, see http://stock.hexun.com/2013/gsshzr/index.html.

According to stakeholder theory, the Chinese government can be regarded as the primary stakeholder who holds the highest level of power, legitimacy and urgency (Deegan, 2006). It can therefore impose the highest-level pressure on firms to improve their environmental performance. Thus, Chinese firms have to satisfy their stakeholders with appropriate environmental performance, in particular, the government, to secure their legitimacy for survival and sustainability (He et al., 2016; Liu et al., 2010c; Marquis & Qian, 2014).

Chinese environmental norms have been developed and enriched in the past two decades. Research suggests that the Chinese public is increasingly concerned about environmental issues and willing to be involved in environmental governance systems (Hong, 2014). Social communities exert their pressure by raising complaints to the government or fighting against polluters (Liu et al., 2010c). Environmental NGOs initiate campaigns combating environmental lawbreakers (Tsoi, 2010). Unhappy communities and NGOs may also engage the media, which provides a platform for different social forces to present their perspectives on environmental and social issues (Du et al., 2015; Liu, Jia, & Li, 2011).

However, given that public participation in achieving environmental sustainability is still at an early stage in China, empirical results show that the impact of social communities on corporate environmental practice has not yet been significant (He et al., 2016; Li et al., 2018; Liu et al., 2010a). Zhou, Luo, and Shen (2022) examined the effect of community pressure on corporate environmental performance based on Chinese firms in environmentally sensitive industries during 2007-2012. The authors of this paper argue that even though community stakeholders have limited impact on firms' economic transactions, they can exert their pressures on government agencies who in turn channel the communities' demands to firms. The statistical results provide significant evidence showing that intensified community pressure can reinforce regulatory power over environmental issues and thus lead firms to improve environmental performance. With China's progress in nationwide environmental governance, in particular, the introduction of new environmental protection laws, the public and NGOs have been conferred litigation power for environmental damages against polluters (Zhang & Cao, 2015). Accordingly, social communities and NGOs are expected to have an increased impact on CER practice.

In theory, industrial associations and industry peers are also relevant institutional stakeholders that influence firms' CER behaviour. Industrial associations develop and issue industrial environmental standards as firms' normative references (Liu et al., 2010b; Zhao et al., 2009). In China, industrial associations contribute to market governance through industrial "self-regulation", which is considered a complement to government regulation (Zhang, 2008). However, though the industrial associations used to play a positive role in market governance, especially in the case of "government failure", their capability to exercise market control is in question due to several issues, such as incomplete self-regulation mechanisms and lack of credibility (Guo, 2010). A survey conducted by Liu et al. (2010a) suggests that the impact of industrial associations on corporate environmental efforts is limited. Therefore, "industrial associations" is excluded from the framework. In contrast, research has found that a firm's industrial peers with environment-friendly images can obtain more competitive advantages, and this may drive other firms to benchmark against them (Zeng et al., 2012; Zhu, Sarkis, & Lai, 2011). This is consistent with the Chinese proverb "following the general trend".[24] However, in certain cases, competitive advantage may not be a significant driver for CER practice in China due to inadequate competition instruments and a lack of perfect market mechanisms (Jean et al., 2016).

Business-related stakeholders in the Chinese context include consumers, suppliers, shareholders and other investors, bank lenders, top managers and employees. Consumers, especially overseas consumers, have increasingly demanded green products (Qi et al., 2011). The pressure from overseas consumers has been found to be positively related to the adoption of CER practices by Chinese firms (Dong et al., 2014; Zhu et al., 2011; Zhu, Sarkis, & Lai, 2007). Liu et al. (2010c) examined stakeholder pressures on poor environmental performers. The findings suggest that suppliers may terminate partnerships with polluters due to a loss of trust; investors may withdraw or cut down their investment; banks may reduce or suspend loans to polluters.

Top managers and employees are internal drivers for a Chinese firm's decision to pursue CER activities. Research has found that in China, top managers are critical decision-makers in the adoption and implementation of CER practices in a company (Xin, 2014; Zhu et al., 2008b). Employees with higher educational levels (college or beyond) in a firm can enhance the firm's capacity to learn and establish an environmental management

[24] In Chinese, this refers to "随大溜".

system (Lu & Abeysekera, 2014). Unhappy employees may choose to leave a firm and work for another with better environmental conditions. Taken together, unsatisfied business-related stakeholders can directly affect a firm's financial status and in turn, threaten its growth and survival.

7.1.3 Contextual factors in the Chinese context

Consistent with the contextual factors identified by the general framework (Figure 2.1), the industrial sector has been found as the first contextual factor in the Chinese CER framework. Research suggests that firms in environment-sensitive industries, such as chemical, mining, oil and printing and dyeing, have more commitments to environmental management and practice due to the higher level of environmental regulations in these industries (Wang, 2008; Wang, Wijen, & Heugens, 2018; Zhu et al., 2011).

Donnithorne (1967) noted that China's provincially focused planning mechanism in the Communist period resulted in increasing regional inequality. That is to say, in a region where economic drive and entrepreneurship are plenteous, its development level is higher. Chinese official statistics have confirmed the ongoing existence of regional inequality in terms of regional culture or religion, economic development level, legal system and enforcement, and industrial structure (Du et al., 2016; Fleisher, Li, & Zhao, 2010). The above region-related factors are external forces out of a firm's control. Therefore, if these factors impact firms' CER practice in the Chinese context, the geographical location should be included as a contextual factor in the Chinese CER framework.

With respect to the concept of CER, Chinese culture emphasises making every effort to construct a harmonious relationship between people and nature. This understanding is rooted in Chinese religions, in particular, Confucian "interpersonal harmony" and Taoist "harmony between man and nature" (Wang & Juslin, 2009, p. 446). Moreover, research has revealed that Chinese traditional culture and religion do influence organisational behaviour associated with environmental responsibility. Specifically, the religious atmosphere, which often serves as a proxy for a set of social norms, is positively associated with corporate environmental and social accountability (Bi et al., 2015; Du et al., 2016).

Many Chinese environmental studies have evidenced that in regions with higher economic development, firms commit to more environmental practices and in turn have

better environmental performance (Du et al., 2016; Marquis & Qian, 2014; Zhao, Zhang, & Zheng, 2015). Fan, Wang, and Zhu (2011) show that in China, legal system efficiency and law enforcement vary across regions. Du et al. (2014) find that in regions with more effective legal systems and better law enforcement mechanisms, firms are more proactive in pursuing CSR or CER activities.

Research has found that the Chinese industrial structure is strongly related to the level of carbon emission (Zhang, 2010). Liu et al. (2010) calculated carbon emission levels by regions and industries in China. The findings suggest that heavy-polluting industries normally have high levels of carbon discharge. Liu et al. thus recommend that regions with a large proportion of high-emission industries should adjust their industrial structures to achieve goals for energy-saving and carbon emission reduction.

Taken together, culture and religion, regional economic development level, legal system and law enforcement and regional industrial structure all impact corporate environmental effort and performance. Therefore, to examine the organisational journey of a Chinese firm to achieve environmental sustainability, its geographical location is another important contextual factor in the CER framework.[25]

7.2 Description of environmental management and CER practices in China

The Chinese environmental management system (EMS) consists of two parts. One is the environmental mission or philosophy; the other is the CER-promoting system. Prior studies suggest that a large number of Chinese firms have an environmental mission or philosophy, at least on paper, but most of them lack an effective CER-promoting system, comprised of the environmental committee, CER promoting schedules, CER-related training and learning programmes and CER-related investment (Marquis et al., 2011; Xiao, Wang, & Li, 2015; 2016; Zhang & Wu, 2017).

According to Lai and Wong (2012), there are four types of Chinese CER practices: production-based, evaluation-based, partner-based and general environmental management practices. Production-based practice refers to environmental activities associated with production processes. It is a part of circular economy practice including

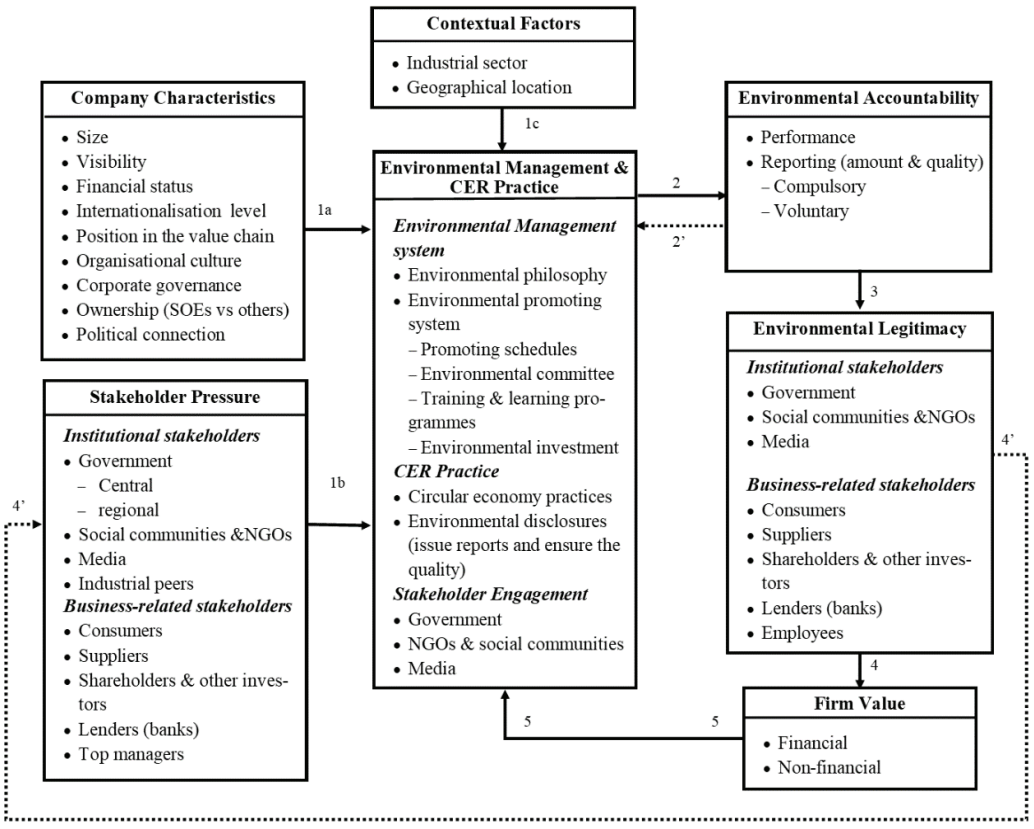
[25] To simplify the model, geographical location is selected to combine the influences from the four sub-factors, because some of them may have an overlapping effect with the government, such as regional legal system and enforcement. This issue can be settled through proper research design for a specific context.

cleaner production and waste management. Evaluation-based practice is defined as a mechanism or routine that a firm uses to self-review its environmental performance, such as strategic environmental assessment (SEA). Partner-based practice refers to the coordination with business partners to obtain environmental sustainability goals. It has been implemented in some circular economy trial projects (Zeng et al., 2017). Examples include green supply chain management, green purchasing and green investment. Other practices are categorised as general environmental management practices, a typical example is environmental information disclosure. Overall, compared with CER practice in developed countries, the Chinese practice towards corporate environmental sustainability is still in its infancy in terms of all four practices (Zhu & Sarkis, 2006).

7.3 CER framework for the Chinese context

Drawing on the general framework (Figure 2.1) and applying the information from the Chinese literature, a Chinese CER framework has been constructed (Figure 2.3).

Figure 2. 3 An Extended Framework for CER Practice in China



Note: *only the most important factors are listed in this framework, and the contents in the categories, except for environmental accountability and firm value, are subject to change for different contexts.*

7.3.1 Determinants of corporate environmental efforts

As described earlier, the following company characteristics impact corporate environmental efforts in China: company size, organisational visibility, financial status, internationalisation level, position in the value chain, organisational culture, corporate governance, ownership, and corporate political connection. The influential links from company features to environmental management and CER practice are shown by arrow 1a.

Of note, with regard to the influence of firms' ownership on CER practice, prior research has found that the SOEs in China tend to disclose more CER information under regulatory pressure due to their political origins (Li et al., 2013; Zhang, Yang, & Bi, 2011). However, research has also revealed that there are two types of agency problems existing in SOEs (Hou, Jin, & Chen, 2015; Hung, Wong, & Zhang, 2012). The first may occur due to the conflict between the government (the controlling shareholder) and other shareholders if the government imposes CER activities on SOEs to reach its political or social goals. The second agency problem may arise if there is a conflict between SOE managers and shareholders. This is because SOE managers are not dependent on market competition in terms of appointment and promotion. They may not have a strong motivation to make an efficient green investment. For example, some SOE managers pursue CER practice simply to gain personal political benefits, irrespective of whether these CER activities are truly socially beneficial. Some CER activities have been found wasteful or questionable (Jiang, Lin, & Lin, 2014). Taken together, the double agency problems of SOEs may influence their motivation to pursue CER practice and thus affect their environmental performance.

According to the analysis in Section 7.1.2, the following stakeholders are included in the component of stakeholder pressure: government, social communities and NGOs, media, industrial peers, consumers, suppliers, shareholders and other investors, lenders, top managers and employees. Given the different functions between the central and regional governments, their impact on corporate CER practice and performance varies due to the existence of environmental "policy-policy decoupling" between the governments at different tiers of China's bureaucratic hierarchy (Wang et al., 2018). Therefore, governmental influence on CER issues needs to be separately examined. The link from stakeholder pressure to environmental management and CER practice is presented by arrow 1b.

As discussed in Section 7.1.3, the industrial sector and geographical location are contextual factors identified in the Chinese CER research. The influential link from contextual factors to environmental management and CER practice is shown by arrow 1c.

7.3.2 Environmental management and CER practice

As described in Section 7.2, Chinese EMS is comprised of environmental philosophy and an environmental promoting system. A typical environmental promoting system includes an environmental committee, CER promoting schedules, CER-related training and learning programmes and CER-related investment.

The most typical CER practices identified by the literature are listed in this framework: circular economy practices and environmental disclosures.[26] Of note, environmental disclosures in this element have a different focus from the "environmental reporting" in the accountability component. The former focuses on whether and how to practice environmental information disclosure, while the latter refers to the quantity and quality of environmental reporting.

A number of studies on the relationships between Chinese CER practices and corporate environmental performance suggest that directly or indirectly, these CER practices can help economise environmental proactivity by saving energy and other resources, reducing costs and obtaining profits (Lai & Wong, 2012; Lai, Wong, & Cheng, 2012). For example, as part of circular economy practices, green supply chain management in some Chinese firms has been found to have win-win relationships with environmental performance as well as financial performance. These win-win associations can be either direct or indirect (Zhu, Sarkis, & Lai, 2013).

The category "stakeholder engagement" is detailed in terms of government, social communities and NGOs, and media. In China, the channels of engaging stakeholders include effective dialogue and invitations for on-site visits. The CSR reports of good - CER-performing companies suggest that proactively engaging the government, media and social communities can help business organisations maintain an environment-friendly image and hence legitimise their environmental performance and behaviour. Chen and Zhang (2009) find that engaging stakeholders can establish two-way communication between a firm and its stakeholders. This communication on

[26] Environmental disclosures in this component refers to a firm electing to issue stand-alone CSR or environmental reports and voluntarily disclosing environmental information.

environmental information can help the firm improve its environmental performance. Tang and Tang (2012) suggest that social communities play a positive role in strengthening corporate environmental management.

The causal link from environmental management and CER practice to environmental accountability is presented as arrow 2.

7.3.3 Environmental accountability

Legitimacy theory suggests that a firm can legitimise its environmental performance with different stakeholders through good environmental accountability. The causal relationship from environmental accountability to legitimacy is represented by arrow 3.

Under the component of "environmental accountability", environmental reporting is divided into compulsory and voluntary disclosures. Currently, most environmental reports of Chinese listed companies are voluntary disclosures, except for those from the "heavy polluters" that are closely monitored by the Ministry of Environmental Protection (currently the Ministry of Ecology and Environment). They are subject to compulsory environmental reporting (Fu, 2018). Research has found that compared to SOEs, private companies that have benefited from governmental subsidies are more willing to voluntarily disclose environmental data and other CSR information (Lee, Walker, & Zeng, 2017). However, recently, the Chinese government announced that by 2020, all Chinese listed companies will be subject to compulsory environmental reporting, provided that related regulations and standards are ready (Tanpaifang, 2017). Therefore, "compulsory reporting" and "voluntary disclosing" needs to be separately considered in the Chinese corporate environmental reporting research.

7.3.4 Environmental legitimacy and firm value

The inclusion of stakeholders in the environmental legitimacy component may differ from context to context. A firm's legitimising strategies can also vary across different stakeholders. For example, a firm may receive legitimacy from the government by compliance with environmental regulations, while it secures legitimacy from social communities through philanthropic donations.

In contrast to the general framework, "lenders" is added as business-related stakeholder in the environmental legitimacy component for the Chinese context. This is because most Chinese banks are controlled by central governments, therefore, they issue loans in line with government green credit policies (Zhang et al., 2011). To attract more financial

resources from lenders, some firms may undertake more environmental activities. If stakeholders are continuously satisfied with a firm's environmental performance and reporting, trust relationships are created. Consequently, trust relationships bring financial or non-financial values to the business. For example, if a firm has established trust relationships with the government and social communities in China, its business resources are guaranteed (Marquis & Qian, 2014), and the firm's environmental compliance costs are reduced (Liu et al., 2010b).

Business-related stakeholders, in different ways, directly influence a firm's financial status or operation. Satisfied business-related stakeholders can add firm value via the value chain. For example, consumers can demand more products and suppliers can retain long-term partnerships with a firm on a win-win basis (Liu et al., 2010c). The link from environmental legitimacy to firm value is denoted by arrow 4.

The increase in firm value generated from environmental trust relationships can strengthen the firm's environmental management and CER practice (Song, Liu, & Guo, 2019). This is represented by arrow 5.

7.3.5 Other interactions in the framework

In addition to the links mentioned in Section 7.3.4, there are two antecedent associations in the framework. On the one hand, environmental reporting may enhance the effectiveness of the CER promoting system, because, in the process of environmental reporting, firms can identify their strengths and weaknesses in CER practice and subsequently develop plans and strategies to improve accountability (shown by arrow 2'). On the other hand, unsatisfied stakeholders may urge a firm to improve its environmental accountability by imposing pressures on the firm. For example, the government may penalise a firm for its breach of environmental laws and NGOs may raise litigations or simply engage the media. Unhappy business-related stakeholders may take actions that affect a firm's financial status thus urging the firm to improve its environmental performance (represented by arrow 4').

7.4 Discussion

Drawing on the general framework (Figure 2.1), the Chinese CER framework has been constructed based on both the Chinese and English language literature on Chinese CER issues (Figure 2.3). The components and the linkages between the components in the

Chinese CER framework are consistent with the general framework, but the contents of some components have been modified in accordance with the Chinese context.

The specific features identified in the Chinese CER framework are as follows. First, the role of the Chinese government (at all levels) is highlighted because the legitimacy granted by the government is essential to firms' survival and growth. Accordingly, company ownership and political connection are added into the component of "company characteristics", given that both of them have a significant impact on CER behaviour in the Chinese context. Second, the framework incorporates a typical environmental management system in China consisting of environmental philosophy and promoting system, which includes promoting schedules, an environmental committee, training and learning programmes and environmental investment. Third, circular economy practices and environmental disclosures are highlighted as important CER practices in China. This is because the former is highly promoted by Chinese governments at both central and regional levels whereas the latter is a key mechanism to achieve polycentric environmental governance in China. Fourth, engaged stakeholders reflecting current Chinese conditions are detailed in the framework, including the government, NGOs and social communities and the media. Fifth, given the tightening regulatory stringency for environmental reporting, Chinese firms are subject to more compulsory environmental disclosures. Thus, environmental reporting related to compulsory and voluntary disclosures needs to be examined separately in the framework. Finally, "lenders (banks)" is included in the legitimacy component of the framework as Chinese banks are generally controlled by the central government. They issue loans to firms in alignment with the government's green credit policies. Therefore, the legitimacy received from banks is equivalent to an assurance of financial resources.

Of note, as mentioned in Section 6.1, the environmental SDGs have been written into China's national plan. These have been converted into a number of executable goals in action plans with multiple governmental agencies involved. The governmental intention of achieving these SDG-related goals can be conveyed to firms through stakeholder pressures, which push firms to improve environmental performance by taking more SDG-related activities. Therefore, to maintain a good relationship and ultimately secure legitimacy with the government, a firm may exert its environmental efforts by proactively responding to the pressures from the government and its agencies. Specifically, a firm may develop plans to address climate change, and invest in technologies and innovations for circular economy projects, such as cleaner production, low-carbon energy system and

renewable energy development, and waste management. By doing this, a firm can improve its environmental performance and thus establish trust relationships with the government, as well as local communities who generally enjoy the benefits from the achievement of the SDGs. The achievement of legitimacy from key stakeholders in turn brings value to the business and this encourages the firm to pursue more SDG-related activities. Therefore, the environmental SDGs can enhance CER practice in China through government pressures due to firms' hunger for political legitimacy.[27]

With regard to the stakeholder pressures on CER practice in China, a large number of studies suggest that the Chinese government plays a dominant role in national environmental supervision and management. Therefore, it has a significant impact on firms' CER practice. Even though the governmental impact on firms' environmental behaviours may vary across the hierarchical levels of China's environmental bureaucracy due to the governmental agency problems (Wang et al., 2018), the central government and its agencies have formed the major force to drive Chinese CER practice. As for other stakeholders, such as NGOs, social communities and industrial peers, research indicates that their impact on firms' CER practice is not significant, to date. This is because China is still a transitional economy, where free-market mechanisms, institutional supplies, legal systems and enforcement instruments are subject to further reforms. Thus, in China, internalising environmental externalities does require governmental intervention. However, with China's progress in the reform of "transformation of government functions", the legal systems will be enhanced, and free-market mechanisms are likely to be improved in the future.[28] As a result, the influences from NGOs and social communities on CER are probably to be increasingly strengthened.

Last, there has been a controversy over whether SOEs in China have better CER practices than non-SOEs. A large number of studies suggest that, overall, SOEs have higher-level commitments to CER practice than non-SOEs, particularly in terms of environmental disclosures. This is because, with the financial support and policy tilt from the Chinese government, SOEs have more capability than non-SOEs to pursue CER practice. However, for a long time, SOEs have functioned as a vehicle for the government to guide

[27] Political legitimacy refers to that granted by the government or its agencies.

[28] "Transformation of government functions" refers to the political reform to transform government functions from an administration-oriented government to a service-oriented government. In essence, the government progressively reduces its intervention in microeconomic activities and leaves them to be driven by the market forces. The government and its agencies thus focus more on providing services for social wellbeing and the maintenance of market order (Xinhua News Agency, 2013).

economic activities and resolve social issues, given that in most cases, the government controls a significant proportion of shares in SOEs. Therefore, other than environmental goals, an SOE is also expected to be a major contributor to local GDP and a reliable employer to absorb labour from local society. When the environmental goals of an SOE conflict with other goals, the firm has to weigh up and choose the most urgent one, this is generally acquiesced by local governments (Marquis et al., 2011). For example, coal mining firms are primarily controlled by local governments in China. To control the pollution and carbon emissions generated by coal mining activities, the most effective way is to close these businesses, but this will throw millions of people out of work. In consequence, social stability is threatened by the significant increase in unemployment; this is unacceptable to both Chinese central and local governments. Therefore, most coal mining businesses remain operating, together with the emissions they produce. Yet, they are expected to invest more in cleaner production and other CE activities, despite having a long way to go. Taken together, given that research on CER behaviours of Chinese SOEs remains limited (Garde-Sanchez, López-Pérez, & López-Hernández, 2018), more empirical evidence is needed to address environmental issues related to SOEs. Accordingly, their environmental efforts and performance should be examined together with relevant political, social, and economic issues, which may vary across geographical locations and industries.

8. Conclusion and research potential

As the largest transitional economy in the world, China has been increasingly called upon by international communities to contribute more to the achievement of the environmental SDGs, given the significant environmental issues incurred by China along with its dramatic economic growth. Because most environmental issues are caused by business productive activities, Chinese companies are subject to increasing demands for better environmental responsibility. However, prior research has not provided a comprehensive framework to analyse the organisational journey of a Chinese firm to achieve environmental sustainability through corporate environmental management and CER practice. Most existing CER frameworks focus on firms' voluntary practice in CER as they assume that firms are operating in a free market with strong legal systems. As such they presume that business practices (e.g., CER practice), are driven by market forces and organisational behaviours are shaped by regulations and laws. Therefore, with regards to environmental externalities, these frameworks cannot reflect the impacts of key

institutional stakeholders on firms' CER practices operating in a transitional economy, such as China, where the government plays a crucial role in internalising externalities to overcome institutional obstacles caused by inefficient markets and incomplete legal systems.

The contributions of this paper are as follows. First, based on a general literature review on CER issues in different countries, this paper has developed a general framework to analyse CER behaviour, which is applicable in both free markets and mixed economies. The general framework adds to the CER literature by differentiating stakeholder pressures on CER practice based on multiple perspectives that incorporate institutional theory, stakeholder theory, legitimacy theory and environmental externality theory. It articulates CER efforts and environmental legitimacy showing an organisational journey towards environmental sustainability. Specifically, it creates the linkages around environmental management and CER practice, environmental accountability, and environmental legitimacy. These linkages help identify and understand the journey for a firm to improve its environmental performance thus achieving environmental legitimacy, and ultimately obtaining value through established trust relationships with stakeholders. The growth of value in turn encourages the firm to pursue more CER practices and this virtuous cycle reflects an effective journey for a firm to achieve environmental sustainability. Given that firms' environmental goals are consistent with the global environmental SDGs, this framework can explain how the SDGs influence firms' CER behaviour and practice and thereby provides a conceptual model for policymakers to promote the implementation of the SDGs at a micro-level.

Second, the extended framework for the Chinese context contributes to the Chinese CER literature by recognising key drivers for a Chinese firm to improve environmental performance through effective environmental management and CER practices. The improved environmental performance and comprehensive disclosures thus enable the firm to secure environmental legitimacy from various stakeholders, in particular, the government which is the primary stakeholder for Chinese businesses. Moreover, as the implementation of the SDGs is mainly promoted by the government, the Chinese CER framework can effectively reflect how the SDGs drive a firm's environmental practice through stakeholder pressures. The improved corporate environmental performance in turn contributes to the achievement of the SDGs in China. In addition, given that the Chinese framework is developed by incorporating the findings of both indigenous and international research on Chinese CER issues, this framework can better reflect the key

CER drivers and their impacts on CER practice in the Chinese context and thus provide a theoretical basis for future research. Finally, the process of extending the general framework illustrates how it can be modified for other contexts where western theories developed in free-market economies are not fully applicable. Specifically, stakeholder groups and company characteristics are key factors to modify the general framework for a target context. In particular, the role of government should be considered the major CER driver in a transitional or mixed economy due to the inefficient market and legal mechanisms. Moreover, SOEs or public companies should be examined separately from private companies because they may have different CER drivers caused by the different levels of government control over them. Given that research on CER practice in SOEs or public companies remains limited (Garde-Sanchez et al., 2018), this is a rich area for future studies.

Based on the Chinese CER framework, future studies could develop hypotheses to examine the interactions between components in the framework, such as the relationship between stakeholder pressure and environmental practice (e.g., environmental reporting), the relationship between corporate environmental practice and firm value, how EMS influences corporate environmental performance (or reporting), and how environmental reporting impacts the environmental promoting system. Further research can also look at the change in an individual stakeholder's influence on Chinese CER practice over time, such as social communities and industrial peers, given that their influences on CER practice are not significant at present in China. In addition, further research could examine the differences between central and regional governmental impacts on corporate environmental management and CER practice in China. That is, whether Chinese central and regional governments have different impacts on corporate environmental accountability, and how these impacts shape a firm's environmental legitimising strategies.

Last, the Chinese framework can also provide a basis to examine the relationships between CER practices (e.g., circular economy activities) and corporate environmental performance. The findings could provide evidence for policymakers to evaluate the effectiveness of certain environmental policies that directly or indirectly help with the implementation of the environmental SDGs in China.

