A Study of the Relationships between Listed Companies' Environmental, Social and Governance (ESG) Reporting, Company Value and Investment Risk in Hong Kong

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This research was undertaken under the auspices of
The Hong Kong Management Association

Submitted in partial fulfilment for the award of the degree of
Doctor of Business Administration

University of Wales Trinity Saint David

2023

Declaration

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed: Kelvin Yiu Fai Leung

Date: 21 August 2023

STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Where correction services have been used the extent and nature of the correction is clearly marked in a footnote(s). Other sources are acknowledged by footnotes giving explicit references. A list of references is appended.

Signed: Kelvin Yiu Fai Leung

Date: 21 August 2023

STATEMENT 2

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Abstract

Driven by Environmental, Social and Governance (ESG) issues across the globe over the years, ESG reporting continues to grow as a top priority for listed companies on the Main Board of the Stock Exchange of Hong Kong Limited (listed companies). Nowadays, listed companies in Hong Kong Special Administrative Region of the People's Republic of China (Hong Kong) are expected to look beyond profit maximisation and demonstrate their accountability to various stakeholders including but not limited to shareholders, employees, creditors, suppliers, customers, community and government. In addition to changing business environment particularly during and post COVID-19 pandemic, ESG regulatory requirements have also been evolving and changing quickly. With effect from 1 July 2020, listed companies in Hong Kong are subject to the stringent disclosure requirements as stipulated in the ESG Reporting Guide under Appendix 27 to the Main Board Rules Governing the Listing of Securities on the Stock Exchange of Hong Kong Limited. In respect of ESG, the expectations of stakeholders are increasing together with more stringent ESG regulatory reporting requirements have been imposed for listed companies in Hong Kong from time to time.

This primary focus of this study is to examine ESG reporting and its quality in terms of ESG performance and the relationships with the company value and investment risk of listed companies in Hong Kong. The research aims of this study are to investigate how the board effectiveness affects ESG reporting and the value of ESG reporting. The research objectives of this study are to investigate the effects of board attributes on ESG performance, the relationship between ESG performance and the company value as well as the relationship between ESG performance and the investment risk.

Firstly, this study investigates the reasons for increasing the attention and efforts of the management in addressing ESG reporting in particular on a voluntary basis in addition to the legal regulatory requirements based on the mandatory basis and "comply or explain" basis together with the costs, benefits, contemporary challenges and issues in ESG reporting of listed companies in Hong Kong. Then, this study investigates how the board attributes affects ESG performance, the relationship between ESG performance and the company value as well as the relationship between ESG performance and the investment risk.

The research is guided by three research questions and has used quantitative research methods in order to answer the research questions.

The first research question addresses whether the board attributes affect ESG performance of listed companies in Hong Kong. This has been examined quantitatively using the fixed effects panel regression model. Based on the statistical results, there is evidence to infer that the separation of the roles of chairman and chief executive officer is statistically significant and positively related to the S&P Global ESG Score. This infers that a listed company with the board independence in terms of the separation of chairman and chief executive officer would have a better ESG performance. However, there is no evidence to infer that the board size or proportion of independent non-executive directors is statistically significant and related to the S&P Global ESG Score. The results do not support that the board size or proportion of independent non-executive directors affects ESG performance.

The second research question addresses whether ESG performance affects the company value of listed companies in Hong Kong. This has been examined quantitatively using the fixed effects panel regression model. Based on the statistical results, there is no evidence to infer that the S&P Global ESG Score is statistically significant and related to the price-book value ratio. As such, the results suggest that ESG performance does not affect the company value.

The third research question addresses whether ESG performance affects the investment risk of listed companies in Hong Kong. This has been examined quantitatively using the random effects panel regression model. Based on the statistical results, there is evidence to infer that the S&P Global ESG Score is statistically significant and negatively related to the annual share price volatility. As such, the results suggest that the ESG performance affects the investment risk negatively. This infers that a listed company with a better ESG performance would have a lower investment risk.

Overall, this thesis enhances the existing body of knowledge and understanding of ESG reporting and its quality in terms of ESG performance and the relationships with the company value and investment risk. In particular, it fills the research gap in the study of ESG in the context of listed companies in Hong Kong. Such investigations are expected to provide constructive information for policy makers and regulatory bodies of Hong Kong to make

improvements and changes to the existing ESG regulatory and reporting regime as well as practical insights for management of listed companies in Hong Kong.

Dedication

This thesis is dedicated to my parents, Lo Chong Leung and Choi Chu Cheng.

Acknowledgements

I would like to take this opportunity to express my sincere gratitude and appreciation to the many people who have accompanied and supported me in making this study possible.

Firstly. I must thank my Director of Studies, Dr Alice Te, for her expertise, knowledge and insights throughout this study. Her feedback has been invaluable to my thesis and I am grateful for her academic support and encouragement. I must also thank my Supervisor, Professor Peter Fong, who has equally dedicated the time and efforts to provide me with constructive feedback, comments and directions. My thesis has undoubtedly been refined through regular discussions with Dr Alice Te and Professor Peter Fong and I am greatly appreciative to both of them.

Secondly, I would like to thank the staff of the Hong Kong Management Association, Jenny Pong, Polly Chan and Lottie Fung, for their continuing support in easing the process of administration. This study was conducted during the COVID-19 pandemic and its challenges are not forgotten.

Lastly, I would like to express my deepest gratitude to my wife, Joey, and my daughter, Natalie, for their love, understanding, and encouragement during my study. Their continuous support has been inspiring and I could not have done this thesis without them.

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Glossary

ANOVA	Analysis of Variance
CEO	Chief Executive Officer
ESG	Environmental, Social and Governance
ESG Reporting Guide	Environmental, Social and Governance Reporting Guide with effect from 1 July 2020
EViews	EViews 12 Student Version
GRI	Global Reporting Initiative
Hong Kong	Hong Kong Special Administrative Region of the People's Republic of China
HKEx	Hong Kong Exchanges and Clearing Limited
HKQAA	Hong Kong Quality Assurance Agency
HSCI	Hang Seng Composite Index
HSCII	Hang Seng Composite Industry Indexes
IFC	International Finance Corporation
IFRS	International Financial Reporting Standards
IIR	International Integrated Reporting
IIRC	International Integrated Reporting Council
ISSB	International Sustainability Standards Board
INEDS	Independent Non-executive Directors
KPIs	Key Performance Indicators
Listed companies	Listed companies on the Main Board of the Stock Exchange of Hong Kong Limited
Listing Rules	Main Board Rules Governing the Listing of Securities on the Stock Exchange of Hong Kong Limited
MSCI	Morgan Stanley Capital International
OLS	Ordinary Least Squares
S&P Global	Standard & Poor's Global
SASB	Sustainability Accounting Standards Board
SEHK	Stock Exchange of Hong Kong Limited

Chapter 1: Introduction

1.1 Introduction

This chapter discusses the research background, regulatory framework for Environmental, Social and Governance (ESG) reporting in Hong Kong Special Administrative Region of the People's Republic of China (Hong Kong), research problems, aims and objectives, questions and hypotheses as well as research significance. In addition, an overview of the thesis structure is presented.

1.2 Background

Over the years, ESG reporting continues to grow as a top priority for companies across the globe. ESG reporting is the disclosure of environmental, social and governance information in ESG reports which summarise the qualitative and quantitative data of a company's ESG practices and activities. ESG reports contain a number of indicators covering various qualitative and quantitative measures which are the metrics used to evaluate ESG performance of a company.

Given that ESG information has been provided to the public on a voluntary basis, a mandatory basis or a "comply or explain" basis, the quality of ESG reporting is assessed by international rating agencies in ESG scores which provide the different levels of ESG performance reflecting the quality of ESG reporting by measuring a company against a set of ESG criteria. As such, ESG scores are the proxies of ESG performance. Then, it is important to understand whether the board attributes affect ESG performance which may affect the company value and investment risk. The primary focus of this study is to examine ESG reporting and its quality in terms of ESG performance and the relationships with the company value and investment risk of listed companies in Hong Kong.

ESG issues are not new but the scope and depth of attention being devoted to the topic have increased significantly from time to time. Companies are expected to look beyond profit maximisation and demonstrate their accountability to the public at large. ESG reporting as part of the external reporting has fast become the lens through which a company is being judged by various stakeholders including but not limited to shareholders, employees, creditors, suppliers,

customers, community and government. Consequently, ESG reporting is gaining increased attention and traction as the centre of global discourse in business (Gorley, 2022).

The focus on business resilience and survival has become even more critical due to the COVID-19 pandemic which has also contributed to putting certain ESG issues in the spotlight. The COVID-19 pandemic has created significant financial and operational challenges for companies. In particular, supply chains around the world have been disrupted and many companies are struggling to survive in the short term and also strive to increase their competitive advantages and create value in the long term. In fact, companies can use their natural agility to tackle business issues and ESG simultaneously (Riess, 2022). The process of ESG reporting serves as a means for the management of companies to identify the risks and opportunities of the business in the future. The increased interest in ESG reporting provides companies with an opportunity to reassess their value creation capabilities for various stakeholders in the long run. It is argued that the benefits of ESG reporting include improving financial performance, lowering costs, improving the company's reputation and solidifying the legitimacy in its relationships with various stakeholders (International Federation of Accountants, 2021).

In addition to the ever-changing business environment, the regulatory requirements have also been evolving and changing quickly regarding ESG practices in different parts of the world. Further demands for improved ESG reporting with higher standards for ESG compliance imposed by regulatory bodies from time to time (Arumugam, 2022). Regulatory bodies across the globe have been increasing the reporting requirements in a broader manner in which stakeholders' perspectives and the value creation capabilities of a company in the long term play a central role in the regulatory framework. This has led to a global growth in ESG reporting frameworks, guidelines, requirements and standards on a voluntary basis, a mandatory basis or a "comply or explain" basis focusing on how companies should report on ESG practices. In particular, for listed companies on the Main Board of the Stock Exchange of Hong Kong (listed companies), they have to fulfill the new ESG reporting requirements imposed on them with effect from 1 July 2020.

All in all, competing in today's business requires the development and execution of ESG strategies and policies to create long-term financial value as well as meet various regulatory reporting requirements. In Hong Kong, ESG reporting provides many benefits and

opportunities for listed companies. At the same time, they are also faced with costs, challenges, issues in ESG reporting with more stringent regulatory requirements imposed in a wider scope and depth from time to time.

1.3 Regulatory Framework for ESG Reporting in Hong Kong

In relation to the regulatory regime, there is a global trend moving from a shareholder approach towards a stakeholder approach to ESG reporting as well as moving from a voluntary basis to a mandatory basis of disclosing ESG information (Ho, 2021).

In Hong Kong, section 388 of the Companies Ordinance (Cap 622) imposes the first mandatory ESG reporting requirements for companies, unless exempted, to prepare a business review in their annual directors' report complying with Schedule 5 to the Companies Ordinance, commencing financial years beginning on or after 3 March 2014 (Companies Ordinance (Cap. 622), 2014). Section 2 of Schedule 5 to the Companies Ordinance provides that a business review must include a discussion on the company's environmental policies and performance, the company's compliance with the relevant laws and regulations as well as an account of the key relationships between the company and its various stakeholders.