CHAPTER 3 ARTICLE 2

Corporate environmental reporting in China: symbolic versus substantive strategies

1. Introduction

Corporate reporting on environmental issues has emerged as an important area of research within corporate social responsibility (CSR) (Deegan, 2002; Golob & Bartlett, 2007). Research suggests that governments are a major driver of CSR practices as they encourage firms to be accountable for their environmental and social performance (Wang, Wijen, & Heugens, 2018; Qin et al., 2019). In general, governments control essential resources (Schuler & Rehbein, 1997), such as subsidies and permits for land use, which firms require to grow and survive (Li et al. 2008). To obtain resources from the government, firms strategically engage in political activities such as CSR commitments in line with government policy (Zhao, 2012). In doing this, firms' legitimacy with the government, also known as "political legitimacy", is secured. In this respect, political legitimacy is "the extent to which the government views the firm's actions as being in accordance with norms and laws" (Marquis & Qian, 2014, p.127).

To achieve political legitimacy, firms develop political strategies to maintain good relationships with the government. This is particularly relevant in a transitional economy where formal institutions (e.g., law enforcement) are weak (Li & Zhang, 2007). Corporate environmental reporting represents one of the main ways for firms to legitimise their environmental actions (Cho, Patten, & Roberts, 2006; Beelitz & Merkl-Davies, 2012). Legitimacy strategies related to environmental and social reporting have been studied extensively in the context of western communities (Campbell, Craven, & Shrives, 2003; Marquis, Toffel, & Zhou, 2016). However, limited research has examined how and when firms pursue environmental and social reporting as a strategy to maintain legitimacy in transitional economies (Den Hond et al., 2014; Marquis & Raynard, 2015; Shirodkar, Beddewela, & Richter, 2018). In particular, almost no research has looked at the variation in corporate reporting strategies under pressures imposed by different regulatory bodies (Aragon-Correa, Marcus, & Vogel, 2020). Therefore, taking China as an example of a transitional economy (Heugens et al., 2009), this paper examines how firms respond to government calls for substantive environmental reporting by separately looking at their

likelihood of reporting and reporting substantiveness i.e., the disclosure level of actual environmental performance.

According to institutional theory, governments apply coercive or normative pressures to drive organisational behaviour in alignment with regulations and norms (DiMaggio & Powell, 1983). However, given the existence of institutional complexity in a firm's operating context (Greenwood et al., 2011), corporate environmental reporting may either follow or depart from the government's expectations. In other words, a firm may embrace a substantive or symbolic reporting approach.[29] Research has found that in China, a firm's reporting strategies are closely connected with its ownership, which directly reflects the firm's political origin and legitimacy position (Wang et al., 2018). Therefore, research is needed to examine how political factors moderate the effect of ownership, including corporate political connection and political monitoring, that may affect a firm's needs for political legitimacy and environmental reporting behaviour. In addition, further research is needed to examine when and why firms adopt symbolic or substantive reporting strategies, particularly where they are facing different levels of decoupling risks. [30]

This research examines a sample of large Chinese listed companies that are required to issue stand-alone CSR reports during 2014-2015 to determine the likelihood of reporting environmental performance and the substantiveness of that reporting. Two sets of hypotheses were developed to examine the following issues: first, the moderating effect of political connection on the relationship between corporate ownership and the likelihood of corporate environmental reporting; second, the moderating effects of political monitoring on the association between corporate ownership and the level of firms' substantive environmental reporting, where the political monitoring is measured through three dimensions: a firm's administrative location, level of regional law enforcement and a firm's status of party embeddedness.

The primary findings are as follows. First, compared with state-owned enterprises (SOEs), private firms are more likely to disclose environmental information. Firms with political connections are more likely to report environmental data than their counterparts,

[29] In this thesis, substantive environmental reporting refers to an approach that a firm uses to disclose actual environmental performance. In contrast, symbolic environmental reporting is an approach that a firm applies to report information decoupled from the firm's actual environmental performance; it helps the firm appear to be legitimate without actually taking actions to improve its performance.

[30] With regard to corporate environmental reporting, in this paper, the decoupling behaviour refers to less substantive or symbolic reporting. Thus, the "decoupling risk" refers to the risk that the firm's decoupling action is exposed by media or government actors.

irrespective of their ownership types. Second, compared with SOEs, private firms are less likely to disclose substantive environmental information. This negative effect of private ownership is moderated by two factors related to political monitoring. Specifically, private firms subject to combined monitoring of provincial/municipal governments and the Securities Regulatory Authorities (SRAs), or those embedded with the Communist Party of China (CPC), are more likely to pursue substantive reporting. Finally, firms subject to high degrees of political monitoring are more likely to pursue substantive reporting due to the concern of high levels of decoupling risk. They disclose environmental information only when they have truly committed to CER activities.

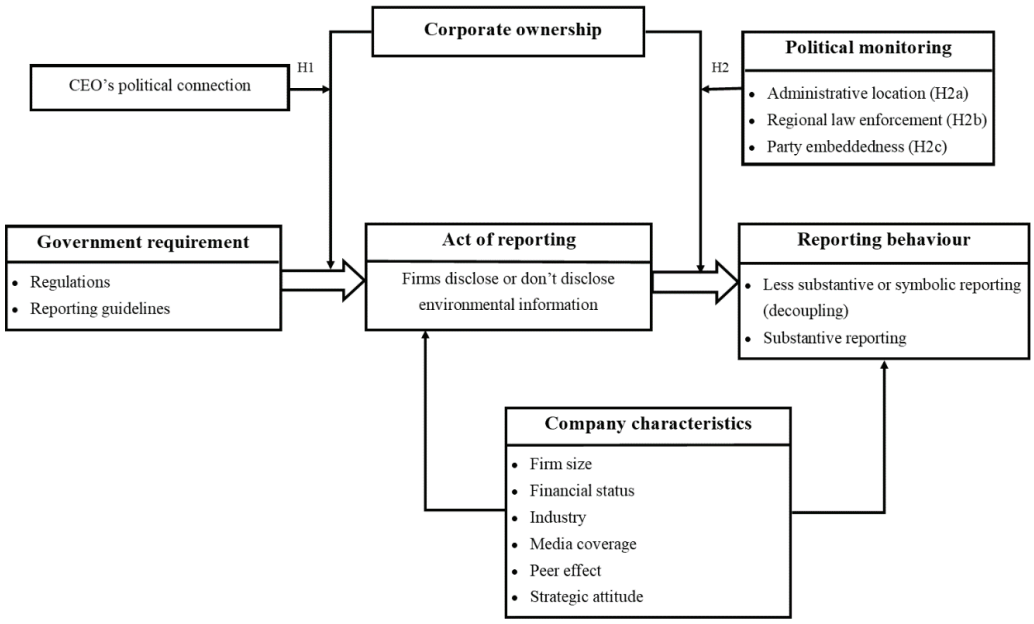
This study adds a political perspective to the CSR literature, showing that a firm's political ties may influence the firm's legitimacy motivation and in turn affect its action and quality of environmental reporting. Moreover, it enriches the literature on organisational behaviour by demonstrating that firms with different types of ownership may employ different reporting strategies when they face different types of coercive forces imposed by different governmental agencies.

The remainder of this paper is structured as follows. Based on the literature, Section 2 constructs a framework for corporate environmental reporting and behaviour. Section 3 develops the hypotheses. Section 4 describes the research design, and Section 5 analyses the results. Finally, Section 6 discusses the findings and concludes.

2. Framework

Drawing on Marquis and Qian (2014), Qin et al. (2019), and the CSR literature, an adapted framework is constructed to analyse the corporate action and behaviour of environmental reporting (Figure 3.1). This framework posits the relationships between government requirements (regulations and guidelines), firms' act of reporting (disclosing or not disclosing), and reporting behaviour (decoupling/symbolic reporting or substantive reporting).

Figure 3. 1 A general framework for corporate environmental reporting and behaviour in China



Adapted from Marquis and Qian (2014) and Qin et al. (2019)

2.1 Government requirement for substantive reporting

As a starting point in Figure 3.1, a government may require firms to follow regulations and guidelines for substantive reporting. In China, two ministry ministry-level governmental agencies who issue regulations and guidelines for environmental reporting: The Ministry of Environmental Protection (MEP) and the China Securities Regulatory Commission (CSRC).

The MEP is the primary government agency that oversees environmental issues across the country. Since 2007, the MEP has issued many regulations for environmental reporting (see Appendix B1). Among others, the MEP requires that firms in heavily polluting industries disclose emission data on designated websites or newspapers.

Chinese listed companies are also supervised by the CSRC and stock exchanges. The CSRC is the major regulator of the securities market. In mainland China, there are two stock exchanges, the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE), that administer share-trading issues in their stock markets. Both the SSE and SZSE are controlled by the CSRC in terms of personnel management, rule-making and administration. Since 2008, both exchanges have required certain companies to publish

environmental information in annual CSR reports (see APPENDIX B1). Companies in breach of the reporting rules are penalised by the CSRC.

Of note, the most recent environmental protection law (effective in 2015) states that firms are responsible to report environmental emergencies, and discharging details of major pollutants. Regional Environmental Protection Bureaus (EPBs) are responsible for enforcement.

2.2 Act of reporting

According to Bi & Peng (2013), in China, reporting regulations issued by stock exchanges have a stronger influence on listed firms than those formulated by the MEP. However, given the complexity of environmental disclosures and the lack of reporting standards in China, firms generally consider that environmental reporting is technically hard, costly and time-consuming (Li, 2017). In addition, given that the violation cost of environmental reporting is low in China, many firms elect not to disclose, even when they are subject to compulsory reporting (Wang, 2015).[31] In this regard, firms' acts of reporting are categorised into disclosing or not disclosing environmental information.

2.3 Reporting behaviour

Environmental and social disclosures generally tend to promote a positive image of the company rather than reflect its true operations (De Villiers & Van Staden, 2006). However, if a firm has unfavourable performance on environmental and social responsibility then it faces legitimacy problems. In this case, some firms may employ substantive strategies to improve their accountability. In contrast, others elect not to change, instead, they embrace symbolic strategies attempting to change stakeholder expectations or manipulate their perceptions (Michelon, Pilonato, & Ricceri, 2015).

In figure 3.1 "reporting behaviour" refers to a spectrum between symbolic reporting and substantive reporting. This component consists of "decoupling behaviour" and "substantive reporting". Decoupling refers to "less substantive reporting" or "symbolic reporting". A substantive report "implies actual, concrete changes in organisational actions to conform to prevailing social norms". In contrast, a symbolic report is normally decoupled from the firm's actual performance; it helps the firm appear "to conform to

[31] There are limited cases on the violation of environmental disclosure regulations. The highest penalty on a firm for a breach is ￥400,000 (US$ 60,500 equivalent). See https://www.sohu.com/a/238434457_100161500 .

social norms without actually transforming organisational activities" (Rodrigue, Magnan, & Cho, 2013, p. 109).

2.4 Corporate ownership and political connections

The institutional theory posits that in an institutional environment, the major goal of an organisation is to survive and obtain legitimacy (Powell & DiMaggio, 2012). To achieve this goal, a firm needs to do more than just obtain economic success (Burns & Scapens, 2000; Scapens, 2006); it needs to establish and maintain legitimacy by developing strategies to manage its relationships with stakeholders.

Given the importance of government in transitional economies, where achieving political legitimacy generally ranks ahead of other organisational objectives (Zhao, 2012), it is essential to identify how a firm relates to or depends on the government. That is, whether the government has any direct or indirect ownership of a firm that will enable it to exercise control. According to Tan (2002), a firm's ownership directly reflects the firm's political origin and ties; moreover, it is a strategic variable that significantly impacts a firm's decision-making and performance (Han & Zheng, 2016). As a result, corporate ownership is the key factor that affects corporate reporting in China (Zeng et al., 2011; Li et al., 2013).

Other than corporate ownership, the political connections of a Chief Executive Officer (CEO) in a firm indirectly reflect the firm's political ties which in turn shape its need for legitimacy (Huang & Zhao, 2016; Cheng et al., 2017). Thus, it is likely that CEO political connections can moderate the impact of ownership on the firm's act of reporting (see further discussion in Section 3.1 on hypothesis development).

2.5 Political monitoring

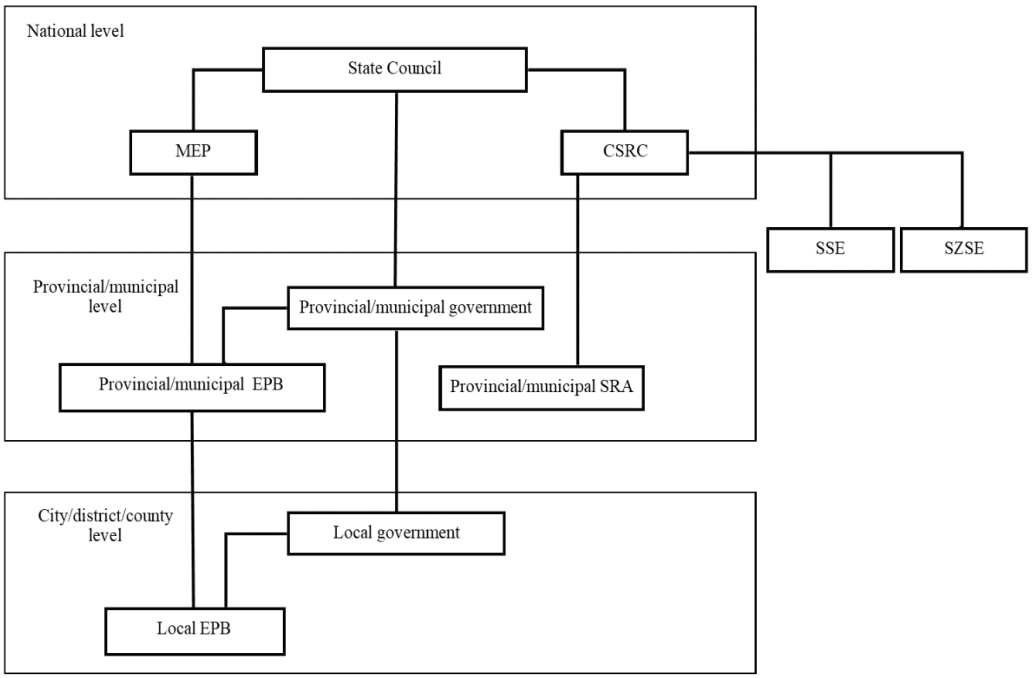
Institutional pressures may drive firms to pursue decoupling strategies in certain circumstances (Boxenbaum, & Jonsson, 2017). To secure legitimacy, firms may enact decoupling practices to respond to stakeholders' demands in a symbolic manner (Oliver, 1991; Okhmatovskiy & David, 2012). Research on decoupling has found that a firm normally pursues a symbolic strategy when it is not scrutinised (Zajac and Westphal 2004). In this regard, a combination of (a) a firm's administrative location, (b) regional law enforcement, and (c) the Chinese communist party embeddedness, reflects the extent of governmental monitoring to which a firm is exposed (Wang et al., 2018; Yu, Zhang, & Bi, 2019).

In China, a firm's "administrative location" is significantly associated with the level of governmental monitoring (Chang & Wu, 2014; Luo, Wang, & Zhang, 2017). Figure 3.2 depicts the administrative structure for environmental reporting for Chinese listed companies. There are three basic levels in the hierarchy: national, provincial or municipal, and city/district/county levels.[32] The top-down hierarchical structure demonstrates the control or collaborative relationships between government agencies. The State Council is constitutionally synonymous with the Chinese central government. Both the MEP and the CSRC are directly controlled by the State Council and have a collaborative relationship with respect to environmental reporting governance. The CSRC's immediate subordinates known as Securities Regulatory Authorities (SRAs), are mainly located in provincial capitals, and municipalities. The SRAs supervise listed companies within their precincts to ensure their compliance with securities laws and regulations, for example, observance of the reporting regulations. The SRAs are also responsible for cooperating with regional governments to address governance issues in the securities markets, though they are directly controlled by the CSRC only.

Figure 3.2 The administrative hierarchy of corporate environmental reporting for Chinese listed companies

[32] In China, there are four municipalities that are directly governed by the central government: Beijing, Shanghai, Tianjin, and Chongqing. These cities are categorised in the provincial administrative hierarchy.

Figure 3. 2 The administrative hierarchy of corporate environmental reporting for Chinese listed companies



The MEP stands for the Ministry of Environmental Protection. The CSRC denotes the China Securities Regulatory Commission. The EPB stands for the Environmental Protection Bureau - a subordinate of the MEP but controlled by the local government. The SRA represents the Securities Regulatory Authority - a subordinate of the CSRC.

Adapted from Wang et al. (2018)

A Chinese listed company is subject to supervision by both the CSRC and the MEP for environmental reporting. The CSRC regulations require a listed company that has caused serious environmental damage to immediately notify the public. The MEP requires that heavy polluters in certain industries (e.g., metal and chemical etc.) make compulsory disclosures. Working with the CSRC, the MEP has issued environmental reporting guidelines for listed companies (see Appendix B1). If a firm breaks environmental laws or regulations, the MEP issues an enforcement note to the firm and then requires the regional EPB on duty to complete the enforcement. Of note, the EPBs are primarily controlled by local governments, therefore, they have to follow the instructions of local governments. As a result, the MEP exercises its power by working with local governments and the CSRC.

A firm's "administrative location" captures the hierarchy of governmental agencies in the administrative system that oversee that firm. Specifically, if a firm's head office is geographically located in provincial capitals or municipalities, its environmental reporting is under the monitoring of both the provincial (or municipal) government and the SRA. Being close to governmental actors in higher administrative hierarchies exposes a firm to direct scrutiny from more diverse and senior governmental actors. Thus, the "administrative location" is a key factor that reflects the level and type of political monitoring.

In addition, prior research has suggested that in China, firms' environmental reporting and practices vary across regions (Du et al., 2016). The level of regional law enforcement is the major coercive force imposed by regional governments to drive corporate environmental practice (Marquis, Zhang, & Zhou, 2011). Specifically, it is the EPBs who enforce the MEP's notes on behalf of regional governments. Thus, "regional law enforcement" also contributes to the degree of "political monitoring".

In China, the leadership of the Communist Party of China (CPC) is a crucial formal institution in organisational governance (He & Ma, 2018). The Chinese constitution has highlighted the CPC's leadership in China's political life and economic construction. Chinese company law requires a company to set up a party organisation if it has more than three employees who are formal party members. The role of the party organisation is to ensure that the firm's goals and operations are in line with the CPC's objectives, the basis on which the central government formulates laws and policies. Members of a party organisation are subject to the supervision of the firm's superior party committee and Commission for Discipline Inspection (CDI). If a party member is found in breach of the party disciplines other than laws, this person may be subject to disciplinary actions such as a warning and stay on probation, otherwise, this member will be expelled from the party and then transferred to the judiciary. Given executives in many Chinese listed companies are party members, the framework includes the concept of "party embeddedness" as a component of "political monitoring" that reflects the extent to which the party members in a firm, particularly those who hold senior positions, exercise their political leadership to shape the firm's environmental activities.

Political monitoring likely has moderating effects on the relationship between corporate ownership and substantive reporting. More discussion on this issue is presented in the section on hypothesis development.

2.6 Company characteristics

Research has identified several company characteristics that impact a firm's act of reporting and reporting behaviour: firm size, financial status, industry, media coverage, and strategic attitude. Large firms are more likely to disclose more environmental information as they are subject to higher levels of public scrutiny (Brammer & Pavelin, 2006; Zeng et al., 2011; Wegener et al., 2013). Firms in different industries have different environmental reporting behaviours (Stanny & Ely, 2008). In addition, firms subject to higher levels of media exposure tend to follow environmental norms (Patten, 2002a; Du et al., 2015); and perceived mimetic pressures from industry peers may lead a firm to follow their practices (Dacin, 1997; Liu et al., 2010).

The CSR literature also suggests that a firm's strategic attitude towards environmental and social responsibility reflects the firm's environmental efforts (Glennie & Lodhia, 2013; Alrazi, de Villiers, & Van Staden, 2015). Porter and Van der Linde (1995) argue that a good corporate environmental strategy can strengthen a company's profitability and competitiveness. This factor thereby influences a firm's act of reporting and environmental practice. Moreover, firms that are more willing to be strategically involved in CER activities are more likely to pursue better environmental reporting and practice (Qin et al., 2019). Accordingly, "strategic attitude" is also included in the component of company characteristics.

3. Hypothesis development

3.1 Corporate ownership, political connection, and firms' acts of reporting

According to Schuler and Rehbein (1997), governmental activities such as regulation and taxation, have critical impacts on firms' daily operations. In order to reduce uncertainty and maintain legitimacy with the government, firms embrace political strategies to manage their relationships with governmental agencies (Hillman, Zardkoohi, & Bierman, 1999). Research on corporate political strategies has found that in western countries, firms closely connected with the government tend to strategically engage themselves in political activities, for example, lobbying and testimony on crucial issues (Bonardi, Hillman, & Keim, 2005). Other firms, however, simply prefer compliance with regulations (Oliver & Holzinger, 2008), for example, environmental and social reporting, as their strategy to sustain political legitimacy (Deegan, 2006; Marquis et al., 2016). In the context of transitional economies where the institutional infrastructure is rudimentary

and law enforcement is weak, a firm may suffer from a lack of information transparency and sometimes not really know how to interpret or follow the government's regulations and guidelines (Peng & Heath, 1996; Marquis et al., 2011). Thus, the personal networks of executives in a firm are generally valued as the key to mediating the firm's relationships with various governmental agencies (Wang & Qian, 2011). Research has also found that these political ties have different impacts on a firm's need for legitimacy, depending on the firm's ownership type (Marquis & Qian, 2014). Further, driven by legitimacy needs, the political connections of executives may either strengthen or weaken the impact of corporate ownership on a firm's environmental activities (Tang, 2017).

According to Hillman (2005), firms reduce uncertainty and risks through political connections, whereby they can increase the levels of legitimacy, information, and other resources. In China, political connections exist in many firms. For example, an executive of a firm may be a government official (Ma & Parish, 2006). The political network cultivated by corporate executives may lead firms to rent-seeking (Chen et al., 2017), which helps firms appear legitimate in the eyes of the government. In this regard, a firm's political connections may drive the firm to disclose environmental information. Yet, these connections can also buffer the firm from the need to disclose sensitive information that exposes the firm to more scrutiny from the government.

An SOE is born with political connections (Firth, Fung, & Rui, 2007); its legitimacy is inherently granted by its state ownership. Compared with private firms, SOEs are granted much higher levels of political legitimacy and hence inherently enjoy favourable status and business resources (Ma & Parish, 2006). Therefore, SOEs have lower levels of legitimacy pressures and less need than private firms to be engaged in activities such as environmental reporting in order to acquire resources from the government. However, they may disclose environmental information under the coercive pressure imposed by their government owners, as they are vehicles for the government to achieve socio-political objectives (Li et al., 2013; Xiao, Wang, & Li, 2015; 2016).

In contrast, Chinese private firms used to have lower social status than SOEs (Hong, 2004) and thus lower legitimacy positions in the economy and society. As a result, driven by legitimacy motivations, they are likely to act in alignment with the government requirements, for example, to disclose environmental information which might or might not be substantive. In parallel, they invest a lot of effort into cultivating their relationships with the government, where political connections comprise a proportion of their political

expenses (Li & Zhang, 2007). Compared with SOEs, private firms appear to experience more difficulties in maintaining political connections. Therefore, these connections are valued higher in private firms and thus they will shape these firms' decision-making on environmental reporting. In this regard, the following hypothesis was developed regarding the effect of political connections:

HYPOTHESIS 1 (H1) *A firm's political connections have a moderating effect on the relationship between its ownership and the likelihood of environmental reporting.*

3.2 Political monitoring and reporting behaviour

A firm's quality of environmental reporting may vary with the levels of monitoring from different government agencies. A firm may employ a decoupling reporting strategy to maintain both internal efficiency and political legitimacy without truly abiding by government requirements for reporting (Boxenbaum, & Jonsson, 2017). In this regard, such a firm has to avoid close monitoring from the government and other stakeholders, otherwise, it could be penalised due to its deceptive behaviour. This phenomenon is known as "decoupling risk".

The literature on decoupling suggests that generally, stakeholders do not inspect whether a firm substantively carries out the goals it has announced (Zajac and Westphal 2004). Therefore, firms are not much concerned with the consequences of the decoupling being exposed. However, research on greenwashing in western economies has found that decoupling behaviour towards environmental reporting is very risky once it is exposed, given the significant punishments from stakeholders that can occur (Lyon & Maxwell, 2011). In the Chinese context, research has found evidence of decoupling between the environmental regulation and enforcement. However, this gap is getting much narrower along with the increasing levels of top-down monitoring in China's bureaucratic systems since 2006 (Marquis et al, 2011). Therefore, the level of decoupling risk perceived by a firm is likely to be an important factor that affects the firm's environmental reporting strategy.

Compared with SOEs that are inherently supported by the government, private firms make more efforts to maintain their legitimacy, for example, to avoid any risks that threaten their political legitimacy positions. In fact, private firms are less willing than SOEs to pursue substantive reporting as most environmental information has negative effects, which may result in additional monitoring from governmental agencies (De

Villiers & Van Staden, 2006). However, when these firms are exposed to high levels of monitoring, they may perceive high degrees of decoupling risk leading them to penalties and financing issues. In this regard, they are more likely to comply with government requirements for substantive environmental reporting. Therefore, Hypothesis 2 (H2) proposes that political monitoring can influence the effect of corporate ownership on the substantiveness of the firm's environmental reporting (listed at the end of this section). Based on the framework, three types of monitoring forces are identified as follows.

Administrative location. This term refers to whether a firm is geographically located in a provincial capital or a municipality where both the provincial government and Securities Regulatory Authority (SRA) are located. Accordingly, firms in a provincial capital or a municipality are subject to monitoring from multiple government agencies and thus they are expected to report more substantive information. Given that private firms have higher levels of legitimacy motivation than SOEs, they are more likely to employ a substantive reporting strategy when they are subject to more scrutiny. Hence, a firm's ownership effect on substantive reporting is likely to be moderated by the firm's administrative location.

Regional law enforcement. Since the fiscal reforms started in the late 1980s, Chinese regional governments have been empowered with certain rights to develop their local economy (Walder, 1995). In areas with high levels of law enforcement, regional governments are more capable of supervising business activities within their jurisdiction (Du et al., 2016). Thus, driven by the need for political legitimacy, private firms are more likely to employ a substantive reporting strategy if they are in an area with high levels of law enforcement.

Party embeddedness. As a formal institution of corporate governance in China, the CPC party embeddedness in an SOE is crucial to ensure the firm behaves in alignment with the party's objectives (Chen & Lu, 2014). In private firms, however, the average level of party embeddedness remained limited until the end of 2014. Since then, more private firms have set up party organisations and appointed CPC party members as their senior management members (Yu et al., 2019), who in turn influence firms' decision-making and organisational behaviour (He et al., 2018). Given these members are subject to strict monitoring from superior party committees or CDI, it is reasonable to contend that the CPC party leadership can restrain the behaviour of these members and in turn shape their firms' political strategies and activities. Accordingly, compared with others, firms with

party embeddedness are subject to higher levels of monitoring from the superior party committees and paired governments. Hence, they are more likely to engage in substantive environmental activities. This is particularly the case for private firms that perceive high levels of legitimacy pressures.

The hypotheses about the effects of political monitoring are outlined as follows:

HYPOTHESIS 2 (H2) *The political monitoring of a firm has a moderating effect on the relationship between the firm's ownership and environmental reporting substantiveness.*

HYPOTHESIS 2a (H2a) *A firm's administrative location has a moderating effect on the relationship between the firm's ownership and environmental reporting substantiveness.*

HYPOTHESIS 2b (H2b) *A firm's regional law enforcement level has a moderating effect on the relationship between the firm's ownership and environmental reporting substantiveness.*

HYPOTHESIS 2c (H2c) *A firm's party embeddedness has a moderating effect on the relationship between the firm's ownership and environmental reporting substantiveness.*

4. Research design

4.1 Samples

Two samples were used to separately examine the environmental reporting likelihood and substantiveness. To identify the behaviour of decoupling at the firm level, corporate environmental performance data are necessary for comparisons and modelling given that corporate environmental performance is the outcome of a firm's strategic attitude towards corporate environmental responsibility. The CSR Capability Maturity Index (CSRCMI) is an ideal source to reflect this outcome.[33] Hence, the samples were constrained by the

[33] This article focuses on corporate strategies that help firms to achieve legitimacy with stakeholders. Therefore, the measurement for environmental performance should incorporate strategic concerns. In this regard, compared with other sustainable assessment systems such as LEED and BREEAMS, maturity models better integrate business strategic goals to reflect business CSR performance in terms of multiple dimensions (Goh, 2014). The data reviews on other CSR data sources in China, such as Hexun CSR index database and Chinese Corporate Social Responsibilities database (CCSR), suggest that some firms' environmental performance data are incomplete. For example, some firms' environmental performance indices are not annually disclosed on the Hexun website. Some disclosures in the CCSR database are inconsistent with those in CSR reports. In this regard, the level-1 index of CSRCMI, namely "ability of generating environmental value", was adopted to measure corporate environmental performance. This index incorporates the following indicators: environmental management, emission reduction, resource sustainability, climate change practice, and ecological protection (Xiao, Wang, & Li, 2015; 2016).

availability of the CSRCMI index, which was available for the top 50 largest Chinese listed companies in each of the fifteen major industries in 2014 and for all the listed companies in 2015.[34] As a result, the test period is restricted to the period from 2014 to 2015, during which the government released intense regulations for environmental reporting.

Each sample firm was selected based on the following criteria: the firm had complete data for each model variable during the test period; it was not a specially treated company suffering continuous financial loss, and it was subject to compulsory CSR reporting according to the regulations of the CSRC and stock exchanges. [35]

Using these criteria two samples were created. The first consisted of 306 listed firms selected from the Chinese A-share trading markets. A pooled data set was formed with a total of 612 firm-years for 2014 and 2015. This sample was used to test for environmental reporting likelihood. For the second sample, firms that did not disclose were removed, resulting in a new sample comprised of 526 firm-years (263 firms). This sample was used to test for reporting substantiveness.

This research focuses on environmental disclosures only in CSR reports. Some Data (e.g., whether or not a required discloser by the MEP) were manually collected from the CSR reports that were publicly accessible on the exchanges' websites. Also, corporate environmental performance data were collected from the official CSRCMI reports (Xiao et al., 2015; 2016). Data for company characteristics, the background of corporate senior members, media coverage, corporate financial data and numeric environmental disclosures in CSR reports, were collected from the China Stock Market and Accounting Research (CSMAR) database. Regional law enforcement indices were collected from the annual reports of China's regional marketisation indices (Wang et al., 2018a).[36]

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[34] These industries are Energy, Metals, Chemicals, Utility, Finance, Real estate, Machinery, Automobile, Construction, Transportation, Electric and Information Technology, Textile, Food, Pharmaceuticals, and Electronic equipment (Xiao, Wang, & Li, 2015; 2016). Since 2014, the annual CSRCMI data have been produced but only the printed reports are available in the Chinese book market 1-2 years later from the target year of CSR performance. Because it is very time-consuming to match the CSRCMI data with those in the CSMAR database due to the significant difference of data structure, only two years' CSRCMI data for 2014 and 2015 were collected and handled.

[35] Some listed companies subject to compulsory CSR reporting elect not to report given the light punishment and weak enforcement regarding CSR reporting in China (Wang, 2015). This paper does not consider voluntary CSR reporters because they might selectively disclose CSR information; this may result in the endogeneity concern of sample selection bias.

[36] The regional marketisation indices measure "the quality of market-supporting institutions at the provincial level" (Li, Meng, & Zhang, 2006, p.567). They are regularly calculated by Chinese economists in terms of five dimensions: government-market relations, development of the non-state enterprise sector,

4.2 Measures

Based on the framework (Figure 3.1), several regression models were constructed to test environmental reporting likelihood and substantiveness. The major variables are described as follows.

4.2.1 Dependent variables

This study focuses on how the factors identified in the framework would impact (a) the likelihood for a firm to disclose environmental information and (b) the substantiveness of environmental reporting. *Environmental report* is a dummy variable equal to 1 if the related firm has disclosed environmental information in the corresponding year and 0 otherwise.

Environmental reporting substantiveness measures how substantive the environmental activities are for a firm as depicted in its environmental disclosures. A large number of studies suggest that a firm's environmental disclosures tend to show favourable aspects for the firm through textual information (Guthrie & Parker, 1990; Deegan & Gordon, 1996). These disclosures are more likely to be subjective therefore they may be unable to effectively reflect the substantiveness and objectivity of an environmental report. In contrast, numeric or graphical disclosures are more likely to be objective (Wan, 2011). Further, compared with textual disclosures, numeric environmental information is more difficult to fabricate or manipulate. In this regard, it can more accurately represent the substantiveness of an environmental report (Freedman, Jaggi, & Stagliano, 2004; Meng, Zeng, & Tam, 2013; Van der Laan Smith, Adhikari, & Tondkar, 2005; Wiseman, 1982; Zeng et al., 2010). Accordingly, *environmental reporting substantiveness* is measured by the number of numeric environmental disclosures recorded in the CSMAR database that captures corporate numeric disclosures of environmental projects, rewards and certificates using data-mining techniques.[37] These records are grouped under the content type namely "environmental sustainability". The number of disclosures was log-transformed.[38]

development of the commodity market, development of factor markets and intermediate or legal framework. Regional law enforcement index is a subindex of the intermediate or legal framework.

[37] The introduction to the data structure and data collection procedures are detailed on the CSMAR web page for the CSR data downloads. A data review suggested that environmental disclosures in the database generally include numbers.

[38] "Using the logarithm of one or more variables instead of the un-logged form makes the effective relationship non-linear, while still preserving the linear model." (Benoit, 2011)

4.2.2 Independent variables

Two sets of independent variables were identified to test the hypotheses. For the analysis of the likelihood of corporate environmental disclosure, the following independent variables were included: *Private ownership* is a dummy variable equal to 1 if the firm was ultimately controlled by private shareholders, and 0 otherwise. To measure a firm's political connection, this research considers its CEO's political network given the importance of a CEO's role in business management (Li et al., 2006). *CEO's political connection* is a dummy variable equal to 1 if the CEO held a position in governmental agencies just prior to the appointment as CEO or during the tenure of the CEO position, and 0 otherwise (Fan, Wong, & Zhang, 2007; Li et al., 2006). The CEOs' background data were collected from the CSMAR database.

To analyse the effects of political monitoring on reporting substantiveness, several independent variables were selected as follows: *administrative location* is a dummy variable equal to 1 if the firm is located in a capital city of a province or a municipality, or Shenzhen city, 0 otherwise.[39] Of note, *administrative location* reflects the combined impact of both the CSRC (via SRAs and stock exchanges) and regional government. *Regional law enforcement* is a sub-index of the marketisation index, representing the level of law enforcement in a province or municipality.[40]

To reflect the party's impact on organisational behaviours, a dummy variable was introduced, namely, *party embedded.* It is equal to 1 if a member of a firm's senior group held a position in the party organisation (i.e., party committee or CDI), and 0 otherwise.[41] This is because it is likely that only when a senior member holds a position in the party system will the party's leadership and supervisory function be effectively exercised throughout the firm.

4.2.3 Control variables

Based on the environmental reporting literature, several control variables were also included as follows.

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[39] Shenzhen is not a municipality, but it is the city where the Shenzhen stock exchange is located, and the SRA also operates in Shenzhen. Listed companies in Shenzhen, are subject to close monitoring from the exchange and SRA.

[40] Law enforcement index is calculated based on company leaders' evaluations of the quality of local law enforcement agencies. Since 2003, these data are regularly collected from approximate 4,000 firm-level surveys (Wang, Fan, & Zhu, 2007).

[41] The senior group is comprised of the board of directors, board of supervisors and senior management team.

Environmental performance. A firm's environmental performance is the outcome of the firm's environmental efforts. Thus, it is associated with the firm's strategic attitude regarding CER practice. The proposed framework in Figure 3.1 shows that a firm's strategic attitude towards CER may positively influence the firm's act of environmental reporting and reporting substantiveness. In this regard, the variable of *environmental performance* is included, which equals the "ability to generate environmental value", a sub-index of the CSR Capability Maturity Index to reflect the outcome of a firm's environmental strategic attitude. This index is constructed by several indicators, including environmental management, emission reduction, resource sustainability, climate-change practice and ecological protection (Xiao et al., 2015; 2016).[42]

The MEP regulates firms in heavily polluting industries to disclose environmental information.[43] To control the possible variations of firms' environmental reporting likelihood and substantiveness between the compulsory and voluntary environmental reporters required by the MEP, a dummy variable *required discloser* was included, equal to 1 if in the firm-year the annual report stated that the firm was in the MEP's list, and 0 otherwise.

Firm size was measured by a log-transformed value of a firm's total assets. Firm financial status was reflected by firm *ROA*, *slack,* and *LEV* (Seifert, Morris, and Bartkus, 2004; Chen, Hung, & Wang, 2018). *ROA* refers to the return on assets; *slack* is the sum of cash flows from operating, financing, and investing activities, scaled by total assets (Carow, Heron, & Saxton, 2004); *LEV* is the ratio of total debts over total assets. To adjust the lag effect of financial data, the prior year's data were applied for *firm size, ROA, slack,* and *LEV*.

The probable time effect was controlled using the *year* dummy variable (1 for 2014 and 0 for 2015). Moreover, any differences between firms listed on the Shanghai and

[42] To further verify that using CSRCMI was a valid way to reflect a firm's environmental performance, a thorough review was conducted regarding corporate environmental activities of the top three and bottom three ranked environmentally sensitive firms. All the data were collected from company websites and CSR reports. The findings suggest that best performers generally have an environmental management system (ISO14001-GBT/24001-2004) in place and they presented improved environmental performance in their CSR reports by disclosing numeric details. In contrast, the poorest performers have normally been penalised by the MEP due to their violation of environmental regulations. They rarely disclose negative environmental information in their reports unless they are forced to do so. Accordingly, the CSRCMI data are a valid representation of corporate environmental management level and performance.

[43] A firm subject to compulsory CSR reporting regulated by its stock exchange is not necessarily a required environmental reporter by the MEP. If a firm is not in an environmentally sensitive industry, it is not in the MEP's watch list.

Shenzhen stock exchanges were also considered by including a dummy variable *stock exchange* that equals 1 if the firm was listed on Shenzhen Stock Exchange, and 0 if it was listed on Shanghai Stock Exchange.

There is significant variation in the extent of environmental reporting across industries. To control for industry differences for the relatively small samples used in this paper, this research followed the approach of Shen and Feng (2012) and grouped the 64 industries in the samples into eight combined categories: energy, biotechnology and pharmaceuticals, chemicals and rubber, textile and clothing, mining, metal and non-metal materials, food and beverage, and Others. However, a data review revealed that the textile and clothing firms contribute less than 2% of both the reporting likelihood and substantiveness samples thus these firms are unlikely to make any significant difference to the industry effect on dependent variables. To reduce the number of model variables for small samples, textile and clothing firms were categorised into the Others category. In this regard, six dummy variables *industry1-6* were introduced to represent seven combined industries. [44] Of note, in order to compare and control the variations of firm environmental reporting between environmentally sensitive industries, all the non-environmentally sensitive industries were grouped into the Others category, which functions as a reference for comparison.

The variable *media coverage* was included to control the level of media attention. It equals the log form of the number of news articles that were recorded in the CSMAR database; these articles were collected from the most prevalent media sources such as *the People's Daily*, *Shanghai Securities News* and *Financial Times*. The number was log-transformed.

It is possible that in a region with more SOEs, the regional government may formulate policies that are more favourable to SOEs. Driven by the motivation to narrow the legitimacy status gap with their SOE peers, private firms may pursue similar political strategies as the SOEs. For example, if most SOEs in the region comply with environmental reporting regulations, private firms are likely to follow the reporting practice. Thus, the *number of SOEs in region* (i.e., province) was included to control the

[44] The values (0 or 1) of six dummy variables in the sequence of industries1-6, denote seven industries as follows: 000000, others; 100000, energy; 010000, biotechnology and pharmaceuticals; 001000, chemicals and rubber; 000100, mining; 000010, metal and non-metal materials; 000001, food and beverage.

peer effect of the SOEs. The number of SOEs in each region was collected from the CSMAR database and then log-transformed.

Model variables for the tests of reporting likelihood and reporting substantiveness are respectively described in part 1 and part 2 of Table 3.1.

Table 3. 1 Variables (part 1) for reporting likelihood test

Variables for reporting likelihood test		
Type	**Variable Name**	**Description**
DV	Environmental disclosures reported	Yes=1; No=0
IVs	Private ownership	Yes=1; No=0
	Political connection	Yes=1; No=0
CVs	Environmental performance	Extracted from Xiao et al. (2016), log-transformed
	Required discloser	Required by the MEP=1, 0 otherwise
	Firm size (t-1)	Total assets in last year, log-transformed
	ROA (t-1)	The ratio of net income over total assets in last year
	Slack (t-1)	The sum of cash flows from operating, financing and investing activities, scaled by total assets, last year's data
	LEV(t-1)	The ratio of total debts over total assets
	Year	2014=1; 2015=0
	Stock exchange	Shenzhen=1; Shanghai=0
	Industries1-6	Dummy variables (0/1). 000000, others 100000, energy 010000, biotechnology and pharmaceuticals 001000, chemicals and rubber 000100, mining 000010, metal and non-metal materials 000001, food and beverage.
	Media coverage	Number of news pieces from major media sources, log-transformed
	SOEs in region	Number of SOEs in the region where the firm is located, log-transformed
	Administrative location	Operating in provincial or municipal capital =1, 0 otherwise
	Regional law enforcement	Extract from Wang et al.(2018a)
	Party embedded	Yes=1; No=0

Note: DV, IVs, and CVs respectively stand for dependent variables, independent variables and control variables.

Table 3. 1 Variables (part 2) for reporting substantiveness test

Variables for reporting substantiveness test		
Type	**Variable Name**	**Description**
DV	Substantiveness	Number of numeric disclosures (CSMAR data)
IVs	Private ownership	Yes=1; No=0
	Administrative location	Operating in provincial/municipal capital =1, 0 otherwise
	Regional law enforcement	Extract from Wang et al.(2018a)
	Party embedded	Yes=1; No=0
CVs	Environmental performance	Extracted from Xiao et al. (2016), log-transformed
	Required discloser	Required by the MEP=1, 0 otherwise
	Firm size (t-1)	Total assets in last year, log-transformed
	ROA (t-1)	The ratio of net income over total assets in last year
	Slack (t-1)	The sum of cash flows from operating, financing and investing activities, scaled by total assets, last year data
	LEV(t-1)	The ratio of total debts over total assets
	Year	2014=1; 2015=0
	Stock exchange	Shenzhen=1; Shanghai=0
	Industries1-6	Dummy variables (0/1). 000000, others 100000, energy 010000, biotechnology and pharmaceuticals 001000, chemicals and rubber 000100, mining 000010, metal and non-metal materials 000001, food and beverage.
	Media coverage	Number of news pieces from major media sources, log-transformed
	SOEs in region	Number of SOEs in the region where the firm is located, log-transformed
	Political connection	Yes=1; No=0

Note: DV, IVs, and CVs respectively stand for dependent variables, independent variables and control variables.

4.3 Estimation method

A logit regression model was employed to examine the likelihood of a firm disclosing environmental information. Several ordinary least squares (OLS) regressions were developed to examine the substantiveness of corporate environmental reporting.

To correct for cross-sectional and time-series dependence in residuals from estimating the regression models, standard errors were clustered by firm and by year (Gow, Ormazabal, & Taylor, 2010). Because the samples contain only two time clusters, a bootstrapping approach was applied to overcome the small cluster concern, that is, cluster-robust methods can over-reject a true null when the number of clusters is small (Cameron, Gelbach, & Miller, 2008). Following Barth et al. (2017), the cluster-robust approach was applied based on bootstrapping 10,000 iterations.

5. Results

5.1 Sample distribution, descriptive statistics and correlations

The CER reporting literature suggests that corporate environmental reporting behaviour is significantly associated with the industry, therefore, Table 3.2 details the distribution of the firms by year and industry in both the reporting likelihood and substantiveness samples. In each sample, the number of firms was equally divided between 2014 and 2015. The firm-year observations were distributed among seven combined industry categories including six environmentally sensitive industries and an Others industry that combines all non-environmentally sensitive industries and the textile and clothing industry.[45] It shows that around 56% of the companies in each sample were in non-environmentally sensitive industries. The metal and non-metal industry was the second largest group, comprising 11.44% (11.22%) firm-years in the reporting likelihood sample (the substantiveness sample), followed by Energy and Mining. In contrast, the Food and Beverage industry was the smallest category containing 3.92% (3.8%) firm-years in the reporting likelihood sample (the substantiveness sample).

Of note, regarding the "others" category, the number of firm-years in the reporting likelihood sample was 55 more than in the substantiveness sample. This means that 55 firms disclosed environmental information that was not substantive, indicating the existence of symbolic reporting in non-environmentally sensitive industries.

[45] The number of textile and clothing firms contribute less than 2% of both samples thus they do not have a significant effect on the statistical results. To reduce the number of model variables for small samples, textile and clothing firms were categorised into the Others category.

Table 3. 2 Sample description: distribution by year and industry

	Reporting likelihood		Substantiveness	
Year	**Firms**	**%**	**Firms**	**%**
2014	306	50%	263	50%
2015	306	50%	263	50%
Total	*612*	*100*	*526*	*100*
Industry	**Firm-years**	**%**	**Firm-years**	**%**
Energy	52	8.5%	44	8.37%
Biotechnology and Pharmaceuticals	34	5.56%	32	6.08%
Chemical	34	5.56%	32	6.08%
Mining	42	6.86%	39	7.41%
Metal and Non-metal	70	11.44%	59	11.22%
Food and Beverage	24	3.92%	20	3.8%
Others	348	58.17%	293	57.03%
Total	*612*	*100*	*526*	*100*

Table 3.3 illustrates the descriptive statistics of model variables and their correlations for the sample of reporting likelihood, and Table 3.4 for the sample of reporting substantiveness. In the sample for the reporting likelihood test, 86% of firms disclosed environmental information; 25% (mean of private ownership) were privately controlled.[46] In the sample for the substantiveness test, 24% (mean of private ownership) were private firms. The mean score of environmental reporting substantiveness was 1.517 (logarithm), equivalent to approximate 9 disclosure items. The standard deviation was 1.223 (the standard deviation of the number of disclosures was 42), which suggests a wide range of reporting substantiveness in the sample. In this regard, this sample includes firms across the various levels of corporate environmental reporting in China.

The correlation statistics show the existence of significant inter-correlations among the variables; therefore, the potential multicollinearity was examined for each model. All the variance inflation factors (VIFs) were less than 10 (Myers, 1990) and all the tolerance levels were more than 0.2 (Menard, 1995). Thus, the potential multicollinearity does not appear to be an issue.

[46] In this article, all the sample firms are subject to compulsory CSR reporting and have issued stand-alone CSR reports, but as noted previously some firms subject to compulsory requirements choose not to comply.

Table 3. 3 Descriptive statistics and correlations (Pearson) for the reporting likelihood sample (part 1)

Environmental reporting likelihood N=612											
Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. *Environmental reporting*	0.860	0.348									
2. *Environmental performance*	3.001	1.062	0.478								
3. *Required discloser*	0.190	0.390	0.109	0.218							
4. *Firm size (t-1)*	14.75	1.558	0.239	0.253							
5. *Firm ROA (t-1)*	0.044	0.054			-0.083	-0.244					
6. *Slack (t-1)*	0.008	0.060		-0.103							
7. *Firm LEV (t-1)*	0.554	0.198	0.082			0.592	-0.551				
8. *Year*	0.500	0.500		-0.090				-0.141			
9. *Stock exchange*	0.360	0.479	-0.259		-0.093	-0.251			-0.145		
10.*Industry1*	0.085	0.279		0.081	0.080						
11.*Industry2*	0.056	0.229		0.103	0.140	-0.154	0.279		-0.265		
12.*Industry3*	0.056	0.229		0.089	0.104	-0.101					
13.*Industry4*	0.069	0.253		0.141	0.235	0.100	-0.113				
14.*Industry5*	0.114	0.319		0.146	0.356		-0.164				0.097
15.*Industry6*	0.039	0.194		-0.130		-0.164			-0.120		
16.*Media coverage*	4.355	0.272	0.093	0.107		0.530		0.082	0.236		-0.113
17.*SOEs in region*	6.629	0.338	-0.011				0.138				
18.*Administrative location*	0.590	0.493	0.053			0.298	-0.127		0.186		-0.182
19.*Regional law enforcement*	7.589	1.988	0.042		-0.136	0.194	0.155				-0.201
20.*Party embedded*	0.100	0.306	-0.015			0.113					
21.*Private ownership*	0.250	0.434	-.091*	-0.148		-0.299	0.261		-0.195		0.182
22.*Political connection*	0.180	0.383	0.053		-0.091						

Note: only significant correlations are reported at p<0.05 (2-tailed)

Table 3.3 Descriptive statistics and correlations (Pearson) for the reporting likelihood sample (part 2)

			Environmental reporting likelihood (continue) N=612										
Variable	Mean	S.D.	10	11	12	13	14	15	16	17	18	19	20
1. *Environmental reporting*	0.860	0.348											
2. *Environmental performance*	3.001	1.062											
3. *Required discloser*	0.190	0.390											
4. *Firm size (t-1)*	14.76	1.558											
5. *Firm ROA (t-1)*	0.044	0.054											
6. *Slack (t-1)*	0.008	0.060											
7. *Firm LEV (t-1)*	0.554	0.198											
8. *Year*	0.500	0.500											
9. *Stock exchange*	0.360	0.479											
10.*Industry1*	0.085	0.279											
11.*Industry2*	0.056	0.229											
12.*Industry3*	0.056	0.229											
13.*Industry4*	0.069	0.253	-0.083										
14.*Industry5*	0.114	0.319	-0.11	-0.087		-0.098							
15.*Industry6*	0.039	0.194											
16.*Media coverage*	4.355	0.272	-0.126		-0.087								
17.*SOEs in region*	6.629	0.338					-0.098	-0.163					
18.*Administrative location*	0.590	0.493	0.112	-0.116					0.112	-0.083			
19.*Regional law enforcement*	7.589	1.988				-0.089	-0.218	-0.16	0.192	0.138	0.165		
20.*Party embedded*	0.100	0.306		-0.083	-0.145						0.188		
21.*Private ownership*	0.250	0.434	-0.123	0.188	-0.192	-0.157		0.154			-0.525		-0.161
22.*Political connection*	0.180	0.383	-0.111	0.111			-0.14					0.085	

Note: only significant correlations are reported at p<0.05 (2-tailed)

Table 3. 4 Descriptive statistics and correlations (Pearson) for the reporting substantiveness sample (part 1)

Environmental reporting substantiveness N=526											
Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. *Substantiveness*	1.517	1.223									
2. *Environmental performance*	3.207	0.805	0.413								
3. *Required discloser*	0.200	0.403	0.185	0.169							
4. *Firm size (t-1)*	14.90	1.559	0.377	0.166							
5. *ROA (t-1)*	0.044	0.056	-0.119			-0.25					
6. *Slack (t-1)*	0.007	0.055		-0.092							
7. *LEV (t-1)*	0.560	0.197	0.138			0.578	-0.557				
8. *Year*	0.500	0.500						-0.137			
9. *Stock exchange*	0.310	0.461	-0.11		-0.1	-0.226	0.097		-0.157		
10.*Industry1*	0.084	0.277	0.218		0.103						
11.*Industry2*	0.061	0.239		0.092	0.148	-0.176	0.285	0.096	-0.294		
12.*Industry3*	0.061	0.239			0.108	-0.112					
13.*Industry4*	0.074	0.262	0.141	0.155	0.254	0.093	-0.133				
14.*Industry5*	0.112	0.316		0.105	0.314		-0.171	-0.089			
15.*Industry6*	0.038	0.191	-0.09	-0.173		-0.156			-0.126		
16.*Media coverage*	4.365	0.288	0.205	0.101		0.547			0.242		
17.*SOEs in region*	6.627	0.352					0.138				
18.*Administrative location*	0.600	0.491	0.164		-0.087	0.311	-0.117		0.17		-0.205
19.*Regional law enforcement*	7.622	1.969	0.126		-0.124	0.231	0.155				-0.215
20.*Party embedded*	0.100	0.304				0.153			0.112		
21.*Private ownership*	0.240	0.425	-0.294	-0.113		-0.278	0.278		-0.179		0.214
22.*Political connection*	0.190	0.390			-0.096						

Note: only significant correlations are reported at p<0.05 (2-tailed)

Table 3.4 Descriptive statistics and correlations (Pearson) for the reporting substantiveness sample (part 2)

			Environmental reporting substantiveness (continue) N=526										
Variable	Mean	S.D.	10	11	12	13	14	15	16	17	18	19	20
1. *Substantiveness*	1.517	1.223											
2. *Environmental performance*	3.207	0.805											
3. *Required discloser*	0.200	0.403											
4. *Firm size (t-1)*	14.90	1.559											
5. *ROA (t-1)*	0.044	0.056											
6. *Slack (t-1)*	0.007	0.055											
7. *LEV (t-1)*	0.560	0.197											
8. *Year*	0.500	0.500											
9. *Stock exchange*	0.310	0.461											
10.*Industry1*	0.084	0.277											
11.*Industry2*	0.061	0.239											
12.*Industry3*	0.061	0.239											
13.*Industry4*	0.074	0.262											
14.*Industry5*	0.112	0.316	-0.107	-0.09	-0.09	-0.101							
15.*Industry6*	0.038	0.191											
16.*Media coverage*	4.365	0.288	-0.13		-0.086								
17.*SOEs in region*	6.627	0.352					-0.111	-0.197					
18.*Administrative location*	0.600	0.491	0.135	-0.116	-0.181		-0.115		0.12				
19.*Regional law enforcement*	7.622	1.969	0.114		-0.196		-0.209	-0.185	0.221	0.152	0.223		
20.*Party embedded*	0.100	0.304		-0.086					0.087		0.2		
21.*Private ownership*	0.240	0.425	-0.103	0.196		-0.157		0.171			-0.514		-0.158
22.*Political connection*	0.190	0.390	-0.109				-0.139						

Note: only significant correlations are reported at p<0.05 (2-tailed)

5.2 Estimates of reporting likelihood

The results for estimating the logit regressions of the likelihood of environmental reporting are detailed in Table 3.5. As a baseline model, Model 1 analysed the main effect of private ownership on the likelihood of reporting. Model 2 tested H1 which examines the moderating effect of political connection on the ownership-reporting likelihood relationship.

Table 3. 5 Estimates of firms' likelihood of environmental reporting

Dependent variable	*Environmental reporting* (yes=1; no=0)	
	Model (1)	Model (2)
Independent variables and moderators		
Private ownership	0.178***	0.304**
	(0.045)	(0.132)
Political connection		0.544*
		(0.336)
H1: *Private ownership× Political connection*		-0.832
		(0.58)
Control variables		
Environmental performance	1.197***	1.204***
	(0.169)	(0.177)
Required discloser	0.554***	0.581***
	(0.109)	(0.125)
Firm size (t-1)	0.695***	0.678***
	(0.012)	(0.024)
ROA (t-1)	3.16***	3.044***
	(0.722)	(0.638)
Slack (t-1)	-0.064	-0.111
	(2.034)	(2.287)
LEV(t-1)	-0.844***	-0.753***
	(0.149)	(0.212)
Year	0.282**	0.284**
	(0.138)	(0.146)
Stock exchange	-1.721***	-1.704***
	(0.236)	(0.256)
Industry1	-1.267***	-1.237***
	(0.291)	(0.270)
Industry2	0.068***	0.164
	(0.011)	(0.120)
Industry3	0.141	0.164
	(0.154)	(0.186)
Industry4	-0.206	-0.160
	(0.572)	(0.576)
Industry5	-1.376***	-1.355***
	(0.09)	(0.123)
Industry6	0.687	0.735
	(0.475)	(0.467)
Media coverage	-0.481	-0.071
	(0.363)	(0.164)
SOEs in region	-0.481**	-0.144***
	(0.066)	(0.052)
Administrative location	-0.054	0.035
	(0.139)	(0.150)
Regional law enforcement	0.003	-0.012
	(0.003)	(0.012)
Party embedded	0.17	0.047
	(0.12)	(0.115)
Constant	-6.950***	-6.930***
	(1.642)	(1.438)
Observations	612	612
Pseudo R^2	0.372	0.374

*Note: standard errors are in parentheses; *p<0.1; **p<0.05; ***p<0.01(two-tailed test).*

Under Model 1, the effect of *private ownership* was positive and significant ($p<0.01$), suggesting that private firms are more likely to disclose environmental information than SOEs. This evidence is consistent with the existing findings that private firms in China exchange CSR efforts for legitimacy and resource access (Hong, 2004; Ma & Parish, 2006). Hypothesis 1 proposed that political connections would influence the effect of ownership on corporate environmental reporting. Results from Model 2 reveal that the main effect of *private ownership* was positive and significant, consistent with Model 1. In addition, the main effect of *political connection* was positive and significant ($p<0.1$), meaning that SOEs (i.e., when *private ownership* =0) with political connections are more likely to disclose environmental information than their counterparts. Untabulated results show the effect of political connection exists for both SOEs and private firms. However, the coefficient for the interaction term between *political connection* and *private ownership* on reporting likelihood was negative as expected but not significant. This provides no evidence of a moderating effect of political connection. Thus, H1 was not supported.