The Stock Exchange of Hong Kong Limited (SEHK) issued the first ESG Reporting Guide which introduced ESG issues as voluntary disclosure items for listed companies in Hong Kong in August 2012 in which the ESG reporting was divided into four areas and each area was further divided into three sections, namely aspects, general disclosure recommendations and key performance indicators (KPIs). In 2016, the SEHK upgraded general disclosures to "comply to explain" provisions. In 2017, the SEHK changed disclosure requirements of environmental KPIs to "comply or explain" provisions.

In 2018, the SEHK published a guide to ESG reporting and issued a consultation paper on revisions of the ESG Reporting Guide. The SEHK published conclusions to its consultation on the "Review of the Environmental, Social and Governance Reporting Guide (ESG Reporting Guide) and Related Listing Rules" and the findings of the latest review of listed issuers' ESG disclosures on 18 Dec 2019. The amendments to the Main Board Rules Governing the Listing of Securities on the SEHK (Listing Rules) (Hong Kong Exchanges and Clearing Limited, 2019b) and the updated ESG Reporting Guide have been effective from the financial years

commencing on or after 1 July 2020 for listed companies in Hong Kong. That is, with effect from 1 July 2020, listed companies are subject to the disclosure requirements as stipulated in the ESG Reporting Guide under Appendix 27 to the Listing Rules.

The ESG Reporting Guide sets out an ESG disclosure framework, which moved from ESG disclosures being on a wholly voluntary basis in 2012 to being a "comply or explain" basis in 2016 and then to being mandatory the context of reporting on the board's engagement and oversight on ESG matters and requiring "comply or explain" disclosures in the scope of four environmental and eight social aspects with effect from 1 July 2020.

As stated in the ESG Reporting Guide, listed companies are not only subject to "comply or explain" disclosures on each of the following identified environmental and social aspects but also to disclose KPIs to demonstrate how they have performed (paragraph 6 of Appendix 27 to the Listing Rules).

The environmental aspects are:	The social aspects are:
Aspect A1: Emissions	Aspect B1: Employment
Aspect A2: Use of Resources	Aspect B2: Health and Safety
Aspect A3: The Environment and Natural Resources	Aspect B3: Development and Training
Aspect A4: Climate Change	Aspect B4: Labour Standards
	Aspect B5: Supply Chain Management
	Aspect B6: Product Responsibility
	Aspect B7: Anti-corruption
	Aspect B8: Community Investment

As the board of directors is the central management and control of a listed company, the burden on fulfilling the new stringent ESG reporting requirements imposed by regulators in Hong Kong as well as the quality of ESG reporting rest on the board. With effect from 1 July 2020, under the mandatory disclosure requirements, a statement is required from the board of directors containing a disclosure on the board's oversight of ESG issues, the board's ESG

management approach and strategy and how the board reviews progress made against ESG-related goals and targets (paragraph 13 of Appendix 27 to the Listing Rules).

Under paragraph 14 of Appendix 27 to the Listing Rules, listed companies are required to provide a description of the application of three reporting principles, namely "materiality", "quantitative" and "consistency" in the preparation of the ESG report.

Listed companies are also required to quantify non-financial factors using KPIs and there is often a concern that providing forward-looking information may expose listed companies to the threat of litigation (The Hong Kong Institute of Chartered Secretaries, 2014). Undoubtedly, the new ESG reporting requirements significantly impose the following three obligations on listed companies:

(1) Strengthening board's responsibility: Listed companies should enhance their board's responsibility for introducing the mandatory disclosure requirements on board's statement and overseeing ESG issues.
(2) Improving ESG management: Listed companies should introduce a new aspect of disclosure of significant climate-related issues, describe and explain the application of the "materiality", "quantitative" and "consistency" reporting principles and also set targets for environmental KPIs. The disclosure obligations of social aspects have been upgraded and amended to KPIs.
(3) Enhancing reporting quality: It is mandatory for listed companies to explain the process used to determine the reporting boundary. In addition, they are required to publish ESG reports within five months after the end of the financial year and are encouraged to seek independent assurance to strengthen the credibility of the ESG information disclosed.

All in all, seven key changes to the ESG Reporting Guide and related Listing Rules include:

(1) Paragraph 28(2)(d) of Appendix 16 to the Listing Rules provides that the directors' report in the annual report must contain a business review in accordance with Schedule 5 to the Companies Ordinance. The ESG Reporting Guide should complement the content requirements of the directors' report and in particular to disclose specific ESG information (paragraph 12 of Appendix 27 to the Listing Rules).
(2) Introducing mandatory disclosure requirements (Part B of Appendix 27 to the Listing Rules) to include (i) a board statement setting out the board's oversight of ESG issues, ESG management approach and strategy and how the board reviews progress made against ESG-related goals and target (paragraph 13 of Appendix 27 to the Listing Rules); (ii) application of Reporting Principles "materiality", "quantitative" and "consistency" (paragraph 14 of Appendix 27 to the Listing Rules); and (iii) explanation of reporting boundaries of ESG reports (paragraph 15 of Appendix 27 to the Listing Rules).
(3) Amending the "Environmental" KPIs to require disclosure of relevant targets (Part C: "A. Environmental" of Appendix 27 to the Listing Rules)
(4) Significant climate-related issues are required to be disclosed as well as the actions how to manage them (Part C: "A. Environmental - Aspect A4: Climate Change" of Appendix 27 to the Listing Rules)
(5) Upgrading the disclosure obligation of all "Social" KPIs to "comply or explain" provisions (Part C: "B. Social" of Appendix 27 to the Listing Rules);
(6) Shortening the deadline for publication of ESG reports to within five months after the end of the financial year (paragraph 4(d) of Appendix 27 to the Listing Rules); and
(7) Encouraging independent assurance on ESG information disclosed (paragraph 9 of Appendix 27 to the Listing Rules).

1.4 Research Problems

Traditionally, listed companies focus on financial performance and financial risk management. However, the pressing global ESG issues are pushing listed companies to expand the remit. Nowadays, listed companies are expected to not only find sustainable ways to do the business aiming at profit maximisation but also focus on creating long-term value and strengthen accountability to benefit all stakeholders including but not limited to shareholders, employees, creditors, suppliers, customers, community and government. From time to time, stakeholders demand greater reporting transparency in ESG reporting which is well beyond the traditional financial reporting.

Nowadays, in the absence of uniform global ESG reporting framework, ESG reporting cannot be consistent, comparable, transparent and reliable. It is very difficult for listed companies to identify and disclose relevant ESG information and for stakeholders to interpret and compare it. As such, the ESG information available varies a lot for listed companies in the same or different industries. On 9 November 2022, the International Federation of Accountants released a report 'Getting to Net Zero: A Global Review of Corporate Disclosures' and found that inconsistency and incomparability of target disclosures might pose challenges for investors, regulators and other stakeholders who required actionable information (International Federation of Accountants, 2022). Consequently, investors are hard to evaluate and compare listed companies on their ESG performance and it is difficult for them to take into account of ESG factors in their decision-making. Therefore, the need for a universally accepted set of reliable, comprehensive and robust ESG standards has never been greater (Melancon, 2022). Definitely, it is a challenge for regulatory bodies in Hong Kong of how to regulate ESG reporting in the absence of universal acceptable frameworks and standards.

Given the rapid changing business environment during and post COVID-19 pandemic and the new regulatory framework for ESG reporting in Hong Kong with effect from 1 July 2020, there is no doubt that ESG reporting is important to meet the increasing expectations of different stakeholders. As such, ESG reporting is a challenging topic for listed companies and regulatory bodies with lots of problems and issues to be fixed in Hong Kong.

As discussed, ESG reporting is on a voluntary or mandatory basis changing from time to time, the first research problem is how to find the determinants of the quality of ESG reporting in terms of ESG performance given that ESG reports have been provided to the public at large.

That is, what specific board attributes would affect ESG performance of listed companies in Hong Kong. Some prior studies argue that there is a close relationship between the board effectiveness and company performance. However, those studies examine the effects of various board attributes including the board size, proportion of independent non-executive directors, separation of the roles of chairman and chief executive officer, executive compensation and directors in different industry sectors, which are fundamentally influencing the board effectiveness, on the company performance from the shareholder perspective and they have not taken into account of the effects of these board attributes on the protection of interests of various stakeholders (Mallin & Michelon, 2011; Khan, et al., 2013; Amran, et al., 2014; Garcia-Sanchez, et al., 2015; Garcia, et al., 2017; Cohen, et al., 2023). Furthermore, the extant studies on board effectiveness have mainly focused on corporate governance (Kiel & Nicholson, 2003; Van den Berghe & Levrau, 2004; Finegold, et al., 2007) but not ESG reporting. Moreover, those prior studies were done when the ESG reporting was on a voluntary basis using different regulatory frameworks overseas and the findings might not be applicable to listed companies in Hong Kong especially under the new ESG regulatory framework with effect from 1 July 2020.

Undoubtedly, listed companies are required to use lots of financial and human resources to prepare ESG reports. In particular, it is a big challenge to some small to medium sized listed companies which may not have sufficient resources to fulfill the stringent ESG disclosure requirements and also the extra costs incurred will also be an issue. Although ESG reporting is well accepted to be socially desirable, critics of ESG argue that it increases economic costs and reduces shareholder wealth at the end. In order to address the problems and issues regarding the changes in the new regulatory framework, amendments to Listing Rules, increasing focus on ESG reporting from various stakeholders as well as the pressure from institutional investors, it is important for listed companies in Hong Kong to understand what is the value of ESG reporting.

The second research problem is how to find the value of ESG reporting of listed companies in Hong Kong in order to justify making strategic decisions on putting more efforts and resources to meet the ever-changing expectations of various stakeholders. In order to find the value of ESG reporting, it is important to understand whether ESG performance affects the company value and investment risk.

In terms of the company value, it is argued that ESG performance is correlated with the company value (Yanagi & Michels-Kim, 2018). It is hypothesized that the company value in terms of future expected financial value creation can be synchronized with ESG performance. It is argued that all dimensions of corporate social responsibility have a positive effect of the company value adopting the value relevance methodology (Gregory & Whittaker, 2012). Furthermore, some prior studies argue that capital markets value the disclosure of transparent ESG information (Reverte, 2012; Carnevale, et al., 2012). On the other hand, some studies examine the relationship between environmental performance and share prices using the different value relevance models and find a negative relationship in both cases (Hassel, et al., 2005; Semenova, et al., 2009). The above mixed results do not have a conclusive consensus among researchers regarding ESG performance and the company value. Those prior studies were done when the ESG reporting was on a voluntary basis using different regulatory frameworks overseas and therefore the findings might not be applicable to listed companies in Hong Kong especially under the new ESG regulatory framework with effect from 1 July 2020.