For the control variables, the coefficients for *environmental performance*, *required discloser*, *firm size, and ROA* were positively associated with the likelihood of reporting. These results suggest that firms with better environmental performance, required disclosers by the MEP, larger firms, or firms with better financial performance are more likely to disclose environmental information in their CSR reports, consistent with prior literature (Clarkson et al., 2008; Bi & Peng, 2013; Wegener et al., 2013). Firms with higher levels of debt (*LEV*) are less likely to disclose environmental information as this may lead to more scrutiny from banks and governmental agencies. Of note, the number of SOEs in a firm's region (*SOEs in region*) was negatively associated with the likelihood of the firm's environmental reporting. This may be because SOEs have lower levels of legitimacy pressures than private firms. In this regard, state ownership may reduce the need to disclose environmental information for legitimacy. Driven by the mimetic forces from these SOE peers in the same region, private firms are likely to follow their reporting behaviour.

Table 3.5 also shows the significant effects of certain industries on the likelihood of corporate environmental reporting. Compared with the "Others" industry group, firms in the energy industry and the metal and non-metal materials industry are less likely to disclose environmental information. In contrast, firms in the biotechnology and pharmaceuticals industry are more likely to report environmental data. This is probably

because of the institutional variation of environmental reporting across different industries in China. For example, a firm's action of environmental reporting may be driven by the mimetic force exerted by its industry peers.

The results also present a significant year effect, that is, more firms disclosed environmental information for 2014 than for 2015. This was unexpected given the historically harshest environmental protection law was introduced effective from the first day of 2015. However, given that firms issue CSR reports in the following year, in 2015 many firms may have reported environmental data for 2014 under uncertain conditions regarding the likely consequences of noncompliance with the new legislation. After one year's observation of the new regulations, in 2016, firms may have been less likely to disclose environmental information for 2015 because they had not seen any severe penalties for breaches of the new legislation. The coefficient for *Stock Exchange* is negative, meaning that firms listed in Shenzhen are less likely to disclose than in Shanghai. This result was expected given the Shanghai Stock Exchange has issued more environmental reporting guidelines compared with the Shenzhen Stock Exchange and it has a more systematic mechanism to oversee its listed companies in terms of their environmental and social reporting (Bi & Peng, 2013). The remaining control variables do not show significant results.

In summary, in the Chinese context of compulsory CSR reporting, compared with SOEs, private firms are more likely to disclose environmental data under political legitimacy pressures. Moreover, firms with political connections are more likely to report environmental information than those that do not have these connections. This is consistent with the view that a firm's political connections function as a "supporting hand" that helps the firm appear to be legitimate by disclosing environmental information. It is worth noting that such disclosure is not necessarily substantive. The interaction effect between political connection and ownership on environmental reporting was not significant, which did not support H1.

5.3 Estimates of report substantiveness

Table 3.6 illustrates the OLS regression results of environmental reporting substantiveness. Model 1 tested the main effect of private ownership on reporting substantiveness; Models 2-4 tested H2a, H2b and H2c, respectively. Model 5 included all test variables in the regression simultaneously as a robustness check.

Table 3. 6 Estimates of corporate environmental reporting substantiveness

Dependent variable	*Substantiveness*				
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Independent variables and moderators of political monitoring					
Private ownership	-0.489***	-0.720***	-0.737**	-0.534***	-1.222***
	(0.018)	(0.058)	(0.306)	(0.020)	(0.239)
Administrative location		-0.222***			-0.251***
		(0.048)			(0.062)
H2a: *Private ownership × Administrative location*		0.813***			0.994***
		(0.156)			(0.117)
Regional law enforcement			0.034*		0.045**
			(0.018)		(0.019)
H2b: *Private ownership × Regional law enforcement*			0.032		0.055
			(0.041)		(0.040)
Party embedded				-0.157***	-0.102***
				(0.051)	(0.028)
H2c: *Private ownership× Party embedded*				1.188***	0.949***
				(0.274)	(0.269)
Control variables					
Environmental performance	0.460***	0.463***	0.459***	0.458***	0.462***
	(0.098)	(0.099)	(0.105)	(0.096)	(0.104)
Required discloser	0.363***	0.361***	0.371***	0.389***	0.393***
	(0.083)	(0.085)	(0.087)	(0.083)	(0.081)
Firm size (t-1)	0.242***	0.253***	0.238***	0.248***	0.253***
	(0.012)	(0.006)	(0.019)	(0.012)	(0.017)
ROA (t-1)	-0.719	-0.651	-0.885	-0.62	-0.8
	(1.227)	(1.232)	(1.153)	(1.173)	(1.136)
Slack (t-1)	-0.658**	-0.547*	-0.620**	-0.710***	-0.517**
	(0.258)	(0.317)	(0.313)	(0.221)	(0.25)
LEV (t-1)	-0.404*	-0.460*	-0.377*	-0.401*	-0.435*
	(0.274)	(0.254)	(0.280)	(0.269)	(0.253)
Year	0.191**	0.195**	0.191**	0.191**	0.195**
	(0.096)	(0.098)	(0.095)	(0.095)	(0.097)
Stock exchange	0.006	-0.035*	0.037**	0.017**	0.007
	(0.008)	(0.018)	(0.020)	(0.009)	(0.019)
Industry1	0.773***	0.793***	0.753***	0.691***	0.706***
	(0.141)	(0.140)	(0.136)	(0.129)	(0.123)
Industry2	0.267***	0.252***	0.269***	0.255***	0.243***
	(0.042)	(0.027)	(0.040)	(0.014)	(0.044)
Industry3	0.194*	0.140	0.245***	0.178**	0.189**
	(0.100)	(0.108)	(0.069)	(0.095)	(0.009)
Industry4	0.083*	0.042	0.111	0.053	0.049
	(0.055)	(0.056)	(0.084)	(0.074)	(0.056)
Industry5	-0.051	-0.122*	-0.005	-0.057	-0.077
	(0.060)	(0.067)	(0.046)	(0.043)	(0.049)
Industry6	0.269***	0.197***	0.357***	0.286***	0.318***
	(0.046)	(0.028)	(0.054)	(0.039)	(0.028)
Media coverage	0.209***	0.243***	0.169***	0.205***	0.189***
	(0.037)	(0.014)	(0.044)	(0.031)	(0.041)
SOEs in region	0.001	0.01	-0.013	0.013	0.002
	(0.063)	(0.055)	(0.069)	(0.059)	(0.065)
Political connection	-0.042*	-0.063*	-0.049***	-0.047**	-0.079***
	(0.027)	(0.035)	(0.017)	(0.021)	(0.029)
Constant	-4.378***	-4.527***	-4.321***	-4.504***	-4.577***
	(0.186)	(0.066)	(0.213)	(0.123)	(0.181)
# Observations	526	526	526	526	526
Adjusted R^2	0.338	0.346	0.339	0.339	0.352

*Note: standard errors are in parentheses; *p<0.1; **p<0.05; ***p<0.01(two-tailed test).*

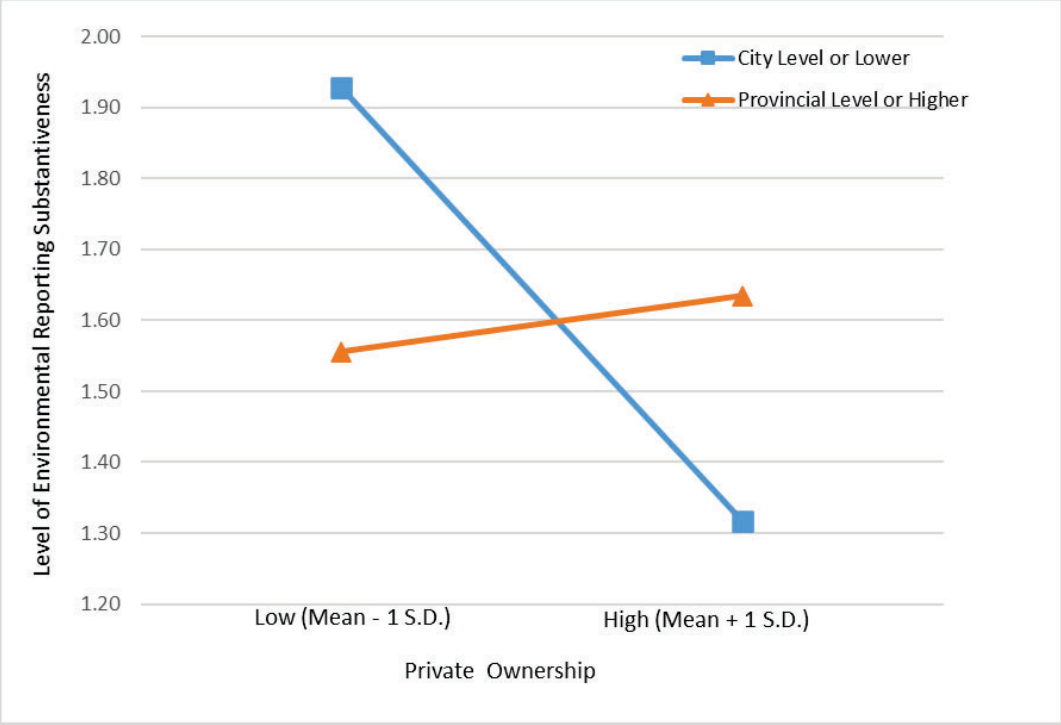
As expected, results from Model 1 suggest that private firms are less likely to disclose substantive information (*p<0.01*) due to the concern about the unfavourable effects of substantive reporting (Wang & Xie, 2019). Under Model 2, the main effect of private ownership was negative and significant (*p<0.01*) as expected, and the main effect of *administrative location* was also negative and significant (*p<0.01*), meaning that SOEs that are geographically close to provincial (or municipal) governments and SRAs are less

likely to disclose substantive information. More importantly, the interaction term between *private ownership* and *administrative location* (*private ownership× administrative location*) was positive and significant (*p<0.01*), showing that higher levels of administrative location can weaken the negative effect of private ownership on substantive reporting. The magnitude of the coefficient of *private ownership× administrative location* (0.813) is greater than that of *private ownership* (0.720), implying that the relationship between the reporting substantiveness and *private ownership* was positive for firms in provincial or municipal capital cities. An F-test was undertaken to check the joint effect of *administrative location* and *private ownership× administrative location*, which was found significant at the 5% level (*F=4.16; p<0.05*). This evidence suggests that, compared with their SOE peers, private firms are more likely to provide substantive information under the combined legitimacy pressure imposed by both the regional government and the SRA. Following the approach introduced by Aiken, West, and Reno (1991), Figure 3.3 depicts the interaction effect between a firm's administrative location and ownership on its reporting substantiveness, which shows that the pattern is consistent with the prediction in H2a.[47] As such, H2a was supported.

Figure 1.3 Interaction effect between administrative location and private ownership on corporate reporting substantiveness

[47] In this paper, significant interactions are visualised using the approach introduced by Aiken et al. (1991), unless stated otherwise.

Figure 3. 3 Interaction effect between administrative location and private ownership on corporate reporting substantiveness

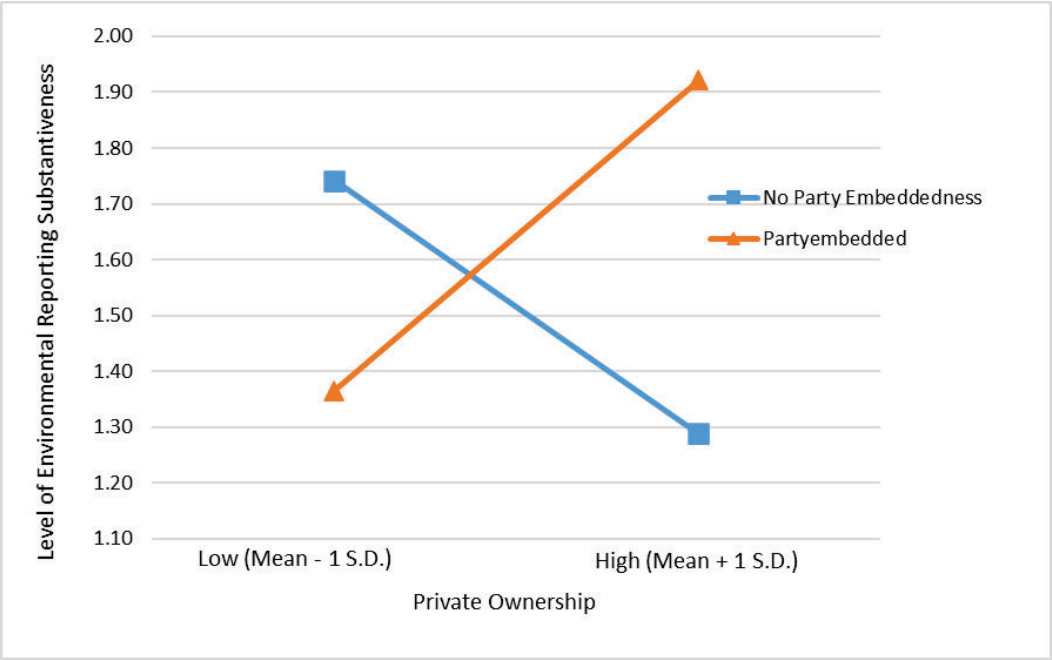


The results from Model 3 detailed in Table 3.6 show that the main effect of *private ownership* was negative and significant at 10% ($p<0.1$); the main effect of *regional law enforcement* was positive and significant ($p<0.01$), suggesting that SOEs exposed to higher levels of regional law enforcement are more likely to disclose substantive information. However, the interaction term between *regional law enforcement* and *private ownership* was insignificant; H2b was not supported.

Under Model 4, the main effects of both *private ownership* and *party embedded* were negative and significant ($p<0.01$). The interaction term between *party embedded* and *private ownership* (*private ownership× party embedded)* was positive and significant ($p<0.01$), meaning that *party embedded* can reduce the negative impact of *private ownership* on reporting substantiveness. The magnitude of the coefficient of *private ownership* × *party embedded* (1.188) is greater than that of *private ownership* (0.534), indicating that the relationship between the substantiveness of reporting and *private ownership* was positive for firms with party embeddedness. In other words, compared with their SOE peers, private firms are more likely to provide substantive information under the legitimacy pressure imposed by the CPC. An F-test revealed that the joint effect of *party embedded* and *private ownership* × *party embedded* was insignificant, but the interaction term (*private ownership* × *party embedded*) passed the F-test at the 10% level

(*F=2.48; p<0.1*). H2c was supported. The interaction effect between a firm's party embeddedness and ownership on its reporting substantiveness is visualised in Figure 3.4, consistent with the predicted pattern.

Figure 3. 4 Interaction effect between party embeddedness and private ownership on corporate reporting substantiveness



Finally, results from Model 5 show that the findings in Models 2-4 are robust when all variables are included, confirming that H2a and H2c were supported whereas H2b was not supported. Overall, there is evidence suggesting that political monitoring plays a moderator role in the relationship between corporate ownership and substantive reporting.

The coefficients attached to the control variables including *environmental performance*, *required discloser* (by the MEP), *firm size* and *media coverage*, were all positively related to reporting substantiveness at the 1% level, consistent with the CSR reporting literature (Clarkson et al., 2008; Bi & Peng, 2013; Du et al., 2015; Wegener et al., 2013). *Slack* was negatively correlated to reporting substantiveness (*p<0.05*), suggesting that firms with more free cash tend to disclose less substantive environmental information. This is probably because they are less financially dependent on the government, hence they do not have to disclose substantive environmental information for legitimacy. This is consistent with the logic that corporate financial independence can buffer a firm from the need to disclose sensitive information (Seifert et al., 2004). This is also in line with the findings of Azadegan et al. (2018) who suggest that more slack resources do not drive managers of developing countries, like China, to commit to CER activities.

Table 3.6 also shows that some industries were associated with the level of report substantiveness: compared with the "Others" industry, firms in the energy, biotechnology and pharmaceuticals, and food and beverage industries are more likely to engage in substantive reporting ($p<0.01$). This is probably due to the technicalities of reporting in certain industries, given the lack of environmental reporting standards. Of note, in conjunction with the results in Table 3.5, firms in the biotechnology and pharmaceuticals industry are more likely than the Others industry, to disclose and provide substantive environmental information. In contrast, firms in the energy industry are less likely to disclose environmental data, but more likely to provide substantive information once they disclose them. A further data review suggested that energy firms are generally located close to provincial governments and SRAs. This implies they are exposed to higher degrees of political monitoring, together with higher levels of decoupling risks. As a result, once they elect to disclose, they prefer to disclose substantive information only.

The results also present a significant year effect, suggesting that firms disclosed more substantive environmental information in 2014 than in 2015. This may be due to the same effect noted for reporting likelihood. That is, uncertainty regarding the level of enforcement of the historically harshest environmental protection law in 2015 is likely to have impacted decisions made in relation to the reporting of 2014 environmental data. Many firms reported substantive environmental data for 2014 in 2015 in compliance with the reporting terms. But, after one year's observation of the enforcement of the new legislation, in 2016, fewer firms disclosed substantive information probably because they had not seen any severe outcomes for not doing so.

It is worth noting that firms with political connections tend to disclose less substantive information, suggesting that these firms are more likely to decouple from reporting regulations by either reporting less substantive information or engaging in a symbolic strategy. This indicates that political connections in a firm can protect the firm from the need to disclose sensitive information, consistent with the findings of Wu et al. (2015). Moreover, the key predictors for the tests of reporting substantiveness, including administrative location, regional law enforcement and party embeddedness, had no effects on the likelihood of environmental reporting. This indicates that if a firm has perceived more decoupling risk due to its exposure to higher levels of monitoring, it discloses environmental information only when it has truly committed to environmental practices.

The results of Tables 3.5 and 3.6 suggest that private ownership was positively associated with reporting likelihood but negatively correlated with reporting substantiveness. This indicates that in certain circumstances, for example, in the case of perceived low decoupling risk, some private firms may employ a symbolic reporting strategy (Zajac and Westphal 2004). This is consistent with the logic that firms subject to high degrees of political monitoring can generally perceive high levels of decoupling risk (Marquis & Qian, 2014); thus, they are more likely to undertake a substantive reporting strategy.

In summary, compared with SOEs, on average, private firms are less likely to disclose substantive environmental information perhaps due to their concerns that too much disclosure of sensitive information may lead to more scrutiny and in turn risk their legitimacy. However, private firms are more likely to engage in substantive environmental reporting if they are under the combined monitoring of the regional government and the SRA or embedded by the CPC. Though law enforcement has no impact on the reporting substantiveness of private firms, it is positively related to SOEs' substantive reporting. This is probably because the environmental reporting of SOEs is more about fulfilling their accountability to the government. Compared with private firms, SOEs appear to be more willing to cooperate with regional governments therefore their reporting substantiveness is associated with regional law enforcement levels. In contrast, the environmental reporting of private firms is more like a mechanism to legitimise their environmental performance (Cho et al., 2006), in this regard, their reporting substantiveness depends on their perceived legitimacy pressures.

5.4 Endogeneity concerns and robustness checks

Endogeneity in a regression model might lead to biased estimates. Prior CSR research has indicated endogeneity potential in three typical forms: sample selection bias, reverse causality, and omitted variable bias (Lewbel, Dong, & Yang, 2012; Liu et al., 2020).

Based on the major research findings, potential endogenous variables include *ownership*, *political connection*, *administrative location*, and *party embeddedness*. Given that this research targets firms subject to compulsory CSR reporting, selection bias is less of a concern than voluntary reporting (Barth et al., 2017; Broadstock et al., 2018). Moreover, reverse causality does not appear to be a concern for this research, because the literature review on Chinese CSR practice, identified neither theory to support nor evidence showing the existence of causal relationships from a firm's environmental reporting

practice to its political characters (i.e., ownership and political connection), or to its political monitoring variables (i.e., administrative location and party embeddedness).

With regards to concerns about omitted variable bias, an extensive literature review suggests that omitted variable bias and other endogeneity issues are generally relevant to regressions testing the associations between firm CSR practice and firm financial status (e.g.: Cuypers, Koh, & Wang, 2016; Erhemjamts & Venkateswaran, 2013). Yet, to address potential omitted variables that are still a concern, all the control variables have been carefully considered, together with the fixed effects of industry and year in the sample. A firm fixed effects model would be an ideal choice. However, the sample size is too small for the implementation of this test. As such, endogeneity issues cannot be completely ruled out.

Multiple tests have been performed to establish the robustness of the findings. First, instead of the pooled data, regression models were applied to firms for 2014 and 2015 separately (results untabulated). Second, for the substantiveness test, all the model variables were included in one model to check the robustness of variable effects (i.e., Model 5). Third, regression models were applied using the current year's financial data rather than the prior year's figures (results untabulated). Finally, following a large number of Chinese indigenous studies, two deflators were applied (results untabulated) to remove the potential inflation effect on firm size between 2014 and 2015 (2014 was the base year).[48] The above tests showed all the results and significance levels were qualitatively consistent with those reported.

6. Discussion and conclusion

This research examines firms' reporting action and strategies in response to government requirements for environmental disclosures. The results suggest that corporate ownership, which directly reflects a firm's political legitimacy position, has a significant impact on firms' likelihood of reporting. Driven by legitimacy pressures imposed by governments, private firms are more likely to disclose environmental information than SOEs. Moreover, firms with political connections have been found more likely to report environmental performance, consistent with the view that a firm's political connections serve as a "supporting hand" that helps the firm appear to be legitimate. The interaction

[48] These deflators are "fixed asset investment index" and "industrial product factory price index" (see CSMAR data descriptions).

term between political connection and ownership on the likelihood of environmental reporting was not significant, implying that many factors, other than political ties, may affect a firm's decision-making on environmental reporting strategy, for example, institutional context and operational environment. These factors may influence the firm's legitimacy status and economic positions that in turn shape its decisions and strategies.

To analyse corporate environmental reporting behaviour, on the one hand, this study examines the monitoring effects from different governmental agencies on the substantiveness of firms' environmental reporting. The results suggest that compared with the SOEs, private firms are generally less willing to pursue substantive reporting. However, they are more likely to disclose substantive information when they are under combined pressure from a regional government and the SRA or when their executives are embedded within the CPC. In contrast, law enforcement from regional EPB was found positively associated with the SOEs' substantive reporting. This indicates that compared with private firms, SOEs are more likely to follow the government requirement of substantive environmental reporting in regions with high levels of law enforcement, given that they are vehicles to achieve social objectives demanded by the government.

On the other hand, this study provides indirect evidence showing the existence of firm-level decoupling. Specifically, compared with SOEs, private firms are more likely to disclose environmental data but less likely to provide substantive information. This indicates the existence of symbolic reporting in certain circumstances, for example, in the case of perceived low decoupling risk. This is supported by the finding that firms subject to higher levels of political monitoring are more likely aware of the high decoupling risk that they are exposed to. Therefore, they are more likely to embrace a substantive reporting strategy.

This research makes two main theoretical contributions. First, it adds a political perspective to the CSR literature, showing that a Chinese firm's environmental reporting behaviour varies with the type of political legitimacy pressures. On the one hand, corporate ownership represents a firm's political legitimacy position. Thus, compared with the SOEs that have been inherently granted legitimacy, private firms generally have higher levels of political legitimacy pressures. As a result, they have stronger motivation to maintain a good relationship with the government by employing political strategies, for example, environmental reporting. Furthermore, a firm's political connections can help the firm appear to be legitimate. For example, drive the firm to disclose

environmental information that might not necessarily be substantive. On the other hand, political monitoring imposes legitimacy pressures on a firm and in turn influences its reporting strategies. Compared with SOEs that report as per the instructions of their governmental owners, private firms are more likely to pursue a substantive reporting strategy under high levels of legitimacy pressures and decoupling risk. However, if a private firm is exposed to lower levels of political monitoring and decoupling risk, it might undertake a symbolic reporting strategy or simply disclose nothing about environmental performance.

Second, this research enriches the literature on organisational behaviour by demonstrating that SOEs and private firms may employ different reporting strategies when they are exposed to different types of coercive forces or legitimacy pressures.[49] A firm may face various enforcement powers from the CSRC (exercised by the SRAs and stock exchanges), regional government (exercised by the EPBs), and the CPC. The results show that driven by these various pressures, SOEs and private firms behave differently and employ different reporting strategies. Specifically, environmental reporting by SOEs is more about fulfilling accountability to the government hence their reporting substantiveness is significantly influenced by law enforcement from the regional government. In contrast, environmental disclosure in private firms is regarded as a mechanism to legitimise their environmental performance. Therefore, their reporting substantiveness is affected by the monitoring of the CSRC or the CPC, which leads the firms to high levels of decoupling risk.

Of note, there are some peculiarities of the Chinese political system that might constrain the generalizability of the research findings. For example, compared with other countries, political legitimacy is more vital for business survival in China (Farashahi & Hafsi, 2009). However, research has also found the importance of government-firm relations in other countries (Hillman et al., 1999; Zhao, 2012). In this regard, as firms globalise, the findings of this research could help with understanding variations in corporate political strategies in a context other than China.

[49] In this thesis, a "coercive force" refers to the top-down institutional force imposed on a firm by the government. In contrast, a legitimacy pressure is the pressure perceived by a firm in the sense that if it does not comply with the government requirements then its political legitimacy is in danger.

CHAPTER 4 ARTICLE 3

Corporate Environmental Investment and Firm Value: The Moderating Effects of Organisational Visibility and Environmental Reporting

1. Introduction

Environmental concerns in China are widespread in response to increasing levels of emissions caused by extensive industrialisation in developing regions. Business activities are considerably implicated in these concerns and the Chinese government is increasingly demanding greater corporate environmental responsibility (Lumenlearning, 2018). In past decades, the Chinese government has progressively provided firms with environmental subsidies and formulated preferential tax policies to help improve environmental performance (Lin et al., 2015; Yang et al., 2020). Though these financial supports are an important source of corporate environmental investment, firms are expected to invest additional amounts in green projects to improve or maintain sustainable environmental performance.

Nevertheless, given that a business generally aims to maximise shareholders' wealth, in many cases, Chinese firms have driven their growth at the expense of environmental resources. This is a result of not investing enough to improve their efficiency of environmental resource consumption, probably because they consider that environmental costs will deplete their profits (Marquis, Zhang, & Zhou, 2011). While some firms increasingly invest in green projects and take more environmental responsibility, still, many polluting firms choose only to pay a minimum amount for emissions charges as regulated by law (Liu et al., 2019). With the increasing calls from the Chinese government and social communities for better corporate environmental responsibility (Marquis & Qian, 2014), it is crucial for firms and their stakeholders to understand the relationship between corporate environmental investment and firm value, as well as the effects of key influential factors on this relationship.