In relation to the investment risk, some extant studies argue that more timely disclosures may decrease the investment risk with a lower share price volatility and companies with strong corporate governance practices would have a lower investment risk (Botosan & Plumlee, 2002; Ashbaugh-Skaife, et al., 2006). Bhojraj and Sengupta (2003) provide evidence linking governance mechanisms to higher bond ratings, which can reduce the investment risk by reducing information asymmetry between the company and investors so as to minimise the agency costs (Bhojraj & Sengupta, 2003). It is argued that an increase in investor confidence resulting in a decrease in the investment risk is enhanced by increased disclosures (Lee & Shailer, 2008). Furthermore, Amir and Lev (1996) develop a model including the financial and non-financial information to examine their impacts of share price volatility. Thereafter, a number of subsequent researches confirms that non-financial information has great influence on share price volatility (Trueman, et al., 2000; Rajgopal, et al., 2003). It is believed that a lower share price volatility due to stable share transactions reflects a lower investment risk. Arguably, it appears that good ESG performance may decrease the investment risk from the investor perspective. Nevertheless, those prior studies were done when ESG reporting was on a voluntary basis using different regulatory frameworks overseas and therefore the findings might not be applicable to listed companies in Hong Kong especially under the new ESG regulatory framework with effect from 1 July 2020.

1.5 Research Aims and Objectives

There has been an increasing trend for businesses to disclose more information on the ESG aspects of their operations. Historically, the ESG disclosures were made on a voluntary basis but now they are on a mandatory basis or a "comply or explain" basis for listed companies in Hong Kong. Hong Kong has entered the new era of the combination of mandatory and "comply or explain" provisions in relation to ESG reporting requirements with effect from 1 July 2020.

The primary focus of this study is to examine ESG reporting and its quality in terms of ESG performance and the relationships with the company value and investment risk of listed companies in Hong Kong. Given that ESG information has been provided to the public on a voluntary basis, a mandatory basis or a "comply or explain" basis, the quality of ESG reporting is assessed by international rating agencies in ESG scores which are the proxies of ESG performance. As such, it is important to understand whether the board attributes affect ESG performance which may affect the company value and investment risk.

There are two research aims of this study as follows:

(1) To investigate how the board effectiveness affects ESG reporting of listed companies in Hong Kong; and
(2) To investigate the value of ESG reporting of listed companies in Hong Kong.

There are three research objectives of this study as follows:

(1) To investigate the effects of board attributes on the quality of ESG reporting in terms of ESG performance of listed companies in Hong Kong;
(2) To investigate the relationship between the quality of ESG reporting in terms of ESG performance and the company value of listed companies in Hong Kong; and
(3) To investigate the relationship between the quality of ESG reporting in terms of ESG performance and the investment risk of listed companies in Hong Kong.

1.6 Research Questions and Hypotheses

In order to achieve the research aim 1 and the research objective 1 as stated in Section 1.5, the following research question 1 and hypotheses 1A, 1B and 1C are constructed.

Research Question 1: Do the board attributes affect ESG performance of listed companies in Hong Kong?

Hypothesis 1A: Board size (independent variable) is positively related to the S&P Global ESG Score (dependent variable).

Hypothesis 1B: Proportion of independent non-executive directors (independent variable) is positively related to the S&P Global ESG Score (dependent variable).

Hypothesis 1C: Separation of the roles of chairman and chief executive officer (independent variable) is positively related to the S&P Global ESG score (dependent variable).

In order to achieve the research aim 2 and the research objective 2 as stated in Section 1.5, the following research question 2 and hypothesis 2 have been constructed.

Research Question 2: Does ESG performance affect the company value of listed companies in Hong Kong?

Hypothesis 2: S&P Global ESG Score (independent variable) is positively related to the price-book value ratio (dependent variable).

In order to achieve the research aim 2 and the research objective 3 as stated in Section 1.5, the following research question 3 and hypothesis 3 are constructed.

Research Question 3: Does ESG performance affect the investment risk of listed companies in Hong Kong?

Hypothesis 3: S&P Global ESG Score (independent variable) is negatively related to the annual share price volatility (dependent variable).

1.7 Research Significance

There are four research significances of this study as follows:

(1) This study would enhance the existing body of knowledge and understanding on the reasons for addressing ESG reporting, costs, benefits, contemporary challenges and issues in ESG reporting particularly on voluntary disclosure in addition to the legal regulatory requirements in the context of listed companies in Hong Kong. Such investigations are expected to provide policy makers and regulatory bodies with some constructive information

to make improvements and changes to the regulatory and reporting regime in Hong Kong as well as management of listed companies in Hong Kong with some practical and managerial insights.

(2) This study provides a literature review of four theories, namely Agency Theory, Legitimacy Theory, Institutional Theory and Stakeholder Theory in relation to ESG reporting which adopts the stakeholder approach instead of traditional shareholder approach and three theories, namely Public Interest Theory, Capture Theory and Private Interest Theory in relation to the regulation of ESG reporting. Such investigations would enrich the academic discussions on ESG reporting as well as contribute to the existing academic research in this important contemporary issue. The significance of this study is the application of the stakeholder approach to ESG reporting as a potential theoretical contribution to the existing academic research.

(3) Prior literature provides empirical evidence regarding the relationship between the board attributes and ESG performance mainly in the USA as well as some overseas countries but with limited discussions in Hong Kong. This study would contribute to the existing academic research on the board attributes in relation to ESG performance by developing some quantifiable measures based on the board size and two board independence attributes, namely the proportion of independent non-executive directors and separation of the roles of chairman and chief executive officer in the context of listed companies in Hong Kong.

(4) This study would bring some advances in the characterization of the emerging stakeholder approach to ESG reporting. This is achieved by analysing the relationship between the quality of ESG reporting in terms of ESG performance and the company value as well as the relationship between the quality of ESG reporting in terms of ESG performance and the investment risk in the context of listed companies in Hong Kong.

1.8 Thesis Structure Overview

The thesis is presented in eight chapters and the main themes of each chapter are summarised as follows:

Chapter 1 discusses the research background, regulatory framework for ESG reporting in Hong Kong, research problems, aims and objectives, questions and hypotheses as well as research significance of this study and an overview of the thesis structure.

Chapter 2 discusses the definition, history, global trend and development of ESG across the world. For the purpose of explaining why the ESG reporting continues to grow as a top priority for listed companies and justifying why the studies of ESG and its relationships with the company value and investment risk are vital, the reasons for addressing ESG reporting, costs, benefits, contemporary challenges and issues in ESG reporting are discussed.

Chapter 3 provides a critical review of the literature regarding four theories related to ESG reporting and three theories related to the regulation of ESG reporting. Moreover, the effects of board attributes on ESG performance, the relationship between ESG performance and the company value as well as the relationship between ESG performance and the investment risk are reviewed from the academic perspective.

Chapter 4 discusses the research methodology adopted to address the research questions being examined in this study. As such, research approach and methods, data collection methods, sampling method and sample size, data analyses as well as research design are discussed in detail.

Chapter 5 builds up three panel regression models with specifications for the purposes of investigating the effects of board attributes on ESG performance, the relationship between ESG performance and the company value as well as the relationship between ESG performance and the investment risk of listed companies in Hong Kong.

Chapter 6 summarises, discusses and analyses the descriptive statistical results of 10 dependent, independent and control variables in this study including the S&P Global ESG Score, board size, proportion of independent non-executive directors, roles of chairman and chief executive officer, company size, leverage, profitability, age, price-book value ratio and annual share price volatility.

Chapter 7 conducts some inferential statistical tests, namely the redundant fixed effects test and Hausman test to determine the right model for panel regression, assesses the required

conditions for the error variable as well as assesses the three panel regression models statistically. Thereafter, inferential statistical results and discussions with regard to the three research questions and five hypotheses are provided.

Chapter 8 presents the key findings and implications of this study, draws conclusions, makes recommendations, identifies research limitations of this study as well as future research opportunities.

1.9 Chapter Summary

This chapter has provided a general discussion of the research background and in particular the new regulatory ESG reporting framework for listed companies' financial years commencing on or after 1 July 2020 in Hong Kong subject to the disclosure requirements as stipulated in the ESG Reporting Guide under Appendix 27 to the Listing Rules. Owing to the new ESG reporting requirements for listed companies in Hong Kong, this chapter has discussed the research problems, aims and objectives, questions and hypotheses, research significance of this study as well as an overview of the thesis structure.

The next chapter will discuss the definition, history, global trend and development, reasons for addressing ESG reporting, costs, benefits, contemporary challenges and issues in ESG reporting.

Chapter 2: Environmental, Social and Governance

2.1 Introduction

This chapter discusses the definition, history, global trend and development of ESG across the world. For the purpose of explaining why the ESG reporting continues to grow as a top priority for listed companies and justifying why the studies of ESG and its relationships with the company value and investment risk are vital, the reasons for addressing ESG reporting, costs, benefits, contemporary challenges and issues in ESG reporting are discussed.

2.2 Definition of ESG

Although there is no universal definition of ESG, there are many organisations across the globe providing some sorts of definitions from time to time. ESG reporting is also commonly known as corporate social responsibility reporting, sustainability development or reporting and triple-bottom-line reporting in academic journals and professional articles.

ESG is based on the concept of sustainability development. In 1987, the United Nations was the first organisation to mention sustainability development. Sustainability development meets the needs of the present without comprising the ability of meeting the needs of the future generations (United Nations World Commission on Environmental Development, 1987). ESG focuses on three interrelated outcomes, namely a sustainable economy, a sustainable environment and a sustainable society.

In the mid of 1990s, some companies throughout the world started discussing environmental and social aspects in addition to economic performance of what had termed as triple-bottom-line reporting which is still commonly used today. Triple-bottom-line reporting is defined as the information regarding the economic, environmental and social performance provided by companies to various stakeholders. Triple-bottom-line reporting involves the simultaneous pursuit to economic, environmental and social performance. As such, companies are expected to perform not against the financial performance but against the three components of economic, environmental and social performance (Elkington, 1997).

In the European Union, the Commission of European Communities provides a definition of corporate social responsibility as "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis" (Commission of European Communities, 2001, p. 6). That means, the companies not only fulfill the regulatory rules and regulations but also go beyond compliance requirements to meet the expectations of various stakeholders on a voluntary basis.

ESG requires companies to consider the interrelated impacts of their activities on the economy, the environment and the society. The core elements of ESG include the following:

(1) ESG is concerned with the future and with the ability to maintain certain values, assets or capabilities over the long term;
(2) ESG involves decisions that address the interaction between environmental, social and economic domains; and
(3) ESG requires choices that take account of equity within society and across generations (National Sustainability Council, 2013).

In addition to maximising profits, companies have to involve minimising damage to the economy, environment and society as well as undertake actions that led to improvements in performance across the economy, environment and society both now and in the future (Langfield-Smith, et al., 2018).

In Hong Kong, although there is no definition of ESG, the ESG Reporting Guide provides the scope of environmental, social and governance aspects by setting out an ESG disclosure framework with effect from 1 July 2020 that it is on a mandatory basis as well as a "comply or explain" basis as stated in Section 1.3. Listed companies are subject to "comply or explain" disclosures on each of the four environmental and eight social aspects as stated in the ESG Reporting Guide as well as disclose KPIs to demonstrate how they have performed (paragraph 6 of Appendix 27 to the Listing Rules). Because governance is part of ESG, an effective governance structure of ESG matters is fundamental to ESG performance and reporting. Under C.2 of Appendix 14 to the Listing Rules, the board is responsible for evaluating and determining the nature and extent of the risks including material risks related to ESG as stated in the ESG Reporting Guide.

2.3 History, Global Trend and Development

Prior to recent decades, it was generally considered by most, if not all, people that companies were only responsible for their financial performance to shareholders. Under Agency Theory, directors are the agents that are accountable to shareholders who focus on a company's financial performance in order to maximise shareholder interests. As such, corporate governance was traditionally viewed and designed as a process by which a board of directors could achieve the best financial return to shareholders through the effective control and management of a company (Wong & Yeung, 2000).