Generally, firms' environmental investments are made to improve environmental performance, which is key to obtaining environmental legitimacy from governments and social communities (Alrazi, de Villiers, & van Staden, 2015; Shocker & Sethi, 1973). As

a critical business resource, legitimacy is essential for a firm to survive and succeed (Qin, Harrison, & Chen, 2019; Marquis & Qian, 2014; Porter & Van der Linde, 1995; Rouse, van Staden, & Tresadern, 2014). However, corporate environmental investment does not necessarily lead to an increase in firm value. Existing research on the association between corporate environmental investment and firm value is mixed (e.g., Jaggi & Freedman, 1992; Pekovic, Grolleau, & Mzoughi, 2018; Sueyoshi & Wang, 2014), and research has shown that this relationship can be affected by company characteristics, environmental regulations, and stakeholder pressures (Alrazi et al., 2015; Qin et al., 2019). In the Chinese context, research on the economic consequences of corporate environmental investment remains limited (Tang & Li, 2013). Environmental regulations, industry, corporate ownership, and CEO political connections have been identified as significantly moderating the association between corporate environmental investment and firm value (Li, Tian, & Liu, 2016; Tang & Li, 2013; Tang, Li, & Wu, 2013). Yet, there has been limited research examining the moderating effects of organisational visibility and environmental reporting on the above association, where organisational visibility reflects a firm's reputation and popularity that are shaped by social norms, and environmental reporting functions as a strategic mechanism for a firm to legitimise its environmental efforts and performance. Findings about these effects will help clarify the organisational journey towards improving a firm's value in environmental endeavours.

The sample of this study contains 367 firm-years for companies listed on the Shanghai Stock Exchange (SSE), that disclosed environmental investment data during the period 2016-2019. These companies either belonged to environmentally sensitive industries that were required to disclose or belonged to non-environmental sensitive industries that disclosed environmental information in their CSR reports. [50] This research focuses on Shanghai-listed companies because compared with Shenzhen Stock Exchange, the SSE has issued more environmental reporting guidelines for its companies and supervises their disclosures in a more systematic way (Bi & Peng, 2013). Moreover, the test period is within the timeframe of the 13th Five-year plan, which incorporates more governmental priorities to resolve environmental issues than previous five-year plans (Central Committee of the Communist Party of China, 2016). [51] This indicates that polluting firms

[50] The environmentally sensitive industries were defined in the corporate environmental reporting guideline issued by the Chinese Ministry of Environmental Protection in 2010. These industries produce emissions that have significant negative impacts on the environment; typical examples are mining, metal and non-metal materials and chemical industries.

[51] China's Five-Year Plans are periodical schemes of social and economic development released by the Communist Party of China (CPC). As mentioned in Article 2, the party plays a leading role in strategic planning for economic development, setting growth objectives, and introducing reforms. The 13th Five-Year Plan refers to the duration of 2016-2020 (Chen, Li, & Xin, 2017).

are subject to harsher scrutiny of environmental performance. As a result, there are likely to be more environmental investments during this period.

This research focuses on the short-term (one year) impact of environmental performance on firm value. Three sets of hypothesis tests were developed to examine the following issues: first, the relationship between corporate environmental investment and firm value; second, the moderating effects of organisational visibility on the relationship between corporate environmental investment and firm value, where organisational visibility is measured by public attention and analyst coverage; finally, the moderating effects of corporate environmental reporting on the investment-value relationship, where the quality of environmental reporting is measured by a firm's reporting of emissions and monetary environmental information.

The main findings are outlined as follows. First, as expected, the overall relationship between investment and firm value was negative and significant. Regarding the moderating effect of organisational visibility, a higher level of public attention was associated with a reduced negative effect of environmental investment on firm value. In contrast, organisational visibility related to analyst coverage had no significant effect on the relationship between the investment and firm value. Regarding the moderating effect of environmental reporting (i.e., monetary environmental disclosure and emissions disclosures), firms that disclosed monetary environmental information had a less negative investment-value relationship compared with those that did not disclose monetary information. In contrast, corporate reporting of emissions was not found to have a significant effect on the association between investment and firm value. Second, further analysis shows that for firms making larger environmental investments the overall relationship between investment and firm value was negative but not significant. Regarding the interaction effects, high levels of organisational visibility (both public attention and analyst coverage), and more substantive emissions disclosures were associated with reduced negative effects of investment on firm value. In contrast, monetary environmental disclosures had no interaction effect.

This study contributes to the understanding of the theoretical links between corporate environmental efforts and firm value creation by showing that both organisational visibility and environmental reporting can positively influence shareholders' valuation of corporate environmental investment. The findings also add to the CSR literature by providing evidence to suggest that where there are, generally, low levels of CSR awareness, such as in a developing country like China (Xu & Yang, 2010; Zhao, 2012), shareholders' interpretations of a firm's environmental investments are affected by their

cost-benefit analysis of the investment projects and the firm's legitimising efforts towards these investments.

This paper is structured as follows. Section 2 reviews the literature then Section 3 discusses hypothesis development. Next, Section 4 describes the research design and section 5 reports the results. Finally, Section 6 discusses the research findings and then concludes.

2. Literature review

2.1 Corporate environmental investment

The CSR literature suggests that several motives may drive firms to make an environmental investment, for example, intrinsic desire to be environmentally friendly (van Oorschot, Kok, & van Tulder, 2020), stakeholder pressure (Barnett & Salomon, 2012; Wing-Hung Lo, Fryxell, & Tang, 2010), positional benefits (Husted, Allen, & Kock, 2015), and tax and other economic advantages (Yang et al., 2019). Sharma (2000) further remarks that a firm's environmental efforts are associated with its managerial interpretations of environmental challenges. These interpretations are influenced by a firm's organisational context, including factors such as the legitimation of environmental issues and discretionary slack resources (Sharma, 2000).

It is worth noting that from a firm's perspective, the importance of introducing environmental technologies is a typical factor that influences the firm's environmental efforts. Murovec, Erker, and Prodan (2012) analyse survey data from Slovenia companies and find that governmental policies related to the introduction of environmental technologies can significantly impact a firm's environmental investment. Moreover, their results also show that the availability of a firm's slack resources is essential to its environmental investment.

Research has also found that environmental regulations have a significant impact on corporate environmental efforts. For example, based on the analysis of FDA-related industries, Olson (1999) finds that the regulatory impact on firm compliance varies with industry and compliance cost. [52] Lopez, Sakhel, and Busch (2017) examine both regulatory uncertainty and regulation-induced uncertainty through a survey of more than 250 firms that are members of the European Union Emissions Trading System. They find

[52] The FDA stands for Food and Drug Administration in the United States.

that only regulation-induced uncertainty is associated (positively) with a firm's act of environmental investment. In addition, firms with a history of environmental investment are more likely to reinvest in green projects.

Azadegan et al. (2018) examine differences in drivers for managers to make environmental investments in developed and developing countries. They find that compared with developed countries, consumer pressure has less impact on the decision-making of developing country managers. However, in the case that community pressure and consumer pressure are jointly imposed on business organisations, developing country managers invest significantly larger amounts. Moreover, in contrast to developed country managers, high levels of slack resources do not drive developing country managers to make more investments in environmental projects. This indicates that in a developing country where market mechanisms are incomplete and legal systems are rudimentary, normative forces from social communities play a crucial role in driving corporate environmental investment.

Research on corporate environmental investment remains limited in China (Tang, Li, & Wu, 2013). The Chinese literature suggests that environmental regulations, which reflect the coercive forces from the central and local governments, function as the major driver of corporate environmental investment (Liao & Shi, 2018). Many firms make environmental investments just to satisfy governmental requirements (Tang, Li, & Wu, 2013; Xue & Yi, 2015). Moreover, research has also found that public appeals and the degree of media exposure have a positive impact on the level of corporate environmental investment (Liao & Shi, 2018; Wang et al., 2017). This is consistent with the CSR literature in western countries, which suggests that institutional forces are critical drivers of corporate environmental efforts and performance (Bui & De Villiers, 2017; Lopez, Sakhel, & Busch, 2017).

2.2 Corporate environmental investment and firm value

The literature offers mixed findings about the relationship between corporate environmental investment and its economic outcomes (Barnett & Salomon, 2012; Bowman & Haire, 1975). According to the conventional logic, environmental investment corresponds to a costly burden imposed on business organisations, which probably reduces firm profitability and growth. Early CSR research for developed countries (i.e., in the 20th century) suggests that corporate environmental investment has a negative impact on firm value or financial performance (Gray & Shadbegian, 1995; Jaggi &

Freedman, 1992; Walley & Whitehead, 1994). However, this view has been challenged by Porter and Van der Linde (1995), who propose that a firm's environmental efforts may lead to better financial performance if the firm can improve the efficiency of resource consumption. In alignment with Porter's hypothesis, Ambec and Lanoie (2008) highlight several paths through which a firm can earn financial benefits from its environmental investments, for example, better access to markets and savings on compliance. Similar results supporting Porter's hypothesis have been found in numerous studies in developed countries (e.g., Al-Tuwaijri, Christensen, & Hughes Ii, 2004; Hart & Ahuja, 1996; Klassen & McLaughlin, 1996; Rouse et al., 2014).

However, a number of studies have found that the positive or negative relationship between corporate environmental investment and firm value is related to the regulatory context of environmental protection. For example, Clarkson, Li, and Richardson (2004) find that for low-polluting firms, their voluntary environmental investments increase firm market value, whereas this is not the case for high-polluting firms that just satisfy minimum environmental requirements. Johnston (2005) finds similar evidence but points out that voluntary and regulatory environmental capital expenditures have different economic outcomes at the firm level. In other words, a firm's compulsory environmental investment leads to decreased firm value. Sueyoshi and Goto (2009) demonstrate that the short-term environmental investment under the US Clean Air Act was negatively associated with firm value in the US electric utility industry.

In contrast to the traditional view and Porter's hypothesis, some studies suggest that there is no significant association between corporate environmental investment and firm value (Fogler & Nutt, 1975). Further, Nakamura (2011) has identified a time lag effect between corporate environmental investment and firm value. Specifically, in the short term, corporate environmental investment does not have a significant effect on firm value but in the long term, environmental investment leads to an increase in firm value. Of note, some research finds a non-linear correlation between environmental investment and firm value (Fujii et al., 2013; Pekovic, Grolleau, & Mzoughi, 2018), which may partially explain the discrepancy between certain empirical studies (Salzmann, Ionescu-Somers, & Steger, 2005).

The above inconsistent findings imply that the relationship between corporate environmental investment and firm value is affected by a variety of factors. In theory, a firm's environmental investment increases firm value by improving its environmental

performance and reducing waste (Alrazi et al., 2015; Qin et al., 2019). However, corporate environmental investment represents a firm's *ex-ante* effort towards sustainable environmental management, which does not automatically lead to good environmental performance (Nakamura, 2011). In fact, environmental investment seems to be essential to sustaining environmental performance, yet the former does not necessarily increase the latter at the same level. The relationship can be affected by company characteristics and external conditions, including firm technology, managerial policies, educational level of employees, industry knowledge spillovers, regulatory context, and legitimacy pressures (Dasgupta, Hettige, & Wheeler, 2000; Johnston, 2005). Moreover, the subsequent environmental performance does not necessarily reflect the motives behind the environmental investment, such as pursuing tax advantages, or positional benefits (Pekovic et al., 2018). In addition, as stressed by Nakamura (2011), whether good environmental performance increases firm value depends on firm characteristics (size and ownership etc.), industry conditions, and environmental strategy (Dixon-Fowler et al., 2013; King & Lenox, 2001). In this regard, the effect of environmental investment on firm value can be affected by various factors that deserve more attention.

Research has found that in the Chinese context, several factors can moderate the relationship between corporate environmental investment and firm value. Jin and Xu (2020) demonstrate that corporate ownership and geographical location have moderating effects on the relationship. Specifically, compared with private companies, state-owned enterprises (SOE) have more ability to utilise environmental investments to improve financial performance. Similarly, firms located in China's eastern regions have better capability to create value from environmental investment than in other regions. Zhang (2019) suggests that corporate industry belonging can influence the effect of environmental investment on firm value; this effect is reinforced in firms that belong to heavy pollution industries. Yu and Li (2021) find that financial constraints can moderate the association between corporate environmental investment and firm value. Yet, there has been limited research looking at the moderating effects of organisational visibility and environmental reporting on the above relationship in China, despite these factors having been found important in the institutional literature regarding their impacts on organisational behaviour and strategies (Greenwood et al., 2011). Specifically, a firm's visibility can affect its compliance with pressures imposed by stakeholders (Marquis & Toffel, 2012), and environmental reporting is a strategy for a firm to legitimise its environmental effort and performance (Alrazi et al., 2015; De Villiers & Van Staden,

2006). As a result, the interactions between these factors and corporate environmental investment may have significant effects on firm value.

3. Hypothesis development

No unified definition has been provided in the literature of the definition of environmental investment in China. In this research, the definition of Tang et al. (2013) is adopted: corporate environmental investment includes payments for research on environmental technologies, purchase or development of green equipment or systems, projects for pollution control, clean production and ecological protection, and pollution charges or environmental taxes.

Regarding the relationship between corporate environmental investment and firm value, all the hypotheses were developed based on the cost-benefit theory and legitimacy theory.

3.1 Cost-benefit theory and legitimacy theory

At the firm level, environmental costs can be classified as explicit and implicit costs. Explicit costs include a firm's environmental investments accounted for in its financial statements, whereas implicit costs refer to the potential costs related to environmental risks or damages. Examples of implicit costs could include a decrease in market share caused by consumers' pursuit of green products from competitors, or more environmental compliance costs and financing costs associated with the introduction of increasingly stringent environmental regulations and green credit policies.

Corporate environmental benefits refer to the growth in firm value, directly or indirectly generated from firm environmental investments and practices. Direct benefits are obtained through the reduction in costs of environmental protection, increase in sales of green products, governmental awards, and tax relief. Indirect benefits are related to the reduction in future environmental costs and financing costs, as well as the increase in firm market value because there is a trend that consumers and shareholders value companies with better environmental and social responsibility practices.

From the perspective of cost-benefit analysis, most expenditures on environmental technologies are strategic investments thus they cannot be recovered in the short term (Sueyoshi & Wang, 2014; Lee, Min, & Yook, 2015). As a result, a firm's environmental investments are likely to reduce its short-term profitability.

However, a firm's survival and growth largely rely on the continued support of society (Shocker & Sethi, 1973), where society grants legal standing and supplies resources and labour to the firm (Matthews, 1993). In response, the firm is expected to ensure that its actions are "desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995, p. 574). In this regard, the generalised perception for a firm to pursue appropriate actions is defined as legitimacy.

According to legitimacy theory, a firm can receive legitimacy from its stakeholders by taking more social and environmental responsibility. Driven by the need for legitimacy, a firm makes strategic environmental investments aiming to cultivate goodwill from shareholders and other stakeholders that can add firm value in the long term (Qin et al., 2019). However, corporate environmental investment has a time lag to increase firm value (Nakamura, 2011). These investments may be interpreted by shareholders as a signal of an increase in environmental expenses or cash outflows, likely to decrease the firm's short-term profitability. As a result, some shareholders devalue the firm and in turn vote with their feet by selling shares (Halme, & Niskanen, 2001).

Accordingly, Hypothesis 1 proposes:

Hypothesis 1 (H1). *In the short term (1 year), a firm's environmental investment has a negative effect on firm value.*

Of note, H1 is regarded as the basis for other tests regarding the moderating or interacting effects of organisational visibility and environmental reporting in Hypotheses 2 and 3.

3.2 Interaction between organisational visibility and investment on firm value

Visibility refers to "the extent to which phenomena can be seen or noticed" (Bowen, 2000, p. 93). Organisational visibility can be categorised into *generic visibility* and *domain-specific visibility*. *Generic visibility* reflects a firm's popularity in society, whereas *domain-specific visibility* refers to the level of public attention that a firm captures due to certain features (e.g., labour relations and environmental impacts), which are subject to public scrutiny (Marquis & Toffel, 2012). In this paper, *domain-specific visibility* is not the focus because, in China, corporate environmental investments and practices are generally driven by governmental agencies (Qin et al., 2019; Wang, Wijen, & Heugens, 2018). Even though the new environmental protection law has given citizens and civic groups the right to collect negative environmental information and commit themselves to

national environmental governance (Zhang & Cao, 2015), the impact of public scrutiny on corporate environmental practice is insignificant at present (Li et al., 2018). Therefore, in the eyes of shareholders, it is likely that firms overall have a similar degree of domain-specific visibility regarding their environmental impacts. Further, in the Chinese context, shareholders generally pay little attention to a firm's environmental events unless these events subsequently affect the firm's financial performance (Xu, Zeng, & Tam, 2012). In this regard, organisational visibility for this study mainly refers to generic visibility.

Since a firm's environmental investments have a lag effect on its financial performance, how investors evaluate these investments is critical to the firm's market value (He et al., 2021). Research has found that investors are interested in the societal benefits of an environmental investment only when the disclosed amount of investment is small (Martin & Moser, 2016). Thus, in the short term, large environmental investments are likely to be interpreted by shareholders as expenses that will reduce a firm's profitability. As a result, they may sell their shares, leading to a reduction in share market value.

Firms with high levels of organisational visibility can attract more public attention via diverse channels, whereby they can provide shareholders with more information to evaluate their green investments. Highly visible firms are generally large and listed on prominent exchanges (Marquis & Toffel, 2012). Compared with less visible firms, more visible firms have more capability to employ effective investor relation strategies to attract and engage long-term investors (Bushee & Miller, 2012). The long-term investors are strategic shareholders, such as institutional investors, who are more likely to share management's view of success and the journey to achieve it, including the benefits of environmental investments (Williamson & Babcock, 2020; Li, & Lu, 2016). Thus, in many cases, they can impose legitimacy pressures on managers to ensure that environmental investment creates long-term value (Nguyen, Kecskés, & Mansi, 2020). In this regard, strategic shareholding may reduce the short-term fluctuation of firm market value.

Hypothesis 2 posits the following:

Hypothesis 2 (H2) *Higher levels of organisational visibility can weaken the short-term negative effect of environmental investment on firm value*.

3.3 Interaction between environmental reporting and investment on firm value

According to the literature on organisational legitimacy, a tactical disclosure of the information is one strategy that firms apply to establish, repair, or maintain legitimacy (Beelitz and Merkl-Davies 2012; Deegan, 2006; De Villiers & Van Staden, 2006), particularly when a firm encounters negative environmental event (Cho, Freedman, & Patten, 2012; Hahn & Lülfs, 2014). Cho et al. (2012) conclude that firms, especially poor environmental performers, appear to use environmental disclosures more as a legitimation device to reduce the risk of being questioned by stakeholders about their environmental performance. Patten (2005) finds that firms tend to exaggerate their projected environmental spending in their financial reports to achieve social legitimacy. Tilling & Tilt (2010) remark that firms, irrespective of good or poor environmental performance, tend to pursue environmental legitimacy by presenting images of environmentally friendly "corporate citizenship". This strategy could help a firm legitimise its investment decisions and performance by reducing the extent of information asymmetry between management and shareholders, thus influencing their valuation of company shares.

In China, many firms consider that environmental information is sensitive given that, in general, environmental disclosures have negative effects (Liu et al., 2019). They thus may believe that too much environmental investment and disclosure will attract more scrutiny (de Villiers and van Staden, 2006), creating a legitimacy risk (Tilling & Tilt, 2010; Scott, 2013). As a result, many polluting companies postpone their environmental investments. Meanwhile, they only disclose emissions and monetary data regulated by the MEP and the stock exchanges, and selectively report other information (Meng et al., 2019). However, when a firm invests large amounts to reduce negative environmental impacts under legitimacy pressures, more substantive environmental disclosures could assist in legitimising environmental efforts and subsequently influence shareholders' valuation in the firm's favour.

Accordingly, Hypothesis 3 proposes:

Hypothesis 3 (H3) *More substantive environmental reporting can weaken the negative effect of environmental investment on firm value*.

4. Research design

4.1 Samples

The research sample was formulated by including firms that were listed on the Shanghai Stock Exchange (SSE) and disclosed environmental investment data. The sample was limited to the SSE because, compared with the Shenzhen Stock Exchange, the SSE has issued more environmental reporting guidelines for listed companies in Shanghai and oversees their disclosures more stringently (Bi & Peng, 2013). The test period targeted 2016-2019 because it is within the timeframe of the 13th Five-year plan, which includes more governmental priorities for environmental issues than previous five-year plans (Central Committee of the Communist Party of China, 2016). With this background, firms operating environmentally sensitive projects were presumed to have made environmental investments for better environmental performance.

Environmentally sensitive industries, typically, disclose environmental investment data. Non-environmentally sensitive firms include both firms that disclose CSR reports and those that do not. To check whether those without CSR reports disclosed environment data elsewhere, the annual reports were reviewed for 100 randomly selected firms that did not disclose CSR reports. No environmental investment data were disclosed by these firms. Accordingly, the sample is restricted to environmentally sensitive firms and non-environmentally sensitive firms that issued CSR reports. For the listed companies on SSE, all the annual reports and CSR reports are publicly assessable on the SSE official website.

Specifically, each sampled firm was selected based on the following criteria: listed on the SSE during the test period; disclosed environmental investments during the period; not a specially treated company that experienced continuous financial difficulties; had complete corporate governance and financial data during the test period. The sampling method resulted in 122 firms and 367 firm-years that cover eight industry categories over the test period of 2016-2019.

Data for company characteristics (ownership and geographical location etc.), corporate governance (e.g., board independence), financial data, analyst coverage and numeric environmental disclosures in CSR reports, were collected from the China Stock Market and Accounting Research (CSMAR) database.

4.2 Models and measures

Based on Manchiraju and Rajgopal (2017), the following regression models were developed to test the hypotheses:

1. $TBQ_{i,t}$=β_0+ $\beta_1 EISs_{i,t-1}$+$\beta_{i,t}$ controls+$e_{i,t}$----------H1
2. $TBQ_{i,t}$=β_0+ $\beta_1 EISs_{i,t-1}$+$\beta_2 EISs_{i,t-1} \times VIS_{i,t} + \beta_3 VIS_{i,t} + \beta_{i,t}$controls+$e_{i,t}$------H2
3. $TBQ_{i,t}$=β_0+ $\beta_1 EISs_{i,t-1}$+$\beta_2 EISs_{i,t-1} \times EDI_{i,t-1} + \beta_3 EDI_{i,t-1} + \beta_{i,t}$controls+$e_{i,t}$---

   ----------H3

Where, for firm *i* in year *t, TBQ* is a proxy for firm value, *EISs* measures environmental investment in *year t-1*, *VIS* represents its level of organisational visibility in *year t* and *EDI* denotes its quality of environmental disclosures in *year t-1*. Thus, *EISs* × *VIS* measures the interaction between the firm's environmental investment and visibility, whereas *EISs* × *EDI* measures the interaction between the firm's environmental investment and its quality of environmental disclosures.

Of note, *EISs* and *EDI* are one-year lagged because environmental investment data are part of environmental disclosures which are published between February and July of the following year. Thus, *EISs* and *EDI* are expected to have one-year lagged effects on firm market value.

Model 1 tests H1 which hypothesised that corporate environmental investment had a negative effect on firm value, thus, a negative β_1 was expected. Model 2 corresponds to H2, which proposed higher levels of organisational visibility can weaken the short-term negative effect of environmental investment on firm value, therefore, a negative β_1 and a positive β_2 were expected. Similarly, Model 3 tests H3, which conjectured that higher levels of substantive environmental reporting can weaken the negative effect of environmental investment on firm value. To support H3, a negative β_1 and a positive β_2 were expected.

Dependent variables

The dependent variable is firm value, which is measured by Tobin's Q ratio (*TBQ*), a popular and comprehensive measure of value creation that combines accounting-based and firm-based values (Lindenberg & Ross, 1981; Waddock, & Graves, 1997). Tobin's Q ratio was calculated using the following formula:

Tobin's Q = total market value / (total assets - intangible assets - goodwill)

The above formula was sourced from the user guide of the CSMAR database.

Independent variables

Corporate environmental investment *(EISs)* is the firm's total annual environmental payments as a percentage of its sales for that year (Pekovic et al., 2018). As mentioned earlier, the prior year's data of *EISs* were applied for regressions.

Since firm market value is determined by shareholders' valuations, organisational visibility is captured along two dimensions: public attention and analyst coverage, which reflect the information environment on which shareholders rely (Brammer & Millington, 2006; Bushee & Miler, 2012; Merton, 1987). [53] To measure the level of public attention (*BaiduHL*), for each firm-year, the Baidu Index was computed, which counts how many times a phrase is searched during a period via the Baidu search engine. Because Baidu is the most popular search engine in China and has more than 70% of the market share, it is a reasonable indicator to reflect the level of public attention on a specific term (Chi, Yang, & Gu, 2018). [54] In this regard, the index for each firm-year on the Baidu Index website was manually collected by separately coding in its stock identity code and stock abbreviation (Yang, Du, & Liu, 2020). [55] The sum of the two results was then recorded as the final Baidu Index for the firm-year. *BaiduHL*, a dummy variable, was employed to measure the level of public attention for each firm-year, which is equal to 1 if its Baidu Index is greater than the sample median, and 0 otherwise.

Analyst coverage level (*AnalystHL*) is also a dummy variable. Again, for each firm-year, the number of analysts following the firm was counted (Adhikari, 2016; He & Tian, 2013). *AnalystHL* equals 1 if the number of following analysts is higher than the sample median, 0 otherwise. The data of analyst coverage was collected from the China Stock Market and Accounting Research (CSMAR) database.

Given that numeric environmental information is more difficult to manipulate than textual disclosures, it is regarded as more reliable and accurate to reflect the quality of corporate environmental reporting (Freedman, Jaggi, & Stagliano, 2004; Meng, Zeng, & Tam, 2013; Van der Laan Smith, Adhikari, & Tondkar, 2005; Wiseman, 1982; Zeng et al., 2010). In this regard, the substantive level of corporate environmental reporting is

[53] Some studies measure firm visibility by sales (examples: Marquis & Toffel, 2016; Yu et al., 2017). Because the foci of this research are factors that influence shareholders' decision-making on share investment, visibility measures relating to the information environment are more relevant to this research.

[54] Data source: http://gs.statcounter.com

[55] Company's full names were searched for ten randomly selected firms. Some searches returned null results, and the average number returned from the search for the company's full name shares less than 5% of the total number returned from the search for stock identity code, stock abbreviation and company's full name. In this case, the Baidu Index in this study was produced based on stock identity code and abbreviation only.

measured based on numeric environmental disclosures from two facets: emissions and monetary disclosures.[56] In using both these disclosures, the differences between the effects of these two types of environmental disclosures may be identified.

To capture the quality of environmental reporting, two sets of measures were employed. The first set is the likelihood to disclose emission information (*EDIeD*) and the likelihood to disclose monetary environmental information (*EDI$D*). Specifically, for each firm-year, *EDIeD* equals 1 if numeric emissions data are disclosed, 0 otherwise; *EDI$D* equals 1 if monetary data other than the total environmental investment is disclosed, 0 otherwise.[57]

The second set of measures is based on the levels of substantive disclosures on emission information (*EDIeHL*) and monetary environmental information (*EDI$HL*). The number of corporate emissions disclosures for each firm-year was counted based on the disclosure data in the CSMAR database, whereas the number of monetary environmental disclosures for each firm-year was calculated based on the disclosures in its CSR or annual reports.[58] For each firm-year, *EDIeHL* equals 1 if the number of emissions disclosures is above its sample median, 0 otherwise; *EDI$HL* equals 1 if the number of monetary disclosures is greater than its sample median, 0 otherwise. Since this research examines shareholders' short-term responses to corporate environmental disclosures, the prior year's data on environmental disclosures were included for the hypothesis tests.

Control variables

A set of control variables was included to control for factors that may affect a firm's value other than environmental investments.

Based on the literature， several controls were selected: firm size, measured by the number of employees (*Employee*), profitability (*ROA*), leverage (*LEV*), ownership centralisation (*OC*), book-to-market ratio (*BTM*), and cash flows from operating activities (*OCF*) (Di Giuli & Kostovetsky, 2014; Peng & Luo, 2000). These data were collected from the CSMAR database.

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[56] According to the disclosed items in the corporate annual reports, monetary environmental disclosures include afforestation fees, pollution fees, emergency expenditures for environmental issues, environmental legal fees, indemnities and penalties, loans and expenditures for environmental projects, environmental awards/rewards, environmental savings from emissions reduction, incomes from waste utilisation, environmental subsidies, and tax relief. Emissions disclosures include the amount of each type of resource consumed (e.g., power, water, gas and coal etc.), the quantity of each type of pollution discharged (e.g., CO_2, SO_2, nitrogen oxides, and wastewater etc.).

[57] The sample used in this paper incorporates only firms that disclosed annual environmental investment, therefore, *EDIeD* refers to the number of monetary disclosures other than the annual environmental investment, unless stated otherwise.

[58] The monetary environmental data were manually collected from corporate environmental disclosures in CSR reports and annual financial reports, which are publicly accessible on the SSE website.

The Ministry of Environmental Protection (MEP) requires firms in the main polluting industries to disclose environmental information. Therefore, a dummy variable *MEP* was included, equal to 1 if in the firm-year the annual report stated that the firm was a required discloser by the MEP, and 0 otherwise.

In China, the government is not only the major regulator but also the eventual owner of many firms, known as state-owned enterprises (SOEs). Compared with SOEs, private firms are generally regarded as of lower social and economic position and lack governmental support for business resources (Ma & Parish, 2006). In this regard, firms with different types of ownership may have different relationships between firm value and environmental investment. Therefore, a dummy variable, *Owner,* was included, which is equal to 1 if the firm was ultimately controlled by private shareholders, and 0 otherwise.

Prior research suggests the existence of regional differences in economic and institutional developments in China (Walder, 1995). Given that corporate environmental efforts may vary with regional institutional context (Qin et al., 2019), a dummy variable was introduced to control the regional differences (*Regn*), which equals 1 if the firm's head office is in a developed region, and 0 otherwise. [59]

Research has also found that board independence (*BoardInd*), capital expenditure (*CAPEX*) and *growth* affect a firm's market value (Manchiraju and Rajgopal, 2017), therefore, all these variables were employed as control variables.

To control the industry effect on firm value in small samples, this paper grouped the 64 industries included in the sample into eight combined categories using the approach of Shen and Feng (2012): energy, biotechnology and pharmaceuticals, chemicals and rubber, paper, mining, metal and non-metal materials, food and beverage, and Others. However, a data review revealed that the firms in the paper industry contribute less than 2.5% of the full sample thus these firms are unlikely to make any significant difference in the industry effect on dependent variables. Thus, to minimise the number of variables for the model, the paper industry was combined with the Others category, and six dummy variables I1-I6 were introduced to represent seven combined industries (see Table 4.1). Of note, in order to compare and control the variations of firm environmental reporting between environmentally sensitive industries, all the non-environmentally sensitive

[59] The developed and non-developed regions were categorised based on their marketisation levels (Wang, Fan, & Hu, 2018). Regions with a marketisation index above the mean value are considered developed regions. Specifically, these regions are Shanghai, Beijing, Jiangsu, Fujian, Hubei, Zhejiang, Shandong, Tianjin, Guangdong, Anhui, and Henan.

industries were grouped into the Others category, which functions as a reference for comparison.

With regard to the year effect, three dummies (Y1-Y3) were employed to distinguish different years in 2016-2019 (see Table 4.1). All the variables are defined in Table 4.1.

Table 4. 1 Variable descriptions

Type	Variable	Description
DV	TBQ	Tobin's Q= total market value/ (total assets-intangible assets-goodwill); the calculation is based on the data at end of the current year. [60]
IVs	EISs	Percentage of environmental investment scaled by sales (last year)
	EISr	Percentage of environmental investment scaled by total assets (last year)
MVs	EDI	Quality of environmental reporting, including EDIeD, EDI$D, EDIeHL, and EDI$HL
	EDIeD	Act of emissions reporting (EDIeD=1 if disclosed; 0 otherwise)
	EDI$D	Act of monetary reporting (EDI$D=1 if disclosed; 0 otherwise)
	EDIeHL	Level of emissions disclosure (EDIeHL=1 if the number of emissions Disclosures > sample median; 0 otherwise),
	EDI$HL	Level of monetary disclosure (EDI$HL=1 if the number of monetary Disclosures > sample median; 0 otherwise),
	VIS	Organisational visibility, measured by BaiduHL and AnalystHL
	BaiduHL	Baidu index
	AnalystHL`	Number of following analysts
CVs	Employee	The number of employees at end of the current year, log-transformed
	ROA	The ratio of net income over total assets at end of the current year
	LEV	The ratio of total debts over total assets
	OC	Ownership centralisation, percentage of the top shareholding
	BTM	Book-to-market ratio, current year
	OCF	The sum of cash flows from operating activities, scaled by total assets, current year data
	MEP	Required by the MEP=1, 0 otherwise
	Owner	Private=1; otherwise=0
	Regn	Regional difference,1= developed, 0=otherwise
	Y1, Y2, Y3	Three dummies representing 4 individual years: 000=2016, 100=2017, 010=2018, 001=2019
	I1, I2, …I6	Six dummies representing 7 industries: 000000, others 100000, energy 010000, biotechnology and pharmaceuticals 001000, chemicals and rubber; 101, mining 000100, mining 000010, metal and non-metal materials 000001, food and beverage.
	BoardInd	The number of independent directors over the total number in the board
	CAPEX	Capital expenditure during the year/total assets at the end of the year
	Growth	Sales growth is defined as $(sales_t - sales_{t-1})/sales_{t-1}$

Note: DV, IVs, and CVs respectively stand for the dependent variables, independent variables, and control variables.

[60] The formula is provided by the user guide of the CSMAR database.

To control for the effect of potential outliers, all the continuous variables were winsorized at 1% in each tail.

5. Results

5.1 Sample distribution, descriptive statistics and correlations

The full sample used in the study contains 367 firm-year observations with environmental investment data during the test period. Table 4.2 details the distribution of the firms by year and industry. The number of firms is 50, 103, 106 and 108, respectively, in 2016, 2017, 2018, and 2019. The firm-year observations were distributed among seven combined industry categories, where the chemical industry was the largest including 151 (41.14%) firm-years. In contrast, the energy industry was the smallest category containing 10 (2.72%) firm-years. Though the full sample also contains firms from non-environmentally-sensitive firms (18.8% of all the sample firms), the industry distribution suggests that the majority of the full sample (81.2%) is comprised of environmentally-sensitive firms. Therefore, most of the sample firms are required environmental disclosers by the MEP.

Table 4. 2 Sample description: distribution by year and industry

Year	**Firms**	**Percentage (%)**
2016	50	13.62
2017	103	28.07
2018	106	28.88
2019	108	29.43
Total	*367*	*100*
Industry	**Firm-years**	**Percentage (%)**
Energy	10	2.72%
Biotechnology and Pharmaceuticals	33	8.99%
Chemical	151	41.14%
Mining	41	11.17%
Metal and Non-metal	50	13.62%
Food and Beverage	13	3.54%
Others	69	18.80%
Total	*367*	*100*

Table 4.3 illustrates the descriptive statistics for the model variables and their correlations. With regard to the dependent variables, the mean score of Tobin's Q was 1.03 (S.D.= 0.74). For the independent variables, environmental investment per 100 RMB dollars of sales was 1.31 (S.D.=1.59), showing a low average but a wide range of investment levels.

This suggests that this sample is reasonably representative of firms making various levels of environmental investment. For the moderator variables, public attention (*BaiduHL*) and analyst coverage (*AnalystHL*) were positively correlated with each other at a moderate level ($p<0.01, r=0.3$), suggesting that they are suitable measures for the two dimensions of organisational visibility. Similarly, emissions reporting and monetary environmental reporting, as well as the quality of emissions reporting and the quality of monetary reporting, were positively correlated (for the act of reporting: $p<0.01, r>0.4;$ for the quality of reporting: $p<0.01, r>0.27$). These statistics show that they are appropriate pairs of measures for environmental reporting.

The correlation statistics also indicate the existence of significant inter-correlations among the variables; therefore, multicollinearity was examined for each model. All the variance inflation factors (VIFs) were less than 10 (Myers, 1990) and all the tolerance levels were more than 0.2 (Menard, 1995). Thus, potential multicollinearity does not appear to be an issue.

Table 4. 3 Descriptive statistics and correlations of the full sample (part 1)

Full sample N=367											
Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. *TBQ*	1.026	0.741									
2. *Employee*	8.700	1.356	-0.59								
3. *ROA*	0.045	0.050	0.284								
4. *LEV*	0.480	0.189	-0.6	0.464	-0.38						
5. *OC*	0.413	0.156		0.275	0.155						
6. *BTM*	0.795	0.235	-0.872	0.569	-0.251	0.372	0.161				
7. *OCF*	0.072	0.065	0.131		0.599	-0.194	0.155	-0.129			
8. *MEP*	0.870	0.332			0.107				0.169		
9. *Owner*	0.250	0.434		-0.228			-0.233		-0.111		
10.*Regn*	0.660	0.475		0.134							-0.125
11.*BoardInd*	0.381	0.071	-0.107	0.266		0.142	0.132	0.124			-0.119
12.*CAPEX*	0.037	0.032							0.202		
13.*Growth*	0.133	0.228		0.106	0.296			-0.103	0.163		
14.*EISs*	1.305	1.586		-0.167		-0.147	-0.12			0.128	0.141
15.*BaiduHL*	0.501	0.501	-0.278	0.498		0.308		0.203			
16.*AnalystHL*	0.515	0.500	-0.14	0.542	0.333		0.16	0.139	0.233		
17.*EDIeD*	0.771	0.421	-0.248	0.397	0.116	0.15	0.174	0.185	0.111		-0.104
18.*EDI$D*	0.668	0.472	-0.17	0.35		0.218	0.183	0.129			-0.112
19.*EDIeHL*	0.485	0.500	-0.222	0.317		0.158	0.159	0.172			
20.*EDI$HL*	0.439	0.497	-0.135	0.215			0.112	0.12			

Note: only significant correlations are reported at p<0.05 (2-tailed)

Table 4.3 Descriptive statistics and correlations of the full sample (part 2)

Full sample N=367 (continued)												
Variable	Mean	S.D.	10	11	12	13	14	15	16	17	18	19
1. *TBQ*	1.026	0.741										
2. *Employee*	8.700	1.356										
3. *ROA*	0.045	0.050										
4. *LEV*	0.480	0.189										
5. *OC*	0.413	0.156										
6. *BTM*	0.795	0.235										
7. *OCF*	0.072	0.065										
8. *MEP*	0.870	0.332										
9. *Owner*	0.250	0.434										
10.*Regn*	0.660	0.475										
11.*BoardInd*	0.381	0.071										
12.*CAPEX*	0.037	0.032	0.138									
13.*Growth*	0.133	0.228										
14.*EISs*	1.305	1.586										
15.*BaiduHL*	0.501	0.501		0.162			-0.122	0.352				
16.*AnalystHL*	0.515	0.500		0.135	0.177	0.138	-0.106	0.3				
17.*EDIeD*	0.771	0.421	0.207	0.121				0.256	0.211			
18.*EDI$D*	0.668	0.472	0.111				-0.125	0.226	0.172	0.414		
19.*EDIeHL*	0.485	0.500	0.242					0.135	0.135	0.529	0.222	
20.*EDI$HL*	0.439	0.497			-0.106			0.352	0.122	0.286	0.624	0.274

Note: only significant correlations are reported at p<0.05 (2-tailed)

5.2 Hypothesis tests

Tables 4.4 and 4.5 report the results of the Ordinary Least Squares (OLS) regression of firm value for Hypotheses 1 through 3.

Starting with Table 4.4, Column 1 presents the results of the H1 test. It shows that the coefficient of corporate environmental investment (*EISs*) was negative and marginally significant (*p<0.1*), supporting H1.

Columns 2-3 report results for H2 that predicted that a firm's visibility level could reduce the negative effect of corporate environmental investment on firm value. H2 was tested separately using public attention (in Column 2) and analyst coverage (in Column 3) as a proxy for visibility. Column 2 reveals that both the main effects of investment level (*EISs)* and public attention level (*BaiduHL*) were negative and significant (*p<0.05*). The interaction term between investment level and public attention (*EISs* × *BaiduHL*) was positive and significant at the 5% level *(p<0.0.5)*, suggesting that higher levels of public attention attenuated the negative effect of environmental investment on firm value. The magnitude of the coefficient of *EISs* × *BaiduHL* (0.039) is greater than that of *EISs* (0.034), indicating that the relationship between firm value and environmental investment was positive for firms with high public attention. An F-test was undertaken to check the joint effect of *BaiduHL* and *EISs* × *BaiduHL*, which was found significant at the 10% level (*F=2.8; P<0.1*). As shown in Figure 4.1, higher firm visibility weakened the negative relationship.[61] In Column 3, the main effect of investment level was negative and significant, but the other coefficients associated with environmental investment and analyst coverage (*AnalystHL*) were not significant, suggesting that analyst coverage had no moderating effect on the investment-firm value relationship. Collectively, there was some evidence that supported H2.

H3 hypothesised that the quality of corporate environmental reporting could weaken the negative association between firm value and firm environmental investment level. Results for H3 are reported in Column 4 of Table 4.4 when the likelihood of substantive reporting is used as a proxy for environmental reporting quality, and in Columns 4 and 5 of Table

[61] In this paper, all the significant interactions were visualised using the approach introduced by Aiken et al. (1991), unless stated otherwise.

4.5 when the level of substantive reporting is used. For completeness, Tables 4.4 and 4.5 are structured in the same way, and hence, columns 1-3 for H1 and H2 are identical.

It is worth noting that while both emissions reporting and monetary environmental reporting are used to measure substantive reporting, Table 4.4 only reported the effect of the likelihood of monetary environmental reporting. This is because of the existence of data multicollinearity in the model between the environmental investment and the likelihood of emissions reporting.[62] In Column 4 of Table 4.4, the main effect of environmental investment (*EISs)* was negatively significant ($p<0.05$) and that of the monetary environmental reporting (*EDI$D*) was not significant. The interaction term between investment level and monetary environment reporting (*EISs* × *EDI$D*) was positive and significant at the 5% level ($p<0.05$), suggesting that higher-quality environmental reporting attenuated the negative effect of environmental investment on firm value. This provides support for H3. further, the magnitude of the positive coefficient of *EISs* × *EDI$D* (0.039) is only marginally greater than that of the negative coefficient of *EISs* (0.039). An F-test was undertaken to check the joint effect of *EDI$D* and *EISs* × *EDI$D*, which was found marginally significant at 10% ($F=2.16;\ p=0.11$). Figure 4.2 depicts the interaction effect between environmental investment and the possibility of monetary environmental reporting and, this shows the pattern of a negative relationship for the non-disclosers and almost no relationship for the disclosers. Overall, the significant and positive coefficient for the interaction term supports H3.

Column 5 of Table 4.4 reports the results for the robustness test that includes all moderating variables simultaneously, the results are consistent with those of the reduced models.

In respect of the effects of control variables, in all Columns 1-5 of Table 4.4, leverage (*LEV*), book-to-market ratio (*BTM*), level of operating cash flow (*OCF*), and the required disclosure by the MEP (*MEP*) were negatively associated with firm value (for *LEV*, *BTM* and *MEP*: $p<0.01$; for *OCF*: $p<0.1$). The results imply that the market value of firms with high levels of debts, or those under direct scrutiny from the MEP is lower than that of their counterparts. Moreover, the negative effect of operating cash flow on firm value is probably because the increase in operating cash flow is a consequence of reduced profit margin (e.g., purchases shrunk due to a decline in market share), which leads to a drop in

[62] 77% of the sampled firms disclosed emissions data, leading to a multicollinearity issue for the test of the interaction effect between emissions reporting and environmental investment.

market value (Ni et al., 2019). In addition, the negative effect of book-to-market ratio on firm value is technically consistent with the nature of Tobin's Q.

Regarding the industry effect on firm value, compared with those categorised in the Other industry, firms in the chemical and mining industries had higher firm value. Moreover, the level of corporate board independence was positively related to firm value ($p<0.01$), consistent with the view that independent directors on boards practise better corporate governance thus leading to higher firm value. This result is in line with the findings of prior studies (Di Giuli & Kostovetsky, 2014; Manchiraju and Rajgopal, 2017; Souther, 2021).

The remaining control variables were not found to have significant effects on firm value.

Table 4. 4 Estimates of firm value with reporting quality measured by the likelihood of reporting (full sample)

Dependent variable	*TBQ*				
	(1)	(2)	(3)	(4)	(5)
Independent variables and interactive items					
H1: *EISs*	-0.016*	-0.034**	-0.025**	-0.039**	-0.055***
	(0.01)	(0.013)	(0.012)	(0.016)	(0.017)
BaiduHL		-0.102**			-0.1**
		(0.046)			(0.048)
AnalystHL			-0.036		-0.008
			(0.05)		(0.05)
H2: *EISs × BaiduHL*		0.039**			0.033*
		(0.02)			(0.021)
EISs ×AnalystHL			0.029		0.009
			(0.021)		(0.023)
EDI$D				-0.03	-0.017
				(0.049)	(0.049)
H3: *EISs× EDI$D*				0.039**	0.035*
				(0.02)	(0.02)
Control variables					
Employee	-0.03*	-0.018	-0.028	-0.028	-0.016
	(0.018)	(0.02)	(0.021)	(0.019)	(0.022)
ROA	0.275	0.276	0.265	0.284	0.266
	(0.445)	(0.443)	(0.459)	(0.446)	(0.46)
LEV	-1.183***	-1.183***	-1.191***	-1.186***	-1.19***
	(0.195)	(0.104)	(0.105)	(0.105)	(0.105)
OC	0.195*	0.15	0.196*	0.182*	0.14
	(0.105)	(0.106)	(0.105)	(0.105)	(0.107)
BTM	-2.344***	-2.367***	-2.356***	-2.362***	-2.286***
	(0.095)	(0.095)	(0.096)	(0.095)	(0.096)
OCF	-0.548*	-0.601**	-0.588*	-0.577*	-0.638**
	(0.303)	(0.302)	(0.305)	(0.303)	(0.304)
MEP	-0.134***	-0.139***	-0.133***	-0.136***	-0.14***
	(0.05)	(0.051)	(0.051)	(0.051)	(0.051)
Owner	-0.048	-0.054	-0.051	-0.046	-0.051
	(0.036)	(0.037)	(0.036)	(0.036)	(0.037)
Regn	0.001	-0.005	0.003	0.002	-0.003
	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)
Y1	-0.017	-0.015	-0.02	-0.012	-0.011
	(0.052)	(0.052)	(0.052)	(0.052)	(0.052)
Y2	-0.052	-0.053	-0.055	0.041	-0.044
	(0.055)	(0.055)	(0.055)	(0.056)	(0.056)
Y3	-0.038	-0.044	-0.04	-0.031	-0.039
	(0.053)	(0.054)	(0.053)	(0.053)	(0.055)
I1	-0.147	0.154	0.121	0.146	0.148
	(0.013)	(0.103)	(0.105)	(0.103)	(0.105)
I2	0.08	0.059	0.079	0.072	0.052
	(0.063)	(0.064)	(0.063)	(0.063)	(0.064)
I3	0.135***	0.132***	0.127***	0.143***	0.142***
	(0.048)	(0.048)	(0.049)	(0.051)	(0.051)
I4	0.216***	0.212***	0.206***	0.209***	0.204***
	(0.062)	(0.062)	(0.063)	(0.062)	(0.062)
I5	0.055	0.065	0.041	0.049	0.056
	(0.057)	(0.058)	(0.058)	(0.057)	(0.059)
I6	-0.13	-0.146*	-0.144*	-0.133	-0.153*
	(0.091)	(0.091)	(0.092)	(0.091)	(0.092)
BoardInd	0.464**	0.554**	0.504**	0.519**	0.61***
	(0.227)	(0.229)	(0.229)	(0.228)	(0.231)
CAPEX	0.339	0.456	0.322	0.37	0.487
	(0.49)	(0.49)	(0.492)	(0.49)	(0.495)
Growth	-0.094	-0.095	-0.093	-0.087	-0.085
	(0.073)	(0.073)	(0.074)	(0.074)	(0.074)
Constant	3.579***	3.542***	3.58***	3.57***	3.526***
	(0.151)	(0.155)	(0.163)	(0.151)	(0.167)
# Observations	367	367	367	367	367
Adjusted R^2	0.858	0.859	0.858	0.868	0.859

*Note: standard errors are in parentheses; *p<0.1; **p<0.05; ***p<0.01(two-tailed test).*

Figure 4.1 Moderating effect of public attention on the association between corporate environmental investment and firm value (full sample)

Figure 4. 1 Moderating effect of public attention on the association between corporate environmental investment and firm value (full sample)

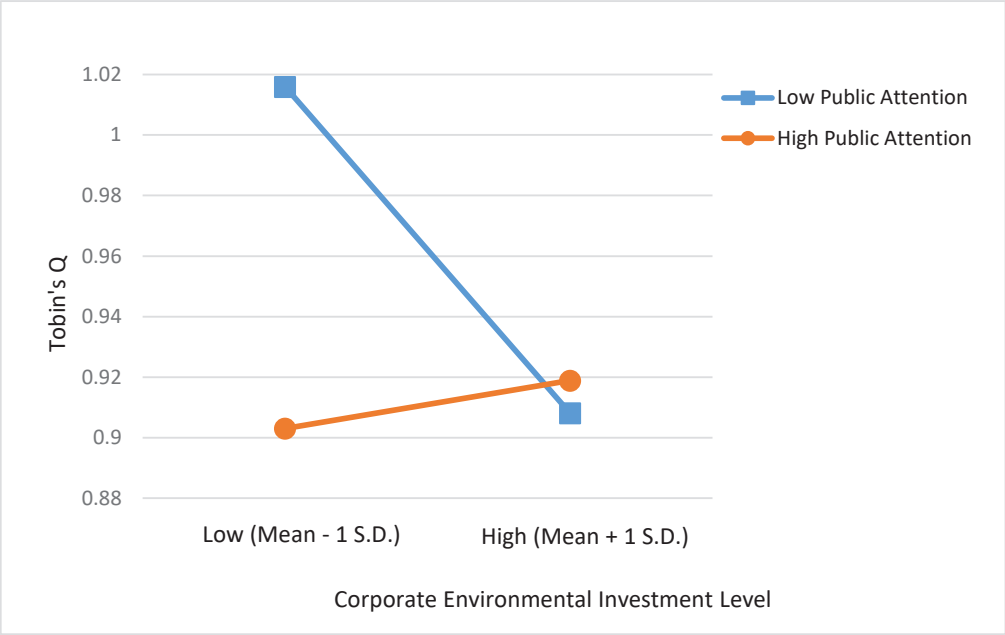


Figure 4. 2 Interaction effect between monetary environmental reporting and corporate environmental investment on firm value (full sample)

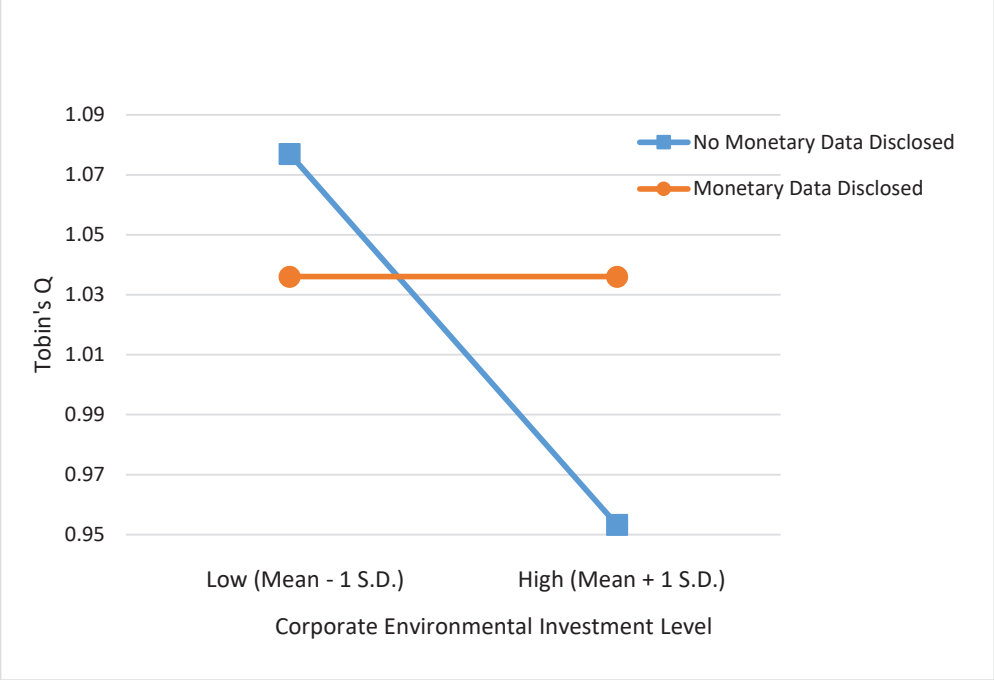


Table 4.5 further reports the results for H3 when the level of substantive emissions and monetary reporting (*EDIeHL* and *EDI$HL*) were used. For completeness, Columns 1-3

were reported with the same results as those in Table 4.4. Columns 4 and 5 reveal that both interaction terms (*EISs* × *EDIeHL* and *EISs* × *EDI$HL*) were insignificant. This means that no significant interaction effects were found when the level of substantiveness of emissions or monetary reporting was used.

Column 6 shows results for the robustness test that includes all moderating variables simultaneously. The results are largely consistent with those of the reduced models.

In addition, the coefficients for the control variables are consistent with that in Table 4.4 in terms of signs and significance levels.

Table 4. 5 Estimates of firm value with reporting quality measured by the substantive level of disclosures (full sample)

Dependent variable	*TBQ*					
	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables and interactive items						
H1: *EISs*	-0.016*	-0.034**	-0.025**	-0.023*	-0.019*	-0.038**
	(0.01)	(0.013)	(0.012)	(0.014)	(0.013)	(0.018)
BaiduHL		-0.102**				-0.091*
		(0.046)				(0.05)
AnalystHL			-0.036			-0.022
		(0.05)	(0.05)			(0.051)
H2: *EISs* × *BaiduHL*		0.039**				0.037*
		(0.02)				(0.023)
EISs ×*AnalystHL*			0.029			0.016
			(0.021)			(0.023)
EDIeHL				-0.089**		-0.052
				(0.043)		(0.046)
EDI$HL					-0.046	-0.029
					(0.04)	(0.041)
H3: *EISs* × *EDIeHL*				0.013		-0.007
				(0.019)		(0.022)
EISs× *EDI$HL*					0.009	0.01
					(0.02)	(0.02)
Control variables						
Employee	-0.03*	-0.018	-0.028	-0.025	-0.028	-0.012
	(0.018)	(0.02)	(0.021)	(0.019)	(0.019)	(0.022)
ROA	0.275	0.276	0.265	0.304	0.283	0.301
	(0.445)	(0.443)	(0.459)	(0.443)	(0.446)	(0.458)
LEV	-1.183***	-1.183***	-1.191***	-1.177***	-1.19***	-1.191***
	(0.195)	(0.104)	(0.105)	(0.104)	(0.105)	(0.105)
OC	0.195*	0.15	0.196*	0.211**	0.195*	0.168
	(0.105)	(0.106)	(0.105)	(0.105)	(0.105)	(0.107)
BTM	-2.344***	-2.367***	-2.356***	-2.351***	-2.342***	-2.38***
	(0.095)	(0.095)	(0.096)	(0.094)	(0.095)	(0.097)
OCF	-0.548*	-0.601**	-0.588*	-0.563*	-0.528*	-0.622**
	(0.303)	(0.302)	(0.305)	(0.302)	(0.304)	(0.305)
MEP	-0.134***	-0.139***	-0.133***	-0.129**	-0.133***	-0.013**
	(0.05)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)
Owner	-0.048	-0.054	-0.051	-0.041	-0.045	-0.048
	(0.036)	(0.037)	(0.036)	(0.036)	(0.051)	(0.038)
Regn	0.001	-0.005	0.003	0.019	0.002	0.012
	(0.034)	(0.034)	(0.034)	(0.035)	(0.034)	(0.036)
Y1	-0.017	-0.015	-0.02	-0.016	-0.018	-0.021
	(0.052)	(0.052)	(0.052)	(0.052)	(0.052)	(0.052)
Y2	-0.052	-0.053	-0.055	-0.046	-0.057	-0.054
	(0.055)	(0.055)	(0.055)	(0.055)	(0.056)	(0.057)
Y3	-0.038	-0.044	-0.04	-0.03	-0.045	-0.046
	(0.053)	(0.054)	(0.053)	(0.053)	(0.053)	(0.055)
I1	-0.147	0.154	0.121	0.145	0.143	0.123
	(0.013)	(0.103)	(0.105)	(0.103)	(0.103)	(0.106)
I2	0.08	0.059	0.079	0.067	0.077	0.051
	(0.063)	(0.064)	(0.063)	(0.063)	(0.063)	(0.064)
I3	0.135***	0.132***	0.127***	0.132***	0.125**	0.123**
	(0.048)	(0.048)	(0.049)	(0.048)	(0.05)	(0.05)
I4	0.216***	0.212***	0.206***	0.238***	0.216***	0.223***
	(0.062)	(0.062)	(0.063)	(0.062)	(0.062)	(0.064)
I5	0.055	0.065	0.041	0.072	0.055	0.067
	(0.057)	(0.058)	(0.058)	(0.058)	(0.057)	(0.06)
I6	-0.13	-0.146*	-0.144*	-0.141*	-0.132	-0.158*
	(0.091)	(0.091)	(0.092)	(0.091)	(0.091)	(0.092)
BoardInd	0.464**	0.554**	0.504**	0.468**	0.476**	0.58**
	(0.227)	(0.229)	(0.229)	(0.226)	(0.227)	(0.231)
CAPEX	0.339	0.456	0.322	0.33	0.276	0.367
	(0.49)	(0.49)	(0.492)	(0.489)	(0.494)	(0.498)
Growth	-0.094	-0.095	-0.093	-0.092	-0.103	-0.095
	(0.073)	(0.073)	(0.074)	(0.073)	(0.074)	(0.074)
Constant	3.579***	3.542***	3.58***	3.545***	3.587***	3.513***
	(0.151)	(0.155)	(0.163)	(0.151)	(0.152)	(0.169)
# Observations	367	367	367	367	367	367
Adjusted R^2	0.858	0.859	0.858	0.859	0.857	0.859

*Note: standard errors are in parentheses; *p<0.1; **p<0.05; ***p<0.01(two-tailed test).*

5.3 Additional tests

To further examine the relationship between environmental investment and firm value, and the moderating effects of firm visibility and environmental reporting quality, this section considers the heterogeneity in the level of environmental investment.