Corporate governance involves issues concerning the relationships between shareholders, board of directors and management. The purposes of implementing good corporate governance practices include ensuring that listed companies are directed and controlled in a manner that protects the interests of shareholders. These mechanisms aim to ensure that management is accountable to directors and directors are accountable to shareholders (Lipton, et al., 2019). In 1992, the United Kingdom introduced the "comply or explain" approach to corporate governance in response to the collapse of Enron and a number of other multinational companies (Cadbury, 1992). This approach has since been adopted by many common law jurisdictions, including Hong Kong, and has become a popular approach to the rules and regulations of listed companies (Wang & Ong, 2005). The new ESG reporting requirements in Hong Kong continue to use the "comply or explain" approach as one of their approaches to their regulatory regime.

However, the corporate governance approach of focusing on and accountable to the interests of shareholders over and above the interests of other stakeholders recently changed over time particularly in the recent decade. In addition to accountability to shareholders in financial performance, it has become more widely accepted that companies have responsibilities to a broader group of stakeholders beyond their shareholders including but not limited to employees, creditors, suppliers, customers, community and government. ESG reporting adopts the stakeholder approach in which companies are required to report different aspects of environmental, social and governance to various stakeholders and are expected to meet their expectations from time to time (Wieland, 2005). In fact, there is an increasing trend that various stakeholders evaluate the performance of a company in different ESG aspects. As such, ESG has been evolved gradually becoming an important global contemporary issue.

The history, global trend and development of ESG are discussed in the following sequential time order.

(1) United Nations - ESG matters was first identified and discussed by the United Nations in 1987.

(2) Global Reporting Initiative (GRI) Standards - The GRI was founded in Boston, USA in 1997. A milestone of ESG reporting was passed in 2000 when the GRI published its first sustainability reporting guidelines.

(3) Sustainability Accounting Standards Board (SASB) Standards - The SASB was established in the USA in 2011 to develop sustainability accounting standards.

(4) International Integrated Reporting (IIR) Framework - The International Integrated Reporting Council (IIRC) was founded in London, UK in 2010. The IIR Framework addressing sustainability was released in December 2013 by the IIRC.

(5) Value Reporting Foundation - The IIRC and the SASB merged to form the Value Reporting Foundation in 2021. The Value Reporting Foundation offers a comprehensive suite of resources including Integrated Thinking Principles, the Integrated Reporting Framework and SASB Standards.

(6) International Sustainability Standards Board (ISSB) - The ISSB was established in the UK to address the demand for better reporting on ESG issues in 2021. The ISSB aims to deliver a comprehensive global baseline of sustainability-related disclosure standards.

2.3.1 United Nations

In respect of ESG matters, a broader term, namely sustainability development was discussed by the United Nations firstly in the world. Sustainability development was identified as a significant issue by the United Nations in the report ‘Our Common Future’ in 1987 (United Nations World Commission on Environmental Development, 1987). The report defines sustainability development as development that would meet the needs of the present without compromising the ability of future generations to meet their own needs. This recognises that

operations of companies affect the economy, social and environment. As a result, companies have a responsibility not only to the financial interests of shareholders but also to the broader interests of all stakeholders both current and future generations. In particular, the report highlighted the importance of both intra-generational equity and inter-generational equity.

Intra-generational equity refers to the ability to meet the needs of current generations whereas inter-generational equity refers that consumption of resources should not affect the quality of life of future generations with a long-term focus. A combination of intra-generational equity and inter-generational equity has been termed eco-justice and the concept is considered to be known as eco-efficiency with a focus on the efficient use of resources to minimise the impact on the environment and society (Loftus, et al., 2020). There is a general agreement that ESG involves preservation and maintenance of the environment and involves some duty of social justice (Gray, 2010).

ESG gained the world's attention following the 2004 report published by the United Nations Global Compact which was jointly endorsed by some global financial institutions to develop guidelines and recommendations on how to better integrate ESG issues in analysis, asset management and securities brokerage services (United Nations, 2004). The report focuses on ESG issues which might have material impacts on investment value and argued that embedding ESG considerations into capital markets would lead to better societal outcome.

2.3.2 Global Reporting Initiative (GRI) Standards

The GRI was founded in Boston, USA in 1997 aiming at creating the first accountability mechanism to ensure companies adhere to responsible environmental, social and governance issues. The GRI is a global organisation that promotes the use of sustainability reporting as a way for organisations to become more sustainable and contribute to sustainability development enhancing transparency, comparability and clarity.

A milestone was passed when the GRI published its first version of GRI Guidelines in 2000 providing the first global framework for sustainability reporting. The first update to the GRI Guidelines, the GRI G2 Guidelines were launched in 2002. As demand for GRI reporting and uptake from organisations steadily grew, the GRI Guidelines were expanded and improved leading to the launch of the GRI G3 Guidelines in 2006 and the GRI G4 Guidelines in 2013.

In 2016, the GRI transitioned from providing guidelines to setting the first global sustainability standards, the GRI Standards which continued to be updated and added to including the Tax Standards in 2019, the Waste Standards in 2020 and the first GRI Sector Standard (Oil and Gas) in 2021 (Global Reporting Initiative, 2022a).

The GRI Standards comprise a set of modular interconnected standards comprising three series of Standards, namely the GRI Universal Standards, GRI Sector Standards and GRI Topic Standards. They allow companies to report the impacts of their activities in as structured way that is transparent to stakeholders (Global Reporting Initiative, 2022b). In fact, the reporting under the GRI Standards goes beyond data collection and reporting by guiding companies to set goals, measure their performance against those goals as well as implement and manage change. In the areas of ESG reporting, the standards of GRI have represented the most important commonly used framework as many large companies in the world have used them to report ESG information.

2.3.3 Sustainability Accounting Standards Board (SASB) Standards

The SASB was established in 2011 in the USA in order to develop a framework of accounting standards which focussed on sustainability. The SASB sought to integrate sustainability accounting standards into documents that have to be filed as part of the annual filings of the US public companies with the US Securities and Exchange Commission. Although the SASB's focus is primarily on the US public companies, many multinational companies have voluntarily elected to apply sustainability accounting standards, with such standards becoming guidance documents throughout the world (Deegan, 2020). The SASB Standards focus on issues that are considered to eventually create risks and opportunities that can impact financial performance. The management of a company can determine which ESG information is material to include in disclosures.

2.3.4 International Integrated Reporting (IIR) Framework

Since the global financial crisis in 2008, in addition to the GRI, various frameworks and standards for ESG Reporting have emerged to help companies and their investors develop a greater understanding of the risks and benefits of ESG and non-financial factors. An alternative

approach to ESG reporting that has been attracting a great deal of attention is integrated reporting.

The International Integrated Reporting Council (IIRC) which was founded in London, UK in August 2010 is a major organisation associated with promoting integrated reporting. An integrated report is a concise communication about how ESG performance of a company leading to the creation of value for the company. The integrated reporting is generally perceived as involving the preparation of reports that integrate information about environmental and social impacts of a company's operations.

The IIR Framework addressing sustainability was released in December 2013 by the IIRC, which has been well supported by a range of global stakeholders, which captures whether a company's activities add value or decrease value. The primary purpose of the integrated report is to explain how companies create value which is defined in terms of six kinds of capital, namely financial capital, manufactured capital, intellectual capital, human capital, social and relationship capital and natural capital (International Integrated Reporting Council, 2013). The IIR Framework (December 2013 version) is a principles-based framework rather than on that stipulated list of required disclosures (International Integrated Reporting Council, 2013). This is consistent with the concepts used in the belief of "no-one-size-fits all" approach in the regulatory regime.

In fact, the IIR Framework (December 2013 version) provides guiding principles together with content elements governing the overall content of an integrated report. In January 2021, the IIRC published a revised International <IR> Framework, which replaced the original December 2013 version.

2.3.5 Value Reporting Foundation

In June 2021, the IIRC and the SASB merged to form the Value Reporting Foundation. The aim of the Value Reporting Foundation is to help businesses and investors develop a shared understanding of enterprise value. The International <IR> Framework and the SASB Standards are complementary to each other and can be used alone or in combination.

The International <IR> Framework provides principles-based guidance for reporting structure and content driving a holistic view of the value creation process. In the meantime, the SASB Standards provide industry-specific disclosure topics and metrics adding comparability to sustainability-related data across peer companies. Combining the International <IR> Framework and the SASA Standards provides a more complete sustainability information of how value is created over time as well as meeting the requirements of comparable, consistent and reliable information (Value Reporting Foundation, 2021).

2.3.6 International Sustainability Standards Board (ISSB)

In response to lacking of high quality, transparent, reliable, consistent and comparable ESG reporting, the International Financial Reporting Standards (IFRS) Foundation Trustees announced the creation of a new standard-setting board, namely ISSB to address the demand for better reporting on ESG issues on 3 November 2021. The ISSB aims to deliver a comprehensive global baseline of sustainability-related disclosure standards that provide stakeholders with information about companies' ESG risks and opportunities (International Financial Reporting Standards Foundation, 2022). As stakeholders demand better ESG reporting from time to time, the ISSB is to a great step forward setting global ESG standards. The IFRS Foundation would capitalise on the existing work done by other bodies on sustainability reporting through the consolidation of two London-headquartered bodies, namely the Climate Disclosure Standards Board and the Value Reporting Foundation which was formed in a merger of the International Integrated Reporting Council and the Sustainability Accounting Standards Board. As such, the ISSB is expected to provide much-needed harmonisation in ESG reporting which has been a complex and fragmented reporting landscape (Ravlic, 2022).

Given the proliferation of various reporting frameworks and standards which allow businesses considerable freedom to choose their ESG disclosures, companies have to decide for themselves which reporting frameworks and standards to apply. The scope and depth of ESG disclosures differ considerably as a consequence of the subjective choices companies make about their approaches to ESG reporting in terms of which frameworks and standards to apply, which stakeholders to address and which information to make public. After the establishment of the ISSB in November 2021, there is renewed hope that we can move toward harmonised,

comparable, worldwide sustainability standards with local customisation, creating space for national legislatures to deal with ESG issues (Watson & Wray, 2022).

In February 2023, the International Sustainability Standards Board announced plans to release its first two sustainability standards, namely IFRS S1 and IFRS S2 aimed at creating a global baseline in June 2023 with an effective date of January 2024. Following the announcement, the International Organization of Securities Commissions announced its support and would complete an independent review of these two new sustainability standards. In additions, a joint statement from the International Ethics Standards Board for Accountants and the International Auditing and Assurance Standards Board applauded such announcement (Strickland, 2023). It is expected the new sustainability standards establishing the global baseline for ESG reporting could drive competitive advantages over time. In fact, the global baseline for ESG reporting is not only for the benefits of stakeholders but there is also a real efficiency and cost benefit for listed companies in the long run.

2.4 Reasons for Addressing ESG Reporting

The significant shift from the shareholders' perspective to the stakeholders' perspective in the market expectations and regulatory regime has brought ESG reporting and management into the boardroom of listed companies. There are some compelling reasons for directors of listed companies to address ESG.

<u>(1) ESG management goes beyond reporting</u>

Managing ESG practices deepens an understanding of the overall business operations and provides insights into the company performance at the end. More importantly, an interplay between ESG issues and financial performance would catalyse directors to take an active part in ESG management and not simply treat ESG as a reporting requirement. As such, it is very important that directors to manage and report ESG performance with integrity, professional scepticism, accuracy, consistent, comparable, faithfully representation on a timely basis.

<u>(2) ESG reporting provides an opportunity to redefine the process of value creation</u>

Management has to lead the integration of ESG into a company's visions, missions, business strategies and operations and support the transformation of business models. Moreover,

management has to lead the process for delivering ESG reporting that would position them to provide long-term company value creation as well and sustainable prosperity.

(3) ESG performance impacts the company value and investment risk

Nowadays, it is well accepted that effective management of ESG issues has significant implications on the creation of the company value and affecting the investment risk from the investors' perspective. As the connection between managing ESG performance and financial performance is especially important for access to capital from global ESG institutional investors who place particular emphasis on socially responsible investing, directors must pay attention to ESG on the top priority.

(4) Global ESG regulations and standards are increasing demanding

Recently, the creation of various new ESG regulations and standards for reporting around the world is on the way and has gathered rapid momentum. In particular, IFRS S1 (General Requirements for Disclosure of Sustainability-related Financial Information) and IFRS S2 (Climate-related Disclosures) are expected to be published by the end of June 2023 with an expected effective date of 1 January 2024. In the meantime, the European Sustainability Reporting Standards are effective from 1 January 2024 for all companies currently reporting under the Non-financial Reporting Directive with one year grace period for smaller companies that also must report against these standards. The US Securities and Exchange Commission is also expected to announce its decision on its proposed climate-related disclosure requirements shortly which would require listed companies to report on climate risks and greenhouse gas emissions.

With the increasing and demanding ESG regulations and standards, the breadth of ESG information to be disclosed must be increased from time to time. This has significant impacts on the systems and processes by which ESG information is collected, collated and communicated.

(5) ESG reporting demands new skills, knowledge, experience and understanding

Managing and reporting ESG requires new competencies in terms of skills, knowledge, experience and understanding of contemporary issues. Understanding how ESG issues also drive intangible value beyond the financial performance of the statement of profit or loss and

other comprehensive income and the statement of financial position providing rich insights into the value of a listed company in the long run. These new skills, knowledge, experience and understanding of ESG are essential for management in order to interpret, provide insights and create impact through ESG performance.

2.5 Costs and Benefits of ESG Reporting

This section discusses the costs and benefits of ESG reporting for listed companies in Hong Kong. In particular, the justifications for costs incurred in ESG reporting for listed companies irrespective of their scales of businesses are discussed.

2.5.1 Costs of ESG Reporting

Currently, ESG performance is central to business strategies and building trust with various stakeholders in the contemporary business environment. It is seen as a good indicator of bottom line success in the long run. From time to time, stakeholders are increasing demanding compliance with strict, often self-imposed ESG targets and will take a dim view of any company failing to take actions on ESG. Moreover, stakeholders would regard any inaction on ESG as an unnecessary risk and unethical concerns (Chartered Accountants Australia and New Zealand, 2023).

However, some critics argue that the preparation of ESG reports is a waste of time and money and the ESG information is hard to understand and possible no one would possibly read it at all. ESG reports as vehicles for greenwash providing listed companies with opportunities to exaggerate their ESG credentials without any genuine intention to make any changes (Kaplan & Ramanna, 2021). In addition, it is also argued that ESG reporting is important for large listed companies but not small and medium sized listed companies on grounds of two reasons. Firstly, as small and medium sized listed companies focus on short-term profits and survival with limited financial and human resources available to them, the preparation of ESG reports is too complex and costly and with dubious return on investment to shareholders. Secondly, compared to large listed companies, small to medium sized listed companies may not face the same stakeholder scrutiny (KPMG International, 2011).

In response to the above arguments and critics, some justifications are provided below to argue that the costs incurred for ESG reporting are worthwhile for listed companies irrespective of their scales of businesses.

Just like financial reports, the preparation of ESG reports requires a lot of financial resources and also the information is not easy to understand. Nevertheless, they are not acceptable reasons for not reporting at all if the ESG information is really important for stakeholders. Of course, greenwash can be a risk but stakeholders are all becoming more knowledgeable to differentiate the difference between the public relations spin the ESG performance.

The development of ESG practices is increasingly being recognised as a business essential for all listed companies but not a nice to have. ESG is an important element in corporate strategy which can lead to competitive advantage, innovation and opportunities (Porter & Kramer, 2006). In particular, the COVID-19 pandemic has created some new challenges for all listed companies irrespective of their scales of businesses struggling to survive in very difficult business environments. An important part of the implementation of ESG practices is placing a strong focus on linkages and relationships with different parties which is key in ESG reporting. ESG practices enhance listed companies to have resilience in the face of adversity and better ability to adapt to changing business environments. Listed companies with innovative ESG practices in place are in better position to survive the COVID-19 pandemic than those without them. ESG presents an opportunity for listed companies to practise corporate social responsibility and to build long term relationships with different parties to support their businesses at the same time (Barber, et al., 2022). Although small and medium sized listed companies have limited financial and human resources, the benefits are greater than the costs and therefore it is worthwhile implementing ESG practices as soon as possible so that they can stand a greater chance of success in the long term.

Moreover, ESG is changing the business world as various stakeholders are increasingly expecting companies to manage their businesses in a more sustainable way from time to time. Although small and medium sized listed companies may not face the same stakeholder scrutiny as that of large listed companies, there are still various stakeholders looking at their ESG performance. For instance, investors and bankers may rely on ESG data, scores and ratings to assess the listed company's risk exposure while communities and customers may consider a listed company's ESG practices in their purchasing decisions (Gorley, 2022).

Furthermore, the risk from ESG incidents applies to all listed companies irrespective of their scales of businesses. Failing to address ESG issues appropriately can lead to a huge financial

loss or reputational damage. Without the backing up from various stakeholders, small and medium sized listed companies are much harder, if not impossible, to recover from the consequences of the adverse and harmful ESG incidents. As a result, no matter the size of a listed company, integrating and incorporating ESG practices into corporate decision-making process is definitely good business risk management.

Moreover, shareholders and investors are increasing recognising the significance of ESG and embracing the capital market participants that show evidence that ESG is one of their value pillars. As such, it is important that listed companies can see how future earnings could be impacted by implementation of ESG practices. Consequently, there is a critical need for listed companies irrespective of their scales of businesses to look beyond the bottom line and pursue a wider stakeholder approach recognising the benefits of ESG practices into consideration in the formulation of the visions, missions and strategies of listed companies in the long run.

2.5.2 Benefits of ESG Reporting

Recently, there is an increasing focus on ESG reporting from the public at large as well as institutional investors. Simply adopting the traditional shareholder approach under which directors focus on increasing financial return to shareholders only is obviously not sufficient without taking into account of interests of stakeholders. Listed companies are required to take the needs, expectations and interests of various stakeholders into consideration. There are many benefits of ESG reporting and each of them is discussed as follows.

<u>(1) Understanding the Impacts of ESG Issues and Creating Long Term Value</u>

Listed companies are running their businesses in competitive environments undergoing dramatic ESG changes. ESG reporting provides listed companies with a framework to identify various sustainability issues. In particular, in the process of ESG reporting, listed companies can:

i. identify environmental and social changes that impact the business and stakeholders;
ii. formulate strategies to manage the risks and opportunities;
iii. innovate new products and services; and
iv. engage in actions to grow the market share and cut costs (KPMG International, 2013).

As such, ESG reporting is the means by which listed companies can understand its exposure to the risks of these changes and its potential to get benefits from the new business opportunities. There are some direct benefits which include enhanced brand value or reputation, greater success at attracting and retaining talent and increasing operational efficiency resulting from introducing more efficient workflows and process redesign as well as increase in revenue coming from the creation of new markets for new products (KPMG International, 2011). ESG reporting is the process by which a listed company can gather and analyse the information it needs to create long term value for various stakeholders and resilience to ESG changes aiming at running the businesses in a more effective, efficient and competitive manner.

(2) Monitoring of ESG Risk

ESG reporting can be used as a risk management tool to identify, address and monitor ESG risks. Any listed companies that simply neglect ESG issues are at increased risk of experiencing an ESG incident which may have potential to be material and cause huge financial loss or reputation damage.

As governance is part of ESG, an effective governance structure of the board is fundamental to ESG performance and reporting. Under the Principle C.2 in the Corporate Governance Code and Corporate Governance Report (Appendix 14 to the Listing Rules), the board is responsible for evaluating and determining the nature and extent of risks includes but is not limited to material risks relating to ESG to ensure that appropriate and effective risk management is in place (Hong Kong Exchanges and Clearing Limited, 2019a).

ESG risk is an important business risk and good ESG risk management should be a regular part of listed companies' risk reduction practices from time to time. In the process of ESG reporting, directors would oversee management in the design, implementation and monitoring of the risk management and ensure they are appropriate and effective for managing ESG issues. As a result, ESG reporting can be used as a risk management tool to reduce risks of listed companies.

(3) Strengthening Internal Control Systems

In the process of ESG reporting, implementing and strengthening ESG control activities are necessary and unavoidable which can help listed companies not only achieve ESG goals but

also improve the performance. It has been shown that ESG control activities can facilitate the involvement of company members in ESG activities and the creation of a company-wide network of participants in ESG practices. As such, ESG control activities can create new interrelations among formerly disconnected operating activities and help move ESG issues from the periphery to the centre of planning, control and decision-making activities (Ligonie, 2022). A study shows that management deployed ESG control activities through different sets of activities which stabilise connections between ESG practices and other practices by:

i. Reassembling through using an existing tool or process in a different way;
ii. Expanding through incorporating a new tool into existing activities; and
iii. Rippling through integrating ESG into tools already shared by multiple areas or practices (Ligonie, 2021).

(4) Dealing with Future Challenges and Taking up Business Opportunities

ESG reporting can be used as a tool to help listed companies deal with different business challenges and issues arising from the competitive business environments. In the face of the COVID-19 pandemic driven issues such as lockdowns, labour supply shortages and supply chain deadlocks, there has been significant supply chain impact on businesses in different industries. As such, building a balanced, resilient supply chain is an essential element in a robust ESG strategy. In response, listed companies are required to optimise faster led to top-line growth with improved quality and efficiencies and lower cost. These productivity improvements directly support ESG including but not limited to using fewer resources, lower scrap, higher recycling, better waste management and lower consumption of energy. Furthermore, ESG reporting is also beneficial for listed companies to nurture the human resources such as a clear communication between listed companies and employees regarding their commitment to ESG, clear growth opportunities and community involvement resulting in lower staff turnover, recruitment and training costs.

(5) Building Stronger Mutual Trust with Stakeholders

Transparency and accountability of ESG reporting are critical to building mutual trust between listed companies and their stakeholders (Butcher, 2022). ESG factors and metrics transform the role of directors and management who take on a leadership role in collaborating across the business to capture and report ESG information in a reliable and consistent way. ESG reporting

is also important for investment professionals who can get benefits from ESG reporting to understand more about the long-term visions, missions and strategies of listed companies. ESG cannot be a bolt-on to the strategy but must be embedded as a business priority. Consequently, ESG reporting can help listed companies build strong mutual trust with their stakeholders.