According to Martin and Moser (2016), investors welcome small amounts of environmental investment, but they have not provided investors' responses to large amounts of the investment. Therefore, this additional test was undertaken to capture variations of the moderating effects of firm visibility and environmental reporting in a group where firms made a large environmental investment.

Based on the full sample, a sub-sample named highEI was formed by including firm-years that invested large amounts in environmental projects. Specifically, a firm-year was included only when its environmental investment amount is greater than the full sample's median environmental investment. [63]

Table 4.6 details the statistics for the additional H1, H2 and H3 tests based on the highEI sample. Again, Column 1 relates to H1, Columns 2-3 correspond with H2, Columns 4-5 display the results for the H3 test and Column 6 lists statistics for the model robustness check. The results show a negative but insignificant coefficient for *EISs* in Column 1, H1 was not supported.

The results in Column 2 suggest the main effects of both the *EISs* and *BaiduHL* were negative and significant (for *EISs*: $p<0.05$; for *BaiduHL*: $p<0.1$), and the coefficient for *EISs* × *BaiduHL* was positive and significant ($p<0.05$), meaning that a higher level of public attention reduced the negative effect of environmental investment on firm value. The magnitude of the positive coefficient of *EISs* × *BaiduHL* (0.037) is greater than that of the negative coefficient of *EISs* (0.033), implying that the relationship between firm value and environmental investment was positive for firms with a higher level of public attention. An F-test revealed that the joint effect of *BaiduHL* and *EISs* × *BaiduHL* was marginally significant at the 10% level ($F=2.26; p=0.11$).

The results in Column 3 show the main effect *EISs* were negative and significant ($p<0.05$), whereas that of *AnalystHL* was insignificant. Yet, the coefficient for *EISs* × *AnalystHL* was positively significant at the 10% level ($p<0.1$), meaning that a higher level

[63] The remaining were included in the lowEI group to test the same hypotheses as that for the highEI sample.

of analyst coverage reduced the negative effect of environmental investment on firm value. The magnitude of the positive coefficient of *EISs* × *AnalystHL* (0.033) is greater than that of the negative coefficient of *EISs* (0.024), indicating that the relationship between firm value and environmental investment was positive for firms with a higher level of analyst coverage.[64]

The above findings related to H1 and H2 suggest that for the sample with a high level of investment, H1 was not supported and H2 was supported, this contrasts with the results based on the full sample reported in Table 4.4, where H1 was supported and H2 was only partially supported. The interaction effects between *EISs* and *BaiduHL* and between *EISs* and *AnalystHL* are plotted in Figures 4.3 and 4.4. The patterns are consistent with the predictions.

In Column 4, the main effects of environmental investment (*EISs*) and emissions reporting level (*EDIeHL*) were negative and significant ($p<0.05$; $p<0.01$), and their interaction (*EISs* × *EDIeHL*) was positive and significant ($p<0.05$). These results suggest that higher levels of emissions reporting attenuated the negative effect of environmental investment on firm value for those firms making large environmental investments. The magnitude of the positive coefficient of *EISs* × *EDIeHL* (0.04) is greater than that of the negative coefficient of *EISs* (0.039), indicating that the relationship between firm value and environmental investment was positive for firms that disclose more substantive environmental information. An F-test was undertaken to check the joint effect of *EDIeHL* and *EISs* × *EDIeHL*, which was found significant at 5% ($F=4.63$; $p<0.05$). Figure 4.5 depicts the moderating effect of the emissions reporting level; the pattern is consistent with the expectation. In Column 5, no coefficients of interest were significant, suggesting that monetary substantive reporting had no moderating effect on the relationship between the investment and firm value when the investment level is high. Overall, the results provide some evidence to support H3 based on the sample of firm-years making large environmental investments.[65]

Column 6 shows results for the robustness test that includes all the variables simultaneously. Apart from the coefficients attached to visibility variables (i.e., *BaiduHL*, *AnalystHL*, *EISs* × *BaiduHL*, and *EISs* ×*AnalystHL*), the remaining results are consistent

[64] An F-test revealed that the joint effect of *AnalystHL* and *EISs* × *AnalystHL* was insignificant. but the interaction term (*EISs* × *AnalystHL*) passed the F-test at 10% level ($F=3.32$; $p<0.1$).
[65] The three hypotheses were also tested for the sample of small environmental investment namely lowEI (see the prior footnote). Untabulated results show that none of the Hypotheses was supported.

with those of the reduced models. This is probably because the visibility variables and reporting variables influence *EISs* differently thus their joint effect in the model leads to insignificant coefficients of the visibility variables and their interaction terms.

Regarding the effects of control variables, leverage (*LEV*), book-to-market ratio (*BTM*) and required discloser (*MEP*) were negatively associated with firm value (*TBQ*), consistent with the results based on the full sample. However, in contrast, the cash flow from operating activities (*OCF*), industries and board independence (*BoardInd*) had no effects on *TBQ*. Rather, capital expenditure (*CAPEX*) was positively related to *TBQ*, consistent with the logic that a firm's management seeks to maximize the firm's market value in making their capital expenditure decisions, particularly on large expenditures (McConnell & Muscarella, 1985).

Of note, an independent *t*-test suggests there is a significant difference in the mean value of size (*Employee*) between the full sample and the highEI sample ($p<0.001$, *Cohen's d effect size=1.31*). 95% of firms in the highEI sample are required disclosers hence they are closely monitored by the MEP. As a result, the same hypothesis tests applied to the highEI sample produced different findings from that based on the full sample as follows.

First, corporate environmental investment and analyst coverage had a significant interaction effect on firm value. This is because analysts are generally interested in large companies, or large investments (Lang & Lundholm 1996). As an information intermediary, analysts have a significant impact on shareholders' decision-making in relation to investments. In this regard, high-level analyst coverage can reduce the negative effect of environmental investment on firm value.

Second, in contrast to monetary reporting, the quality of emissions reporting had a significant moderating effect on the relationship between firm value and environmental investment. This is a contribution to the CSR reporting literature in the sense that a firm's substantive environmental reporting plays an important role in legitimising a firm's environmental effort (i.e., large investment). The coefficient of substantive monetary reporting was not significant as many firms did not disclose detailed monetary information in addition to the total environmental investment.

Finally, regarding the effects of control variables, the operating cash flow (*OCF*) and board independence (*BoardInd*) were not significant for the hypothesis tests based on the highEI sample. Instead, the level of capital expenditure was positively associated with

firm value. Perhaps this is because in the highEI sample, most firms have a large scale of production, and 95% of them are closely monitored by the MEP. When they can make a large environmental investment under the MEP's pressure, they are likely to allocate large capital expenditures to other projects as well. Though the value of these investments is subject to investors' evaluation (Chung et al., 1998), managers are always keen to make each of these investments look like a wise decision to maximise shareholders' wealth. This leads to an increase in a firm market value (McConnell & Muscarella, 1985).

Table 4. 6 Report of additional tests for moderating effects of visibility and environmental reporting (highEI)

Dependent variable	*TBQ*					
	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables and interactive items						
H1: *EISs*	-0.012	-0.033**	-0.024**	-0.039***	-0.016	-0.056***
	(0.009)	(0.013)	(0.012)	(0.15)	(0.012)	(0.019)
BaiduHL		-0.095*				-0.055
		(0.055)				(0.061)
AnalystHL			-0.055			-0.055
			(0.055)			(0.056)
H2: *EISs* × *BaiduHL*		0.037**				0.018
		(0.018)				(0.022)
EISs ×*AnalystHL*			0.033*			0.021
			(0.018)			(0.019)
EDIeHL				-0.154***		-0.123**
				(0.051)		(0.057)
EDI$HL					-0.056	-0.042
					(0.044)	(0.045)
H3: *EISs* × *EDIeHL*				0.04**		0.028*
				(0.018)		(0.021)
EISs× *EDI$HL*					0.006	0.01
					(0.016)	(0.016)
Control variables						
Employee	-0.036	-0.035	-0.034	-0.033	-0.034	-0.024
	(0.023)	(0.024)	(0.024)	(0.023)	(0.023)	(0.025)
ROA	0.15	0.094	0.14	0.001	0.119	0.017
	(0.498)	(0.496)	(0.503)	(0.49)	(0.499)	(0.501)
LEV	-1.115***	-1.142***	-1.148***	-1.144***	-1.125***	-1.185***
	(0.116)	(0.116)	(0.118)	(0.114)	(0.117)	(0.118)
OC	0.116	0.102	0.111	0.094	0.104	0.07
	(0.114)	(0.114)	(0.116)	(0.112)	(0.115)	(0.116)
BTM	-1.958***	-1.971***	-1.974***	-1.949***	-1.956***	-1.98***
	(0.111)	(0.111)	(0.112)	(0.109)	(0.112)	(0.112)
OCF	-0.349	-0.391	-0.43	-0.34	-0.336	-0.422
	(0.361)	(0.359)	(0.363)	(0.354)	(0.361)	(0.362)
MEP	-0.191**	-0.197**	-0.211**	-0.287***	-0.208**	-0.293***
	(0.08)	(0.08)	(0.081)	(0.087)	(0.082)	(0.092)
Owner	-0.066*	-0.076*	-0.071*	-0.056	-0.061	-0.055
	(0.038)	(0.04)	(0.038)	(0.037)	(0.038)	(0.041)
Regn	-0.003	-0.001	-0.006	0.024	-0.006	0.014
	(0.036)	(0.036)	(0.036)	(0.037)	(0.036)	(0.037)
Y1	-0.017	-0.015	-0.029	-0.005	-0.021	-0.018
	(0.056)	(0.056)	(0.056)	(0.055)	(0.056)	(0.057)
Y2	-0.021	-0.021	-0.029	0.007	-0.022	-0.002
	(0.057)	(0.057)	(0.057)	(0.056)	(0.058)	(0.059)
Y3	-0.01	-0.009	-0.014	0.014	-0.012	0.003
	(0.054)	(0.056)	(0.054)	(0.054)	(0.054)	(0.057)
I1	0.007	0.04	0.025	0.096	0.07	0.057
	(0.101)	(0.102)	(0.105)	(0.099)	(0.101)	(0.107)
I2	0.0051	0.016	0.039	0.009	0.059	0.065
	(0.082)	(0.083)	(0.082)	(0.081)	(0.082)	(0.085)
I3	0.08	0.051	0.062	0.1	0.066	0.07
	(0.065)	(0.066)	(0.066)	(0.065)	(0.066)	(0.069)
I4	0.086	0.061	0.071	0.14**	0.085	0.115*
	(0.068)	(0.068)	(0.069)	(0.069)	(0.068)	(0.074)
I5	0.027	0.011	0.006	0.089	0.024	0.066
	(0.068)	(0.069)	(0.069)	(0.07)	(0.068)	(0.075)
I6	-0.121	-0.139	-0.165	-0.123	-0.136	-0.17
	(0.176)	(0.176)	(0.179)	(0.174)	(0.177)	(0.179)
BoardInd	-0.045	0.057	-0.002	-0.101	-0.064	-0.019
	(0.257)	(0.26)	(0.257)	(0.253)	(0.258)	(0.263)
CAPEX	1.35**	1.388**	1.3**	1.341**	1.227**	1.32**
	(0.582)	(0.579)	(0.584)	(0.57)	(0.589)	(0.589)
Growth	-0.129	-0.109	-0.117	-0.091	-0.12	-0.067
	(0.087)	(0.086)	(0.087)	(0.086)	(0.087)	(0.088)
Constant	3.53***	3.62***	3.61***	3.669***	3.591***	3.733***
	(0.212)	(0.218)	(0.215)	(0.219)	(0.216)	(0.228)
# Observations	184	184	184	184	184	184
Adjusted R^2	0.881	0.883	0.883	0.887	0.882	0.885

*Note: standard errors are in parentheses; *p<0.1; **p<0.05; ***p<0.01(two-tailed test).*

Figure 4. 3 Moderating effect of public attention on the association between corporate environmental investment and firm value for firms making large investments (highEI)

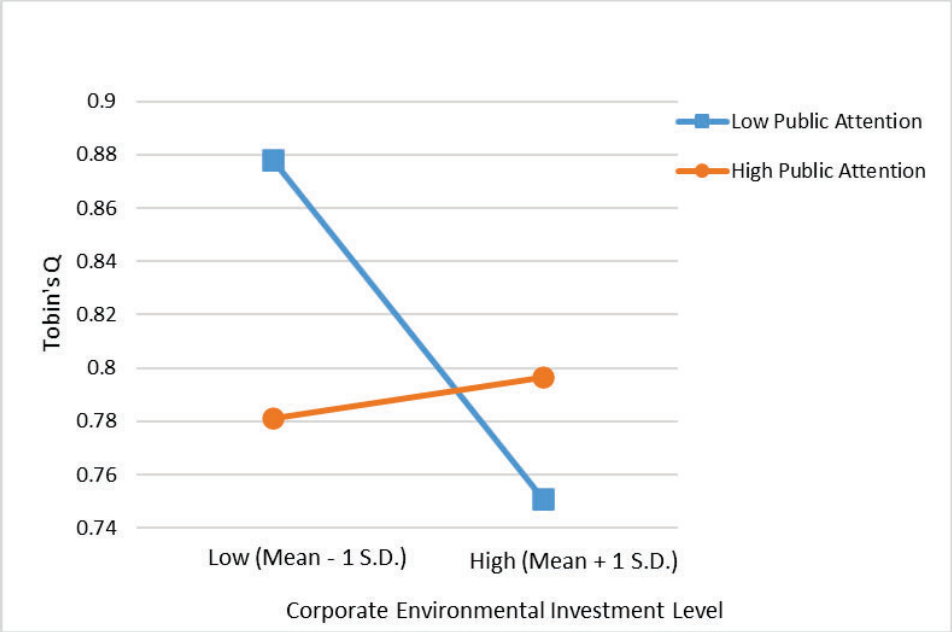


Figure 4. 4 Interaction effect between corporate environmental investment and analyst coverage on firm value (highEI)

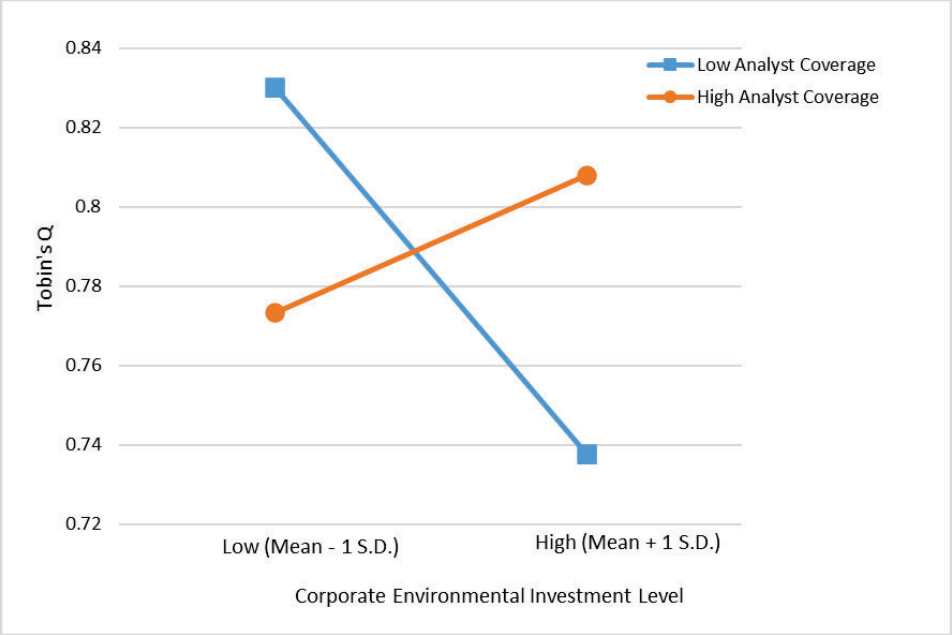
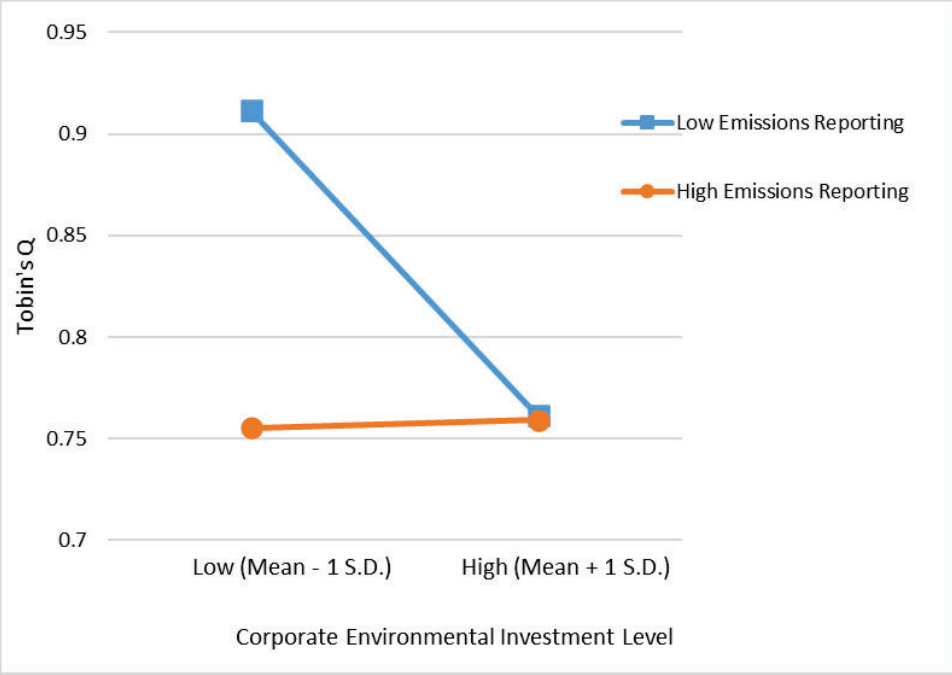


Figure 4. 5 Moderating effect of emissions reporting on the association between corporate environmental investment and firm value for firms making large investments (highEI)



5.4 Endogeneity

The CSR literature suggests that some studies on the relationship between CSR efforts and firm value are clouded by potential endogeneity such as reverse causality or omitted variable issues (Margolis, Elfenbein, & Walsh, 2009). Following prior research (Bhattacharyya & Rahman 2020; Manchiraju & Rajgopal, 2017), this paper considers corporate environmental investment as a potentially endogenous variable. Therefore, this subsection attempts to address the concerns about omitted variables and the potential reverse causality between corporate environmental investment and firm value.

The two-stage residual inclusion (2SRI) method was employed to examine the above endogeneity concerns. This approach was first introduced by Hausman (1978) in a linear context to address endogeneity issues. In contrast, the two-stage predictor substitution (2SPS) is the rote extension (to a non-linear context) of the traditional linear two-stage least squares estimator (2SLS). Regarding the efficiency of correcting endogeneity bias, the 2SRI is preferred to the 2SPS because it has been proven as able to produce more consistent coefficient estimates, particularly in a model with "limited-dependent variables, count variables and skewed distributions" (Terza, Basu, & Rathouz, 2008, p. 532).

Similar to the 2SLS and 2SPS, at the first stage, the 2SRI regression is processed using the traditional instrumental variable approach, where at least one instrumental variable is needed. An instrument should satisfy the conditions of relevance and exclusion. In other words, it must be correlated to the endogenous variable (*EISs* in this case), and unrelated to the dependent variable (Tobin's Q in this case). Following the approach of prior research (e.g., Erhemjamts & Venkateswaran, 2013; Wang & Qian, 2011), the instrumental variable was assigned the mean *EISs* for firms within the same industry in the same year.[66] Driven by intra-industry mimetic forces, levels of environmental investment in a firm are likely associated with industry trends, but levels of environmental investment of industry peers are unlikely to directly affect a firm's market value. For each sample, the relevance of the instrumental variable was tested using the Stock-Yogo test and Kleibergen-Paap-LM statistic. Both supported that in the full sample (N=367), the industry average EISs were a strong instrument for the tests of the negative effect of environmental investment, and interaction effects of both public attention and monetary disclosure.[67] Whereas, for the highEIS sample, for the tests regarding the interaction effects of analyst coverage and emissions reporting, the Kleibergen-Paap-LM statistic was significant thus it confirmed the relevance of the instrument. However, the Stock-Yogo test failed, suggesting that the selected instrument was not strong, probably due to the reduced statistical power of the small sample size (N=184).

The 2SRI regression estimation includes two steps. In the first stage, for each of Models 1-3, the target endogenous variable (*EISs*) was regressed on the instrument (*aveEISs*) and the residuals were saved. In the second stage, each of the initial models was performed by including the residual item derived from the first stage as an additional regressor. The 2SRI estimates (see Appendix C1, Tables C1.1 and C1.2 report the results for the full sample and the highEI sample respectively) suggest that all the interactions are qualitatively consistent with the results based on the full sample (Table 4.4) and the highEI sample (Table 4.6). Accordingly, it appears that the potential endogeneity does not significantly affect the inferences about the interaction effects of interest.

[66] Though firms in paper industry were categorised in the Other group, their industry average was calculated separately from the remaining in the Other category. Moreover, the industry average EISs was calculated based on the full sample, and this value was assigned to the instrument to perform the tests in both the full sample and the highEIS sample.

[67] For the tests regarding the *EISs* effect and the moderating effect of *EDI$D*, the Cragg-Donald F-statistic was consistently larger than the Stock-Yogo critical value at 10%; for the test of the moderating effect of *BaiduHL*, the Cragg-Donald F-statistic was consistently larger than the Stock-Yogo critical value at 15% (Stock &Yogo, 2005). All the *p*-values of the Kleibergen-Paap-LM statistics were consistently below 0.001.

5.5 Robustness checks

Several steps were taken to check the robustness of all the models. First, *EISs* was replaced with *EISr*, another measure of corporate environmental investment level used in the literature (Jo, Kim, & Park, 2015; Jin & Xu, 2020; Chang, Li, & Lu, 2015). *EISr* is the total annual environmental investments as a percentage of total assets for each firm-year. Second, the number of employees (*employee*) was substituted by firm size, which was measured by the logarithm of total assets. Finally, to overcome the small sample concern for the additional tests (i.e., the sample size is less than 200), the bootstrapping approach was applied using 5,000 iterations for the regression analyses. The above tests have suggested that all the ensuring results and significance levels are qualitatively consistent.

Of note, for each set of hypothesis tests (see Tables 4-8), model robustness checks were performed by including all the variables and reporting the results in the last column of each table (i.e., Column 5 of Table 4.4, Columns 6 of Tables 4.5 and 4.6). Overall, the results were largely consistent with the main results in relevant individual columns.

6. Discussion and conclusion

This study examined how organisational visibility and environmental reporting influence the association between corporate environmental investment and firm value in the context of a developing country like China, where public awareness of CSR is weaker and average corporate environmental investment is lower than in developed countries. Essentially, for a firm that has made environmental investments, this association depends on how its shareholders interpret and evaluate these investments, given that weak public awareness of CSR might affect shareholders' valuation of corporate environmental efforts. Since shareholders' decision-making on share investments significantly relies on the quality of the information in their hands, this study argues that organisational visibility and environmental reporting can influence the association between corporate environmental investment and firm value. This is because high levels of organisational visibility can improve the degree of investor following through high levels of media exposure and analyst following, whereas substantive environmental disclosures can increase information transparency thus legitimising firm environmental investments (Marquis & Toffel, 2012).

The effect of organisational visibility was examined along two dimensions: public attention and analyst coverage. The results suggest that higher levels of public attention can weaken the short-term negative effect of environmental investment on firm value. This indicates that a firm with higher public attention is generally more prominent and popular (generic visibility), and this prominence and popularity suggest a better legitimacy being more valued by strategic shareholders. Moreover, higher generic visibility makes firms more concerned about their legitimacy with external stakeholders, such as government actors and civil society (Bansal & Roth, 2000). In this regard, they are more likely to make green investments for long-term benefits.

In contrast, analyst coverage is normally driven by a cost-and-benefit perspective. As an information intermediary for existing or potential investors, analysts generally pursue firms with large size/high visibility, sustainable profitability, or growth (Lang & Lundholm 1996). Therefore, a significant interaction effect between analyst coverage and environmental investment on firm value was found only in the sample of firms making large environmental investments (i.e., the highEI sample). In this group, firms are overall larger than in the full sample, and are more capable of making large investments. Thus, they are able to capture more attention from analysts. In shareholders' eyes, generally, firms with high levels of analyst coverage are more likely to have better returns from their investments. In this regard, a high level of analyst coverage can reduce the negative effect of environmental investment on firm value.

In China, firms that disclose emissions data or monetary environmental information are generally in environmentally sensitive industries or subject to compulsory CSR reporting. Hence, they are overseen by the MEP or stock exchanges in terms of environmental disclosures. Driven by the need for legitimacy with the above governmental agencies, many firms passively disclose required environmental information only. But still, some firms elect not to disclose emissions or monetary environmental information due to the concern about the negative impacts of substantive reporting on share value. Nevertheless, this study has found some evidence suggesting that firms that disclosed monetary data had a less negative relationship between environmental investment and firm value than those that did not disclose the data. The results also show that when firms made large environmental investments, high levels of emissions reporting could reduce the negative effect of environmental investment on firm value. Indeed, these findings support the view that environmental reporting functions as an effective tool for firms to legitimise their environmental efforts with their shareholders. In this regard, corporate environmental

reporting plays a crucial role in influencing shareholders' valuation of corporate environmental investment.

This study enriches the understanding of the organisational journey towards sustainable value creation in environmental endeavours. Given that the relationship between corporate environmental investment and firm value depends on how shareholders interpret these investments, the research findings suggest that organisational visibility and substantive environmental reporting can positively influence shareholders' valuation of firm value. Moreover, this paper adds to the CSR literature by showing that in a context where public awareness of CSR is weaker and corporate environmental investment is lower than in developed countries, shareholder's interpretations of a firm's environmental investments are affected by their cost-benefit analysis of the investment projects and the firm's legitimising efforts towards these investments. For example, shareholders may either take a firm's environmental investments as expenditures decreasing the firm's profitability, or value the social benefits generated by the investments in emissions reduction if the firm has disclosed more substantive environmental information to legitimise this effort. This is consistent with the literature in developed countries where the cost-benefit perspective and firm legitimising efforts are major influences on shareholders' valuation of corporate CSR investment (Adhikari, 2016; Barnea & Rubin, 2010; Deegan, 2006; Hahn & Lülfs, 2014; Tilling & Tilt, 2010). However, compared with developed countries, the weak awareness of CSR in Chinese society likely leads to low corporate environmental investment on average and lower quality of environmental reporting (Xu & Yang, 2010). The better quality of environmental responsibility practices for firms making large environmental investments might be the reason for the major findings produced in this study. This implies that in a transitional and developing economy like China, western theories are applicable to explain CSR issues in certain circumstances, and institutional variations between China and the West must be carefully considered when applying western theories to CSR research in China.