All in all, the benefits of action for ESG reporting far outweigh the costs of inaction particularly for listed companies. A key idea is that systematically considering ESG issues will likely lead to more complete investment analyses and better-informed investment decisions (CFA Institute, 2015). Many listed companies have found that implementing good ESG practices is good for their business as well as offers the opportunities to become good corporate citizens. Institutional investors are more willing to invest in those listed companies in Hong Kong with good ESG performance.

2.6 Contemporary Challenges and Issues in ESG Reporting

As Hong Kong is an international financial centre, it is important for listed companies to note that the business is not as usual because the expectations of stakeholders as well as the global society are changing very fast. ESG reporting is definitely on the important agenda of policy makers resulting that listed companies are exposed to more disclosure requirements from regulators in Hong Kong as well as coping with the changes from the rest of the world.

A report by the International Finance Corporation (IFC) Global Corporate Governance Forum – Emerging Trends in Environmental, Social and Governance Data and Disclosure: Opportunities and Challenges (2014) points out that ESG reporting often requires more fundamental changes to the way companies are run. Firstly, ESG reporting requires the shift from a shareholder approach to a stakeholder approach. Secondly, ESG reporting also means shifting from a short-term to a long-term focus since it requires listed companies to monitor matters relating to the future sustainability of the environment and society (Lydenberg, 2014). As result, it is important for listed companies to note that some fundamental changes to the way of their businesses to be managed are necessary to deal with the challenging and fast changing ESG reporting.

The United Nations' 2030 Agenda for Sustainability Development, the International Labour Organisation International Labour Standards, the Organisation for Economic Co-operation and

Development Guidelines for Multinational Enterprises and the United Nations Guiding Principles on Business and Human Rights are collectively designed to advance sustainable economies by addressing the impacts and corporate risks of business on environment and social aspects (United Nations, 2011; Organisation for Economic Co-operation and Development, 2011; United Nations, 2015; The International Labour Organisation, 2022). Good ESG practices are keys to ensuring the long-term viability of the modern economy. Emerging ESG regulatory compliance reporting requirements implemented from time to time have boosted the strategic-role of forward-looking directors due to the fact that various stakeholders ae proactively keeping eye on more that the bottom line of listed companies.

In addition to fulfilling the new disclosure requirements as stipulated in the ESG Reporting Guide under Appendix 27 of the Listing Rules with effect from 1 July 2020 together with the global changes in ESG reporting from time to time, listed companies in Hong Kong are currently facing with a lot of contemporary challenges and issues in ESG reporting. Details are discussed as follows.

(1) Lacking of Uniform ESG Reporting Framework and Standards

A common challenge faced by listed companies is the lack of uniform ESG reporting framework and standards. The measurement of environmental performance is different from that of societal performance and both of them are different from the measurement of governance performance because governance is a process but not an outcome (Frigo, et al., 2022). Therefore, the three domains of ESG reporting would not be adequately addressed by the regulatory requirements, guidelines and standards in the absence of uniform ESG reporting framework and standards. Listed companies may selectively present metrics that portray themselves in a favourable position. As a result, there is widespread perception that ESG reporting is awash in greenwash (Kaplan & Ramanna, 2021).

Given the lack of uniform ESG reporting framework and standards, different listed companies

have used various standards, guidelines and metrics in their ESG reporting. The main shortcomings of current ESG reporting are incomparability and lack of alignment in standards (Bernow, et al., 2019). It appears that the proliferation of a variety of voluntary sustainability

frameworks and standards issued by different organisations has led to these issues over the years.

Although there is a global trend of harmonisation and unified the requirements of ESG reporting as discussed in Section 2.3, there is still lacking of a universal and coherent framework for ESG reporting. It is well accepted that a globally consistent ESG reporting framework will increase greater accountability for listed companies. As such, uniform ESG reporting framework and standards should be established as soon as possible in order to:

(i) provide standardisation of ESG reporting;
(ii) enhance listed companies to provide consistent, comparable, transparent and reliable ESG information;
(iii) align and complement the objectives of financial reporting by providing ESG information that is connected with financial information;
(iv) help listed companies to translate ESG information into long-term value creation;
(v) provide clear, concise, consistent and comparable information to investors, connecting the listed company's ESG performance to its overall long-term value creation and corporate strategy and prospects;
(vi) enable and encourage informed investor-decision making on the allocation of financial capital; and
(vii) add value to a listed company's existing financial reporting while standardising and simplifying the reporting process aiming at minimising the reporting burden.

<u>(2) Lacking of Quality, Consistent and Coherent ESG information</u>

One important element of ESG performance measurement challenge is having accurate, reliable, verifiable and auditable measures (Frigo, et al., 2022).

Providing quality, consistent and coherent ESG information to stakeholders is also a big challenge to listed companies especially the high growth of ESG information is never-ending. Managing, analysing and interpreting ESG information becomes daunting but crucial to the success of the implementation of ESG practices. Of course, the quality of ESG reporting is a key issue.

Data quality has been discussed in the Climate Disclosure Standards Board report which analysed the 2019 environmental and climate-related disclosures of the largest 50 listed companies in Europe with a combined market capitalisation of US$4.3 trillion. The report found that the information disclosed lacked quality, comparability, coherence and easy access. (Climate Disclosure Standards Board, 2020). In fact, such ESG reporting issues also apply to listed companies in Hong Kong as well.

(3) Resources and Time Constraints on Preparing ESG Reports

Another challenge faced by listed companies in Hong Kong is the accurate and timely collection of non-financial information as most ESG factors and metrics have not been recorded in their management information systems traditionally. Efforts to enhance the ESG reporting are not without challenges and definitely require resources to overcome within a tight ESG reporting time frame which is reduced to within five months after the end of the financial year under the new ESG regulatory regime (para 4(d) of Appendix 27 to the Listing Rules).

(4) Lacking of Comprehensive Mandatory ESG Disclosures

In Hong Kong, only some of the ESG reporting requirements are on a mandatory basis whereas most of them are on a "comply or explain" basis or a voluntary basis. The "comply or explain" approach is consistent with the concept that there is no "one-size-fits-all" (Arcot, et al., 2010). Some critics argue that because there is no one-size-fit all, the "comply or explain" approach to ESG reporting should be adopted. The absence of comprehensive mandatory ESG disclosures is of concern when determining whether listed companies have disclosed sufficient information to meet the expectations and needs of stakeholders.

It is argued that the "comply or explain" approach is not a good regulatory regime as it gives too much flexibility to listed companies (Proimos, 2005). It is also argued that many listed companies are mainly just complying with the regulatory rules without implementing those rules and regulations in their day-to-day management (Allen, 2014). A report by the Hong Kong Institute of Certified Public Accountants found that many listed companies approached it as a "box ticking" exercise and focussed on form over substance (Hong Kong Institute of Certified Public Accountants, 2014). Ensuring ESG reporting is adequate may require comprehensive mandatory enforcement by regulatory bodies. If ESG reporting is mandatory, regulators can

play an important role in enforcing and monitoring ESG reporting and ensuring that the disclosures are met and followed by listed companies.

(5) Lacking of Mandatory Independent Audit or Assurance Requirements

Different legal jurisdictions have different ESG regulatory requirements including mandatory, "comply or explain" and voluntary disclosures. Different from financial information reporting, ESG reporting is not subject to independent audit or assurance before releasing ESG information to the public at large. Stakeholders are increasingly looking to understand the process listed companies are putting in place to verify the integrity of their ESG reporting including but not limited to third party audit or assurance.

It was found in a review of the annual reports of Australia's top 200 companies by PricewaterhouseCoopers in October 2021 that 66% of the Australia's top 200 companies did not have their ESG reports externally assured and only 45% of those companies disclosed how the board of directors obtained comfort over the veracity of ESG reporting. Such study also found that 87% of the companies published non-financial disclosures that were meaningful; up from 58% in 2020. However, the report indicated that the increase in ESG reporting was not accompanied by a similar jump in assurance and a worrying 66% of the companies were not getting any kind of assurance for their ESG reporting (PwC Australia, 2021).

As the independent audit or assurance to ESG reporting is not mandatory, it appears that a significant number of boards of directors do not warrant third party audit or assurance. It is argued that ESG reporting may not be meaningful for decision making in a sceptical marketplace without any kind of audit or assurance (Ravlic, 2022). As such, there is a pressing need of a regulatory requirement that independent audit or assurance is mandatory for ESG reporting. In fact, the accountancy profession is well positioned to drive improvements in ESG reporting ensuring information is trusted and useful for various stakeholders (Fass, 2023).

(6) Increasing Expectations on Corporate Socially Responsible Investing

Given the constantly changing business environment, it is well accepted that ESG is an important element in corporate strategy which can lead to competitive advantage, innovation and opportunities in the long run (Porter & Kramer, 2006). For listed companies, this means

that ESG issues are no longer considered separately but form an important element in the formulation of corporate strategy for analysis, evaluation, planning, control and decision making in the long-term. In order to confidently commit to investing in a corporate socially responsible listed company, institutional investors are currently increasing demanding information to understand their long-term value-creating ESG strategies. As such, listed companies need to develop, communicate and execute a long-term value-creating ESG strategies. Undoubtedly, directors play a pivotal role in helping listed companies focus their ESG performance measures and deployment of resources toward greater long-term value creation (Frigo, 2018).

Given that ESG reporting pressure increases, there is a growing risk that ESG reporting becomes more of a compliance exercise instead of an integrated approach toward a long-term viable corporate strategy in the best interests of stakeholders (De Graaff, 2022). Furthermore, it has been argued that institutional investors find it difficult to rationalise the ESG information being provided by different listed companies and understand the linkage to financial and long-term value creation information. This situation perpetuates inefficiency, increased cost and a lack of trust in reported ESG information (CFA Institute, 2017).

Stakeholder engagement is also a key component of improving ESG reporting. It helps not only identify the completeness of ESG matters but also ensure the listed companies to adopt effective strategies to response to the expectations and needs of stakeholders. In order to address this issue, the relationships and linkages between ESG information, long-term value creation and corporate strategy should be provided in ESG reports to ensure various stakeholders to understand the relationships between different business aspects of a listed company. This means that ESG factors are no longer considered separately but form an important element in the formulation of corporate strategy for analysis, evaluation, planning and decision making in the long run. Good communication channels between listed companies and various stakeholders particularly institutional investors must also be established.

(7) Ethical Issue

Directors have to take a leadership role in establishing more transparency and advocating for good ESG practices and lead developments in ESG reporting to help the listed companies create long-term sustainable value for various stakeholders. Owing to the rapidly changing

regulatory requirements, the consequences of failing to address ESG risk may be considerable. In addition to meeting the regulatory requirements, achieving competence in ESG reporting involves ethical issue. Directors, who possess ESG reporting responsibilities, must prioritise ESG practices and commit to incorporating ethical principles and practices throughout their daily business operations. In particular, they should focus on how to promote and align business ethics with their strategic ESG objectives. All efforts to improve ESG reporting should be underpinned by ethical principles such as honesty, fairness, objectivity and responsibility under the standards and guidelines of professional bodies such as the International Sustainability Standards Board, the International Ethics Standards Board for Accountants and Sustainability Accounting Standards Board. It is imperative that directors communicate ESG information fairly and objectively and provide all relevant information that can reasonably be expected to influence various stakeholders' understanding of the listed company (Ratigan, 2022).

(8) Human Resources Issue

A 2022 survey by Chartered Accountant Worldwide of young professionals found that more than 63% of the respondents said that it was important for them to work in a profession that support ESG in the transformation of the economy including but not limited to providing the information businesses would need to thrive in the next context of ESG reporting (Gilkison, 2023).

Moreover, another research released by KPMG UK on 24 January 2023 found that ESG factors were influencing employment decisions for almost half of UK office workers. KPMG UK surveyed around 6,000 UK adult office workers, students, apprentices and those who left higher education in the past six months on their attitudes to work. It was found that about 46% of the respondents wanted the company they work for to demonstrate a commitment to ESG whereas about 20% of the respondents would turn down a job offer if ESG factors were considered lacking (McCalla-Leacy, 2023).

Based on the results of the above two surveys, it appears that employees may not choose a company to work for if the company is not seen as proactive in ESG. That is a challenging issue in ESG reporting in terms of appointing directors and employing professional staff with knowledge, skills and experience to handle ESG reporting.

2.7 Chapter Summary

Firstly, this chapter has discussed some common definitions of ESG used in the United Nations, the European Union and Hong Kong. Secondly, the history, global trend and development of ESG reporting have been discussed. In particular, six international ESG reporting frameworks and standards, namely the United Nations, GRI Standards, SASB Standards, IIR Framework, Value Reporting Foundation and ISSB have been discussed. Thirdly, this chapter has analysed the reasons for addressing ESG reporting, costs and benefits, contemporary challenges and issues in ESG reporting.

The next chapter will provide literature review of four theories related to ESG reporting and three theories related to whether regulation of ESG reporting is necessary and needed. Thereafter, the effects of board attributes on ESG performance, the relationship between ESG performance and the company value as well as the relationship between ESG performance and the investment risk are reviewed from the academic perspective.

Chapter 3: Literature Review

3.1 Introduction

As stated in Section 1.5, the primary focus of this study is to examine ESG reporting and its quality in terms of ESG performance and the relationships with the company value and investment risk of listed companies in Hong Kong. First of all, it is important to explore different theoretical perspectives in order to understand the rationale and reasons for companies which are willing to disclose their ESG information voluntarily in addition to the legal and regulatory requirements. This chapter provides literature review of four theories, namely Agency Theory, Legitimacy Theory, Institutional Theory and Stakeholder Theory related to ESG reporting in Section 3.2.

Secondly, different countries have different requirements for ESG reporting varying based on a voluntary basis, a mandatory basis or a "comply or explain" basis. As such, it is important to explore different theoretical perspectives in order to understand whether regulation is required for ESG reporting. The chapter discusses three theories, namely Public Interest Theory, Capture Theory and Private Interest Theory related to whether regulation of ESG reporting is necessary and needed in Section 3.3.

Given that ESG information has been provided to the public on a voluntary basis, a mandatory basis or a "comply or explain" basis, the quality of ESG reporting is assessed by international rating agencies in ESG scores which are the proxies of ESG performance. As such, it is important to explore different theoretical perspectives in order to understand whether the board attributes affect ESG performance which may affect the company value and investment risk in Sections 3.4, 3.5 and 3.6.

3.2 Theories Related to ESG Reporting

ESG reporting has been predominately a voluntary process given the lack of regulations for the past one or two decades. Even in the absence of regulations, many companies across the globe have publicly disclosed ESG information on a voluntary basis from time to time. This leads questions of why companies choose to do it and what motivates them to release the ESG information voluntarily.

This section is to explore different theoretical perspectives and discussions on why companies might elect to disclose their ESG information and what motivates them to release ESG information voluntarily in addition to the legal and regulatory requirements. There could be various motivations for management to decide to disclose ESG information voluntarily. Different researchers use differing theoretical perspectives to explain the reasons behind (Gray, et al., 1995). Academically, there are various theories related to ESG reporting, namely Agency Theory, Legitimacy Theory, Institutional Theory and Stakeholder Theory. In the next Section 3.2.1, Agency Theory is firstly explored in detail to examine whether it can explain ESG reporting.

3.2.1 Agency Theory

Traditionally, the purpose of business is to maximise shareholder value and as such a shareholder-based regulatory model has been developed and used in many years based on Agency Theory. Owing to the separation of ownership and management, the major focus of the shareholder-based regulatory model is to ensure that directors act in the best interests of shareholders so as to maximise shareholder value.

Agency Theory explains the relationship between shareholders and directors. Shareholders appoint directors in accordance with the company's constitution from time to time and delegate their powers to directors to manage the business of the company for and on behalf of them (Nordberg, 2011). The delegation of decision-making authority may increase agency costs. Moreover, goal divergence and conflict of interests would arise between shareholders and directors (Jensen & Meckling, 1976). The agency problem arises because of inefficiencies and incomplete information and raises the fundamental issue in regulation (Goo & Carver, 2003).

It has been well established that the traditional literature on Agency Theory provides that the primary role of management is the formulation of strategies and execution of policies acting in the best interests of shareholders by way of maximising shareholder wealth. The maximisation of shareholder wealth is achieved if the share price of the company is maximised. The share price of a company takes into account the company's current and expected profit, the uncertainty and timing of the profit stream, the likely future dividend policy, the capital structure as well as some other economic factors. On this basis, it is assumed that management

aims to maximise shareholder wealth by adopting those operating, investing, financing and dividend polices that maximise the share price of the company. Advocates for maximising shareholder wealth suggest that ESG activities should not be undertaken unless they are consistent with the best interests of shareholders (Henderson, et al., 2014).

Although Agency Theory has a long standing dominance in literature, some critics argue that the theory is excessively narrow and solely focuses on the interests of shareholders (Hirsch, et al., 1987). However, the principal-agent relationship is increasingly become blurred especially for large listed companies in which institutional investors buy and sell shares of their clients giving rise to a multiple agency problem (Crowther & Jatana, 2005) and the composition of ownership changes from time to time resulting the principal-agent relationship becoming hard to find it out. Different shareholders such as major and minority shareholders may have different investment objectives and expectations at different time horizons.

Listed companies have to use a lot of financial and human resources to prepare ESG reports especially for those disclosures are on a voluntary basis that may decrease the financial return to shareholders which is not in the best interests of shareholders. As such, although Agency Theory has been proven as a theory explaining the management behaviour and governance of companies, it cannot explain the situations of which many listed companies are willing to release information about their ESG information voluntarily to various stakeholders although shareholders are also included even in the absence of mandatory regulations. As such, it appears that Agency Theory can only partly but not fully explain why listed companies choose to do so and what motivates them to prepare ESG reports voluntarily. In the next Section 3.2.2, Legitimacy Theory is explored in detail to examine whether it can explain ESG reporting.

3.2.2 Legitimacy Theory

Under Legitimacy Theory, while companies are primarily focused on making profits, they also have an effect on and responsibility to environment and society. Legitimacy Theory argues that companies always seek to ensure that they operate within the bounds and norms, which are not fixed but subject to change, of the public at large. As such, companies have to make sure that their business activities are perceived by the society to be legitimate. The bounds and norms require companies to be responsible to the environment and society. That is, community allows companies to operate pursuing their goals and objectives so long as they agree to act in a

socially acceptable manner (Birt, et al., 2014). Legitimacy can be defined as a condition which exists when a company's value system is congruent with that of the society (Lindblom, 1994).

Legitimacy Theory is based on a theoretical concept that there is a social contract between a company and the society in which the company is allowed to run their business. As such, companies are required to comply with the terms and conditions of the social contract accordingly. It is argued that "organisations draw on community resources and output both goods and services and waste products to the general environment. The organisation has no inherent rights to these benefits and in order allow their existence, society would expect the benefits to exceed the costs to society" (Mathews, 1993, p. 82).

It is argued that society allows a company to continue running their business provided that the company meets the expectations of society. Because the expectations will change at different points of time and also companies in different industry sectors, companies must make disclosures voluntarily to show that they meet the changing expectations of the society.

Owing to the changing expectations of society, Lindblom (1994) argues that a legitimacy gap may exist from time to time. As the time goes by, the legitimacy gap fluctuates owing to the changes in expectations. Consequently, companies should make changes in the reporting on an ongoing basis so as to narrow down or eliminate the legitimacy gap which can avoid the level of conflict between the company and society increases (Lindblom, 1994).

According to Legitimacy Theory, failure to undertake those activities meeting the expectations of society may cause the company no longer being considered to be legitimate which will affect the support it receives from the society and hence its survival in the long run (Deegan & Rankin, 1996). This might occur through customers reducing the demand of the goods and services, suppliers refusing the supply of resources, lenders refusing the supply of financial capital or the government imposing taxes, fines and penalties to prohibit the actions that do not conform to the expectations of society (Deegan, 2020). Given the potential costs associated with breaching the social contract, companies have to take various actions to ensure that their businesses are perceived to be legitimate (Dowling & Pfeffer, 1975). Legitimacy Theory emphasises that a company must consider the interests of various stakeholders but not merely those of its shareholders (Deegan, 2014).

Compared to Agency Theory, it appears that Legitimacy Theory can explain to a certain extent why listed companies are willing to do some actions and disclosures regarding ESG information which are legitimate and expected by the society under the social contract. However, the concept of legitimacy is a generalised perception or assumption that the actions of a company are desirable in accordance with the terms and conditions of the social contract (Suchman, 1995). Legitimacy Theory assumes that there is one social contract between a company and society in which the company is allowed to run their business. As such, a company is deemed to be operating with legitimacy when its operations are perceived by society in compliance with the social contract. Nevertheless, different stakeholder groups may have different expectations on a company and therefore the company may have more than one social contract with different stakeholder groups. Moreover, the notion of social contract refers to expectations rather than a formal contract that companies act in ways acceptable to society. In fact, no such social contract exists with clear terms and conditions in the real world. It is very hard, if not impossible, for listed companies to know the expectations of the society which are deemed to be exist, may be changed from time to time and are different for listed companies in different industries. Therefore, it appears that Legitimacy Theory can only partly but not fully explain ESG reporting especially for those disclosures are on a voluntary basis. In the next Section 3.2.3, Institutional Theory is explored in detail to examine whether it can explain ESG reporting.

3.2.3 Institutional Theory

In relation to ESG reporting, Institutional Theory provides a complementary perspective to Legitimacy Theory for explaining how companies respond to changing social expectations as well as institutional pressures. Institutional Theory explains the relationship between the company's practices and the values of society and there is a need to maintain legitimacy in order to continue running the business. The concept of legitimacy under Legitimacy Theory and Institutional Theory is not exactly the same. The view of legitimacy under Institutional Theory is that the company's practices may incline to some form of homogeneity for the time being. As a result, the structures and practices adopted by different companies tend to become similar to conform with what is considered to be normal (Deegan, 2020). Companies that deviate from the normal form will potentially have problems in achieving legitimacy. At the time of designing a formal structure that adheres to the norms and behaviour expectations, a

company has to demonstrate that it is acting for proper purposes and in a good faith in the best interests of the public at large (Dillard, et al., 2004).