It is worth noting that tactical environmental reporting is not always preferred by Chinese companies, despite this being a popular legitimising strategy in the West (Deegan, 2006; De Villiers & Van Staden, 2006). Many Chinese firms, particularly those privately controlled, obtain legitimacy through rent-seeking other than strategic reporting, and their executives' political connections function as an effective channel for them to pursue these strategies (Chen et al., 2017; Marquis & Qian, 2014).[68] In doing this, they may not have

[68] Political connection was not included as a model variable in this paper due to the relatively small sample size. Moreover, 87% of the firms in the full sample and 95% of that in the highEI sample were closely

to make large environmental investments or disclose substantive environmental information. Article 2 has offered some evidence to support this view.

Since this study focuses on the short-term effects of organisational visibility and environmental reporting quality on the association between environmental investment and firm value, future research could examine their long-term effects. It would also be interesting to compare the organisational journey from an environmental endeavour to value creation in different institutional contexts.

Regarding the generalizability of the findings in this study, the process of sample selection might raise concerns because it targets firms with environmental issues. Substantive environmental reporting may be more critical to these firms and the related findings may not be found in other firms. Moreover, some idiosyncrasies of the Chinese bureaucratic system might also restrain the generalizability of the research conclusions. For example, prior research has found that compared with other countries, the government controls significant business resources in China and acts as the major driver of corporate environmental practice (Qin et al., 2019; Wang et al., 2018). However, as firms globalise, the findings in this study can help managers understand variations in CSR practice in a context that has trading connections with China.

monitored by the MEP, hence, the MEP was the major political driver for CER practice in this article. Therefore, political connections would not have a significant effect on the relationship between corporate environmental investment and firm value.

CHAPTER 5 CONCLUSION

As stated in Chapter 1, the overarching aim of this thesis is to examine the effects of CER-based relational strategies that firms use to handle legitimacy pressures from various stakeholders in China. Therefore, this chapter brings together the main findings of the CER frameworks developed in Article 1 and the major empirical findings of Articles 2 and 3 by linking them to the research aim (as discussed in Section 1). Moreover, theoretical and practical contributions are summarised (as presented in Section 2). In addition, the limitations of the research approach taken in this thesis are identified and areas for future research are provided based on the issues identified during the research process of this thesis (discussed in Section 3), followed by Section 4 which makes the final comments on the contributions.

1. Major findings in Articles 1-3

As mentioned in Chapter 1, business organisations enact institutional strategies as a tactical interaction with their institutional environment. One type of institutional strategy is relational strategy, which helps organisations to manage relationships with stakeholders and address legitimacy pressures imposed by these stakeholders. Given that CSR and CER commitments are considered important relational strategies that help firms maintain relationships with the government and other stakeholders, this thesis aims to examine the effects of CER-based relational strategies focusing more on corporate environmental reporting strategies, which firms use to handle legitimacy pressures from various stakeholders in China. To address this aim, three objectives were identified to construct a conceptual framework for CER practice and investigate the effects of CER-based strategies under the pressures from two important stakeholders: the government and shareholders. Subsections 1.1-1.3 elaborate on how Articles 1-3 serve these objectives. Section 1.4 summarises these findings.

1.1 CER framework for the Chinese institutional context

The first objective was to construct a comprehensive framework for the Chinese context, incorporating pressures from various stakeholders and other key factors that influence a firm's CER practice and performance. To achieve this objective, the idiosyncrasies of the Chinese institutional context needed to be considered and incorporated into a framework of CER practice. Specifically, as a transitional or mixed economy, China shares some

characteristics with that of free markets, for example, the trading rules of the share markets and the important role of shareholders in listed companies. However, it differs from developed economies in institutional conditions as government influences are stronger in China than in developed countries (Farashahi, & Hafsi, 2009; Hoskisson et al., 2000). In this regard, political factors that influence CER practice such as corporate ownership, political connection, and government pressures on CER practice, need to be integrated into the framework.

Article 1 serves the first objective by taking two steps. First, it developed a general CER framework (Figure 2.1) that is adaptable for both developed and developing economies. Importantly, in the component of "Stakeholder Pressure", stakeholders were split into an "institutional stakeholders" group and a "business-related stakeholders" group. This classification helps identify institutional forces and simplifies the analysis of stakeholder pressures. Moreover, the general framework provides the route along which stakeholder pressures drive a firm to pursue effective environmental management and CER practices for better environmental accountability, whereby a firm can achieve legitimacy with its stakeholders. In addition, this framework also suggests a fundamental journey for a firm to take towards environmental sustainability in environmental endeavours.

Second, the article produces an extended CER framework for the Chinese context (Figure 2.3) by incorporating political factors into relevant components. Specifically, corporate ownership and political connection are included in the component of "Company Characteristics". Moreover, the extended framework presents Chinese government pressures by separately illustrating the pressures from the central and regional governments, as government agencies at different bureaucratic hierarchies have various impacts on CER practice. Finally, the framework identifies the important role of environmental reporting as a relational strategy that connects a firm's CER proactivity and environmental legitimacy, given that it contributes to both the CER practice and environmental accountability. In this regard, Articles 2 and 3 focus on the effects of environmental reporting strategies that firms use to address stakeholder pressures.

In essence, because the Chinese CER framework is an extended framework from the general framework, it also depicts how stakeholder pressures drive a firm to achieve legitimacy through environmental management and CER practice for better environmental performance in the Chinese context. The linkages that sequentially

connect stakeholder pressures, CER practice, environmental accountability, and legitimacy theoretically support the hypothesis development in Articles 2 and 3.

1.2 Substantive versus symbolic reporting strategies

The second objective of this thesis was to examine when and why a Chinese firm employs a symbolic or substantive strategy of environmental reporting to address legitimacy pressures imposed by different Chinese government agencies. Article 2 addresses this objective.

Based on the extended framework constructed in Article 1, Article 2 integrates political ties (i.e., corporate ownership and political connection), and various coercive forces from the administrative hierarchy of CER reporting (Figure 3.2) into the framework for the hypothesis tests (Figure 3.1). Thus, the proposed framework assists in better empirical modelling of the institutional context of CER political monitoring in China.

The findings of Article 2 correspond to the second objective by showing that political ties and political monitoring are important factors that influence firms' selection of environmental reporting strategies. On the one hand, compared with state-owned enterprises, privately controlled firms generally perceive higher levels of legitimacy pressures imposed by government agencies due to the lack of governmental support in the acquisition of business resources. Consequently, private firms are more likely to disclose environmental information than SOEs. Their reporting strategy could be symbolic if they are not subject to high levels of political monitoring. Otherwise, when private firms are monitored by multiple government agencies (i.e., CSRC and SRA) or are party-embedded, private firms are more likely to pursue a substantive reporting strategy because high levels of political monitoring inform high degrees of decoupling risk.

On the other hand, Article 2 also finds that a firm's political connections function as a "supporting hand" that reduces the need for a firm to undertake a substantive reporting strategy to handle legitimacy pressures from government agencies, irrespective of the firm's ownership type. This finding indicates that in China, corporate political connections seem to be an effective intermediary that helps firms appear to be legitimate in the eyes of the government.

1.3 Effects of environmental reporting and organisational visibility on shareholders' valuation of environmental investment

The third objective of this thesis was to investigate whether and how environmental reporting and organisational visibility influence shareholders' views on firm environmental investment. Shareholders are an important group of business-related stakeholders (see Figure 2.3 in Article 1), they exert their pressure by exercising shareholders' rights and "voting with their feet". In this regard, shareholders' valuation of corporate investment has a significant impact on firm market value, and effective shareholder management is vital for business survival and success (Neely, Adams, & Kennerley, 2002).

Article 3 serves the third objective by studying two important factors in institutional research, which are corporate environmental reporting and organisational visibility. Hypotheses were developed to analyse how these factors affect shareholders' valuation of corporate environmental investment. Unlike Article 2 which targets the Chinese political institutions, Article 3 investigates the economic consequence of corporate environmental investment in China, a context where public awareness of CSR is weaker and corporate environmental investment is lower than in developed countries. This study finds that for the firms making large environmental investments, the hypotheses regarding the positive effects of environmental reporting and firm visibility on shareholders' valuation, were better supported than in the full sample. This was evidenced by the interaction effects of substantive emissions reporting and both dimensions of organisational visibility being found to be significant. This indicates that in a context with stronger institutional drivers for CER practice, substantive environmental reporting, or strategies to improve organisational visibility, are more likely to enhance shareholder management thus positively influencing shareholders' valuation of firms' environmental investments.

1.4 Summary and comments

Taking together, Article 1 contributes to the overarching research aim by providing a conceptual framework to analyse the effects of CER-based relational strategies that firms adopt to address legitimacy pressures imposed by various stakeholders in China. Drawing on the extended framework in Article 1, Article 2 serves the research aim by showing that, driven by the pressures from government agencies, firms may employ symbolic or substantive environmental reporting strategies to secure their legitimacy with these

agencies. This depends on the level of decoupling risk they perceive, and their political ties also shape their decision-making on the selection of environmental reporting strategies.

Article 3 serves the research aim by demonstrating the effects of substantive reporting strategy and strategies to improve organisational visibility that firms undertake to handle shareholder pressures. The findings imply that in a context where stronger institutional forces drive firms to make a higher environmental investment, the CER-based relational strategies such as substantive reporting, are more likely to enhance shareholder management and thus positively influence their valuation of environmental investment and firm value.

In essence, while Article 1 offers an extended framework to assist in the understanding of the institutional context for CER practice in China, Article 2 and Article 3 jointly provide empirical evidence to support the theoretical path proposed in the extended framework, along which stakeholder pressures drive firms to pursue effective environmental management and CER practice to improve accountability, and in turn achieve legitimacy with these stakeholders. In this regard, the three articles are connected and collectively contribute to the overarching aim.

2. Main Contributions

The contributions of this thesis are outlined as follows:

First, this thesis (as presented in Article 1) contributes to the CSR/CER literature by producing a general CER framework that is applicable in both free market and mixed economies, and an extended CER framework for the Chinese institutional context. The general framework differentiates stakeholder pressures on CER practice based on multiple theories. It creates linkages around key elements of the framework to construct a theoretical path, along which stakeholder pressures drive a firm to pursue effective environmental management and CER practice for better environmental accountability, whereby this firm can achieve environmental legitimacy with these stakeholders. As a result, trust relationships with these stakeholders are able to be established, which ultimately generates firm value that in turn encourages a firm to pursue more CER practices. This virtuous cycle reflects an effective journey for a firm to achieve environmental sustainability.

The extended framework incorporates the Chinese-specific features that impact CER practice in the Chinese institutional context, thus providing a theoretical basis for future studies in China. The process of extending the general framework illustrates how it can be modified for other contexts where western theories developed in free-market economies are not fully applicable. Specifically, stakeholder groups and company characteristics are key factors to adjust the general framework for a target context. In particular, the role of government should be considered the major CER driver in a transitional or developing economy due to the inefficient market and legal mechanisms.

Second, this thesis (as presented in Article 2) adds a political perspective to the CSR literature, showing that firms' environmental reporting strategies vary with their political ties and levels of political monitoring. As a relational strategy, corporate environmental reporting in private firms functions differently from that in SOEs. Specifically, environmental disclosure in private firms is regarded as a mechanism to legitimise their environmental performance; whereas, for the SOEs, environmental reporting is more about fulfilling accountability to the government hence their reporting substantiveness is significantly associated with the extent of law enforcement. In this regard, compared with the SOEs, private firms are more likely to undertake a substantive reporting strategy if they are subject to higher levels of political monitoring that lead to a high decoupling risk; otherwise, they might employ a symbolic reporting strategy if they perceive a low decoupling risk. However, political connections in private firms may buffer them from the need to pursue substantive reporting.

Third, this thesis (as presented in Article 3) contributes to the understanding of the theoretical links between corporate environmental efforts and firm value creation (as shown in the extended framework in Article 1), by illustrating that both substantive environmental reporting and organisational visibility can positively influence shareholders' valuation of corporate environmental investment. Moreover, the thesis adds to the CSR literature by showing that in a context where public awareness of CSR and corporate environmental investment are lower, and the quality of environmental reporting is poorer than in developed countries, shareholder's interpretations of a firm's environmental investments are affected by their cost-benefit analysis of the investment projects and the firm's legitimising efforts towards these investments. This is consistent with the literature in developed countries where the cost-benefit perspective and firm legitimising efforts are major influences on shareholders' valuation of corporate CSR investment (Adhikari, 2016; Tilling & Tilt, 2010).

Fourth, this thesis also makes several practical contributions. Since the Chinese CER framework in Article 1 can reflect how the SDGs drive a firm's environmental practice through stakeholder pressures, it could assist governments in promoting the implementation of the SDGs at the firm level. Moreover, both the general and extended CER frameworks can aid managers and policymakers to better understand and effectively analyse organisational behaviour regarding CER practice and environmental accountability. In particular, managers may benefit from an improved understanding of how company characteristics, stakeholder pressures and contextual factors contribute to obtaining legitimacy and creating firm value. In addition, the results in Article 2 regarding when and why firms undertake symbolic or substantive reporting strategies suggest that increased monitoring will lead firms to pursue substantive environmental reporting. This evidence may support Chinese governments and policymakers to take effective measures that motivate and drive firms to pursue substantive environmental reporting and thus be truly committed to CER activities.

Last, this thesis contributes to the literature on corporate institutional strategies in China by demonstrating how the idiosyncrasies of the Chinese institutional context can be incorporated into a framework for studying Chinese CER-based institutional strategies. Moreover, the three articles jointly contribute to the understanding of CER practice in China by showing the effects of CER-based relational strategies (e.g., corporate environmental reporting), which firms undertake to address legitimacy pressures from different stakeholders.

3. Limitations and future research

Even though both Articles 2 and 3 examine the effect of substantive reporting strategy that a firm uses to address stakeholder pressures, they cannot be connected directly, and their findings or results are not comparable with each other. This is because the data constraints in both studies lead to different research designs. The samples, test period and models are significantly different. Hence, it is impossible to obtain insights by comparing or contrasting these two articles.

In Article 2, given the CSRCMI data constraints in both the reporting likelihood and substantiveness analyses, the samples include only two years of activity for the period 2014-2015. In Article 3, because of the investment data constraints in all the regression analyses, the full sample contains 367 firm-years for the period 2016-2019. The small

samples might limit the statistical power. In this regard, future research on a similar topic may consider other settings free of this constraint.

Regarding endogeneity concerns, future research may develop more instrumental variables to improve the endogeneity tests in Article 3. Article 2 targets compulsory CSR reporters required by the stock exchanges in China. Future research may sample voluntary CSR reporters applying a similar methodology. Because compulsory reporting is generally urged by coercive forces from government agencies, whereas, voluntary reporting is driven by normative forces, for example, government signalling or social norms, it is interesting to examine the variations of reporting behaviours between compulsory and voluntary groups.

It is worth noting that the two CER frameworks developed provide research opportunities in relation to organisational CER behaviour. For example, Article 3 examines the short-term economic consequence of environmental investment and the results do not support the proposition that environmental effort leads to increased firm value in the CER frameworks. Therefore, future research may focus on the long-term effect of environmental investment on firm value. Future research can also examine the effect of pressures from other stakeholders and the potential interactions between different stakeholders.

4. Concluding comments

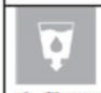
Since a deteriorating environment has resulted in various economic and social issues, environmental challenges are a key obstruction to the full implementation of the SDG 2030 Agenda that aims to protect the planet and benefit human beings. As a consequence, business organisations are increasingly required to contribute to the environmental SDGs through effective CER practices to improve their environmental performance. Therefore, Article 1 has developed a general CER framework and an extended framework for Chinese CER practice which are capable of linking these SDGs to corporate environmental behaviours. In this regard, these frameworks not only provide theoretical models to support CER-related studies but also aid policymakers and government agencies to promote the implementation of the SDGs at a micro-level. One version of Article 1 was published in 2019 and so far it has been cited by other publications 45

times.[69] Articles 2 and 3 can also contribute to this SDG goal because they were carefully designed based on the extended CER framework and the literature. Both articles provide empirical evidence to support the theoretical links from stakeholder pressures to environmental legitimacy in the extended CER framework. Their findings jointly contribute to the understanding of corporate environmental behaviour in China. With progress in the implementation of the global SDGs, these findings can assist government agencies and policymakers in further promoting the SDGs at the firm level by imposing stakeholder pressures.

[69] The citations are from the Google Scholar database as of 29 May 2022.

APPENDICES

Appendix A1. The 17 Sustainable Development Goals (SDGs)

 1. End poverty in all its forms everywhere.	 7. Ensure access to affordable, reliable, sustainable and modern energy for all.	 13. Take urgent action to combat climate change and its impacts.
 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture.	 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.	 14. Conserve and sustainable use of the oceans, seas and marine resources for sustainable development.
 3. Ensure healthy lives and promote well-being for all at all ages.	 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.	 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and biodiversity loss.
 4. Ensure inclusive and equitable quality education and promote life-long learning opportunities for all.	 10. Reduce inequality within and among countries.	 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
 5. Achieve gender equality and empower all women and girls.	 11. Make cities and human settlements inclusive, safe, resilient and sustainable.	 17. Strengthen the means of implementation and revitalise the global partnership for sustainable development.
 6. Ensure availability and sustainable management of water and sanitation for all.	 12. Ensure sustainable consumption and production patterns.	

Source: UNDP (2018a)

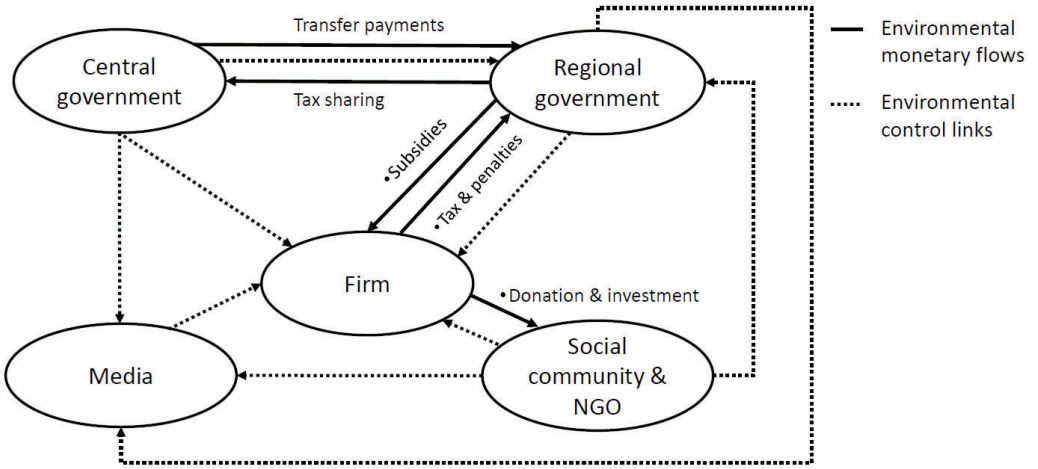
Appendix A2. Timeline of Key Environmental Policies in China

Stage	Year	Policy/law	Relate to
End-of-pipe-control (1973-1992)	1973	First national conference on environmental protection	All
	1979	Environmental Protection Law (initial)	All
	1983	Environmental protection-one basic national policy	All
	1992	China's Agenda 21	All
Whole-process control (1993-2005)	1993	The National People's Congress Environmental and Resources Protection Committee	All
	1995	Solid Waste Environmental Pollution Prevention and Control Law	12,14
	1998	The Energy Conservation Law of the People's Republic of China	7,12,13
	2003	Law of Promoting Cleaner Production	12,14
	2004	Circular economy policy	All
	2002-2005	The Law on Environmental Impact Assessment (G) The Law on Radioactive Pollution Prevention and Control (12) The Law on the Promotion of Renewable Energy (13)	G 12 13
Regional control (2006-present)	2006	Shenzhen Stock Exchange introduced environmental, social and governance (ESG) reporting guidelines	G
	2008	Shanghai Stock Exchange introduced ESG reporting guidelines	G
	2009	The Circular Economy Promotion Law	All
	2010	The low carbon economy (7,12,13) Environmental protection One-Vote Veto policy(G)	7,12,13 G
	2011	Chinese Climate Change Policies and Plans	13
	2013	Air Pollution Prevention and Control Action Plan	12
	2014	The Measures for the Self-Monitoring and Information Disclosure by the Enterprises subject to Intensive Monitoring and Control of the State (for Trial Implementation) (G) The Measures for the Pollution Sources Supervisory Monitoring and Information Disclosure by the Enterprises subject to Intensive Monitoring and Control of the State (for Trial Implementation) (G) Emission Trading Schemes on trial in seven regions (7,12,13)	G G 7,12,13
	2015	Environmental Protection Law (new) (All) Measures for the Disclosure of Environmental Information by Enterprises and Public Institutions (G)	All G
	2017	Environmental Protection Tax Law (12) Audit Rules on the handover of Natural Resource Assets against a leaving governmental official (Trial)（G）	12 G
	By 2020	The China Securities Regulatory Commission (CSRC) and the Ministry of Ecology and Environment (MEE): all Chinese listed companies will be subject to compulsory ESG reporting (Davies et al., 2018).	G

Note: the "Relate to" column only lists the most relevant SDGs, where G= Environmental Governance; 7, 12 & 13=SDGs 7, 12 & 13; All=all the environmental SDGs

Modified and extended from Bai et al. (2015)

Appendix A3. Monetary and control links in China's environmental co-governance system



Note: in the diagram, dotted lines represent control links whilst solid lines present monetary connections.

Chinese central government controls regional government through political centralisation and fiscal decentralisation. The monetary links between the central and regional governments include transfer payments from the central to the regional government and tax sharing from the regional to the central government. After a ten-year journey of the state-owned shareholding system reform in China, the number of SOEs has been significantly reduced. However, the remaining SOEs are large firms; most ex-SOEs still retain political connections within their organisations (Marquis & Qian, 2014). For example, statistics for 2018 show that SOEs were less than 40% of the total firms operating in China. The SOEs owned by the central government were less than 15% of the total firms, while the remaining were controlled by regional governments. Thus, the central government has limited direct control over firms. In contrast, regional governments have more direct control over SOEs, particularly those major contributors to regional GDP.

The Ministry of Ecology and Environment (MEE) supervises corporate environmental performance through regular on-site investigations and interviews. It issues enforcement notes to polluting firms and then requires a regional environmental bureau (REB) to complete the enforcement. Of note, regional environmental bureaus are primarily controlled by regional governments.

The Chinese regional governments have the authority to directly intervene in firms' CER practices through carrot-and-stick policies. The carrot policies embrace the provisions of tax benefits or subsidies that support firms to improve their environmental performance; the stick policies include collecting environmental taxes or penalties that are imposed on polluters. The collected money is subsequently allocated to environmental projects. REBs regularly investigate firms' environmental performance and enforce the determinations of MEE.

A firm is subject to social monitoring for its environmental performance. Unhappy NGOs or communities can complain to regional governments or engage the media to expose environmental damage. Meanwhile, a firm can receive or retain its legitimacy through philanthropic donations and green investments for social benefits.

Appendix B1. Environmental reporting regulations in China

Year	Issuing body/agency	Regulation/law
2003	State Environmental Protection Administration (SEPA)	Notice of Disclosure of Corporate Environmental Information
2006	Shenzhen Stock Exchange (SZSE)	Guide on Social Responsibility of Listed Companies
2007	State Environmental Protection Administration (SEPA)	Environmental Information Disclosure Method (Trial)
2008	Shanghai Stock Exchange (SSE)	Guidelines of the Shanghai Stock Exchange for Environmental Information Disclosure of Listed Companies
2010	Ministry of Environmental Protection (MEP)	Environmental information disclosure guidelines for listed companies
2011	Ministry of Environmental Protection (MEP)	Guidelines for the Preparation of Corporate Environmental Reporting
2012	Ministry of Environmental Protection (MEP)	Further Strengthening the Publicity of Environmental Protection Information Guidance
2014	Ministry of Environmental Protection (MEP)	The Measures for the Self-Monitoring and Information Disclosure by the Enterprises are subject to Intensive Monitoring and Control of the State (for Trial Implementation)
2014	Ministry of Environmental Protection (MEP)	The Measures for the Pollution Sources Supervisory Monitoring and Information Disclosure by the Enterprises subject to Intensive Monitoring and Control of the State (for Trial Implementation)
2014	State Council	Emergency Response Plan for National Sudden Environmental Events
2015	National People's Congress	Environmental Protection Law (new)
2015	Ministry of Environmental Protection (MEP)	Measures for the Disclosure of Environmental Information by Enterprises and Public Institutions
2015	Shanghai Stock Exchange (SSE)	Evaluation Methods of Information Disclosure of Listed Companies

Appendix C1. Endogeneity tests using two-stage residual inclusion (2SRI) model

Table C1.1 Endogeneity tests for the full sample

	Negative effect of environmental investment		Interaction effect of public attention		Interaction effect of monetary reporting	
	Stage 1	Stage 2	Stage 1	Stage 2	Stage 1	Stage 2
Variable	*EISs*	*TBQ*	*EISs*	*TBQ*	*EISs*	*TBQ*
aveEISs	0.975***		0.782***		1.099***	
	(0.24)		(0.272)		(0.371)	
BaiduHL			-0.887**	-0.105**		
			(0.422)	(0.05)		
EDI$D					0.2	-0.028
					(0.534)	(0.049)
EDIeHL						
aveEISs× BaiduHL			0.423*			
			(0.282)			
aveEISs× EDI$D					-0.151	
					(0.348)	
aveEISs× EDIeHL						
EISs		-0.27		-0.04		-0.063
		(0.047)		(0.47)		(0.048)
EISs× BaiduHL				**0.04****		
				(0.02)		
EISs× EDI$D						**0.039****
						(0.02)
EISs × EDIeHL						
Stage 1 Residual		0.012		-0.005		0.025
		(0.048)		(0.06)		(0.047)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.13	0.857	0.138	0.859	0.126	0.858
Observations	367	367	367	367	367	367

*Note: standard errors are in parentheses; *p<0.1; **p<0.05; ***p<0.01 (two-tailed test).*

Table C1.2 Endogeneity tests for highEI sample

	Interaction effect of public attention		Interaction effect of analyst coverage		Interaction effect of emission disclosure	
	Stage 1	Stage 2	Stage 1	Stage 2	Stage 1	Stage 2
Variable	*EISs*	*TBQ*	*EISs*	*TBQ*	*EISs*	*TBQ*
aveEISs	0.476		0.295		0.183	
	(0.544)		(0.517)		(0.487)	
BaiduHL	-2.27**	-0.095*				
	(0.946)	(0.062)				
AnalystHL			-2.62***	-0.035		
			(0.862)	(0.068)		
EDIeHL					-2.41***	-0.146***
					(0.773)	(0.052)
aveEISs× BaiduHL	0.976*					
	(0.557)					
aveEISs× AnalystHL			1.161**			
			(0.541)			
aveEISs× EDIeHL					1.55***	
					(0.488)	
EISs		-0.033		-0.006		-0.013
		(0.38)		(0.037)		(0.032)
EISs× BaiduHL		**0.037****				
		(0.018)				
EISs× AnalystHL				**0.32***		
				(0.018)		
EISs × EDIeHL						**0.037****
						(0.018)
Stage 1 Residual		0.0		-0.019		-0.027
		(0.036)		(0.037)		(0.029)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.26	0.883	0.279	0.882	0.272	0.886
Observations	184	184	184	184	184	184

Note: These endogeneity tests aim to address potential endogeneity concerns regarding the major findings in Article 3. Therefore, the statistics presented here are mainly related to significant interaction effects reported in Table 4.4 and Table 4.6. The *EISs* is the endogenous variable and the *aveEISs* is the instrumental variable. For each 2SRI test, the residual from stage one is included as a regressor in stage two.

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