Institutional Theory explores how particular forms of companies might be adopted in order to bring legitimacy to a company. It views companies as running businesses within a social framework of norms, values, and taken-for-granted assumptions about what constitutes acceptable operating and business behaviour (Carpenter & Feroz, 2001). Companies conform to the institutional pressures to change by ways of increased legitimacy, resources and survival capabilities (Scott, 1987).

Institutional Theory argues that management would develop or adopt new practices because of institutional pressures from other companies. As a result, a company has to emulate itself to these companies in order to meet the expectations of various stakeholders. Institutional Theory argues that a company is under institutional pressures from other companies, which can be coercive, mimetic or normative, to develop or adopt some voluntary ESG disclosures.

Institutional Theory relies on the concept of legitimacy which is to be applied in the context of competitive business institutions to explain ESG reporting. However, the concept of legitimacy is a generalised perception or assumption that the actions of a company are desirable in accordance with the terms and conditions of the social contract (Suchman, 1995). Nevertheless, the mechanisms are hard to be observed and measured particularly listed companies with different scales of businesses and in different industries vary a lot. In addition, the major argument of Institutional Theory is that companies are under institutional pressures from other companies to develop or adopt new ESG practices and management is concerned that if they do not emulate these companies, they will risk disapproval the stakeholders in the long run (Deegan, 2014). One would argue that how listed companies perceive such institutional pressures especially companies with different scales of businesses and in different industries. Even though a listed company conforms some sorts of institutional pressure from competitors in the market to prepare ESG reporting, it does not mean that the listed company has to respond and do the same especially for those disclosures are not mandatory and not common in a particular industry. As a result, Institutional Theory provides a complementary perspective to Legitimacy Theory for understanding how listed companies respond to changing social and institutional pressures and expectations to a certain extent but can only partly but not fully explain ESG reporting especially for those disclosures are not mandatorily

required by the regulatory regime. In the next Section 3.2.4, Stakeholder Theory is explored in detail to examine whether it can explain ESG reporting.

3.2.4 Stakeholder Theory

Stakeholder Theory can be broadly classified into an ethical (or normative) branch and a managerial branch (Deegan, 2020). The ethical branch of Stakeholder Theory provides that a company has to consider the rights of all parties affected by the operation of the company and focus on meeting the expectations of all stakeholders. Under the ethical branch of Stakeholder Theory, a stakeholder is defined as any group or individual who can affect or is affected by the company's operations (Freeman, 1984). Stakeholders would include shareholders, employees, creditors, suppliers, customers, community and government. A company is deemed to be a part of society. Under the ethical branch of Stakeholder Theory, a company must not only act in good faith in the interests of all stakeholders but also balance the interests and expectations of all stakeholders especially if they are different and conflicts with each other. Hence, the ethical branch of Stakeholder Theory provides that companies have true social responsibilities to all stakeholders in society (Hasnas, 1998).

On the other hand, the managerial branch of Stakeholder Theory explains and predicts how a company would react to the expectations of various different stakeholder groups. This branch prescribes that a company would identify different stakeholder groups in particular those are important to its ongoing operations and survival of the business in the long run. The greater the importance of the stakeholders who have significant influence on the business operations, the greater management of the company would spend time and efforts to improve the relationships with those powerful stakeholders. Consequently, a company must continually improve their reporting practices to meet the changing expectations of different powerful stakeholder groups from time to time (Roberts, 1992). As the level of stakeholder power increaes, the importance of meeting stakeholder demands may also increase. In this regard, companies can only survive provided that they are effective and their effectiveness derives from the management of demands of interest groups upon which the companies rely on (Ullmann, 1985). That is, a company can only be successful if it meets the expectations of powerful stakeholders under the managerial branch of Stakeholder Theory.

Many disclosure responsiblities are at a mimimum as required by law. Although many expectations of society are not required at law, some companies disclose ESG information voluntarily to the public at large in order to demonstrate their accountability to various stakeholders (Gray, et al., 1996). Consistent with this view, the decision to disclose voluntary ESG information involves extending the accountability of listed companies which is well beyond the traditional reporting providing financial information to shareholders. Such voluntary disclosure of ESG information is based on the assumption that listed companies have wider responsiblities to various stakeholders instead of shareholders only (Gray, et al., 1987).

As discussed in Section 3.2.1, although Agency Theory suggests that there is a need for good alignment and for monitoring mechanisms to encourage agents to act in the best interests of principals, companies exist within society and therefore it is definitely having responsibilities to society (McDonald & Puxty, 1979). Agency Theory has been proven as a theory explaining the management behaviour and governance of companies but it cannot explain the situations of which many listed companies are willing to release ESG information voluntarily to various stakeholders although shareholders are also included from time to time even in the absence of mandatory regulations. On the other hand, Stakeholder Theory provides that companies are willing to disclose information voluntarily to the public at large to show that they are conforming with the expectations of their concerned stakeholders (Deegan, 2020). Undoubtedly, ESG information are useful in maintaining and improving relationships with various stakeholders (Roberts, 1992). As a result, compared to Agency Theory, Stakeholder Theory provides better explanations and enriches the understanding of ESG reporting.

Compared to Legitimacy Theory as disucussed in Section 3.2.2, Stakeholder Theory conceptualises a company as part of a broader social system wherein the company not only impacts on but also is affected by other groups within society. Stakeholder Theory considers different stakeholder groups within society whereas Legitimacy Theory focuses on the expectations of society as a whole within a social contract. In particular, Stakeholder Theory argues that because different stakeholder groups may have different expectations on a company, there may be various social contracts between different stakeholder groups instead of one social contract in general as argued in Legitmacy Theory. Stakeholder Theory and Legitimacy Theory provide different insights into the factors that motivate management corporate behaviour and the differences between these two theories are largely relates to issues

of resolution in which Stakeholder Theory focuses on how a company interacts with different stakeholder groups whereas Legitmacy Theory considers interactions between a company and society as a whole in general (O'Donovan, 2002). As a result, compared to Legitimacy Theory, Stakeholder Theory provides better explanations and enriches the understanding of ESG reporting.

As discussed in Section 3.2.3, Institutional Theory embraces takes a broader macro view to explain the reasons for companies to take on some reporting practices. Hence, it is argued that the resulting institutional image can sometimes be more apparent than real (Deegan, 2014). The ethical branch of Stakeholder Theory focuses on the rights to information which should be met regardless of the power of the stakeholders involved whereas the managerial branch of Stakeholder Theory predicts the companies may tend to satisfy the information demands of those powerful stakeholders. Under Stakeholder Theory, the disclosure of voluntary information is considered to represent an important way for a company to build up and improve relationships with different stakeholder groups with different powers of influence. Building up a good image and reputation of a social responsible company through disclosing ESG information is part of a strategy for improving stakeholder relationship. As a result, compared to Institutional Theory, Stakeholder Theory provides more comprehensive insights into why listed companies might voluntarily elect to make some ESG disclosures.

As discussed in Section 1.3, the new regulatory framework for ESG reporting in Hong Kong has been effective from the financial years commencing on or after 1 July 2020 for listed companies in Hong Kong moving from a shareholder approach to corporate governance to a stakeholder approach to ESG reporting as well as moving from a voluntary basis to a mandatory basis and a “comply or explain” basis. Such new regulatory framework for ESG reporting aligns with the arguments of Stakeholder Theory.

3.3 Theories Related to Regulation of ESG Reporting

Some theories have been developed in literature to explain why regulation for ESG reporting is necessary and needed in which different researchers have provided different arguments and explanations from time to time. This section is to explore different theories, namely Public Interest Theory, Capture Theory and Private Interest Theory that seek and explain why regulation of ESG reporting is necessarily introduced. In fact, ESG reporting has been more

and more prominence under the new regulatory framework on a mandatory basis and a "comply or explain" basis for listed companies in Hong Kong with effect from 1 July 2020.

3.3.1 Public Interest Theory

Public Interest Theory argues that regulation is necessarily needed to be introduced by regulatory bodies in order to protect the public at large because it can meet the needs of the public of the correction of some improper practices in the market (Posner, 1974). Regulation is imposed to act in the in best interests of society as a whole instead of benefitting particular interest group such as shareholders.

Moreover, Public Interest Theory argues that society needs investor confidence in the financial market and regulation is the best instrument for maintaining such confidence. In the process of imposing regulation, regulatory bodies have to consider both the social benefits and the regulation costs incurred and strive a balance between them in order to protect the best interests of the public at large (Scott, 2003). As such, it is argued that the regulatory bodies should establish minimum standards for ESG reporting for which companies must do in relation to their environmental, social and governance responsibilities. In fact, Public Interest Theory supports that listed companies are expected to do more than required by regulation (Deegan, 2014).

3.3.2 Capture Theory

In addition to Public Interest Theory, Capture Theory also supports that regulation is required for ESG reporting. Capture Theory argues that although regulation is often introduced by regulatory bodies to protect the public at large, the regulatory mechanisms are sometimes and always subsequently controlled or captured by companies or industries (Deegan, 2014). The regulated companies or industries will try to capture the regulatory body aiming at ensuring that regulation subsequently imposed will not be disadvantaged to the companies or industries.

Capture occurs when the regulated parties succeed in coordinating the activities of regulatory bodies and control the regulatory process so that their private interests of the regulated parties are protected (Mitnick, 1980). That is, the regulated parties have significant influence upon the regulatory bodies (Deegan, 2014). Although Capture Theory argues that the regulated

parties will subsequently attempt to control the regulatory process, proponents of such theory assert that regulatory bodies should be established and regulation is necessarily imposed in order to protect the public interest. As such, Capture Theory supports that regulation of ESG reporting should be imposed so as to protect the interests of various stakeholders.

3.3.3 Private Interest Theory

Private Interest Theory provides that different companies would form different economic interest groups to lobby regulatory bodies to impose regulation in their benefits. Private Interest Theory does not adopt the notion of public interests as assumed in Public Interest Theory and Capture Theory but rather assumes that private interests are considered to dominate the legislative process. In fact, Private Interest Theory is derived from a well-accepted economic theory that people are selfish and act in their own self-interest (Posner, 1974). Although Private Interest Theory does not assume that regulation is based on public interest, it argues that regulation is put in place to serve the private interests of particular parties (Stigler, 1971). As such, Private Interest Theory also supports that regulation of ESG reporting is necessarily introduced.

As discussed in Section 1.3, the new regulatory framework for ESG reporting in Hong Kong has been effective from the financial years commencing on or after 1 July 2020 for listed companies in Hong Kong. Such new regulatory framework for ESG reporting aligns with the arguments of Public Interest Theory, Capture Theory and Private Interest Theory that regulation is needed for ESG reporting.

3.4 Effects of Board Attributes on ESG Performance

In recent years, many listed companies have published ESG reports in their annual reports or as adjuncts to their annual reports even though ESG reporting had not been on a mandatory basis at the time of publishing. The quality of ESG reporting in terms of ESG performance is accelerating in importance as listed companies seek to improve and build up the relationships with various stakeholders locally and globally.

It is argued that ESG performance may lack consistency in and criteria for measurement of the nonfinancial attributes and even with quantitative ESG data, and hence ESG performance is difficult to compare among companies and across different periods (Yoon, et al., 2018). Given that ESG information has been provided to the public on a voluntary basis, a mandatory basis or a "comply or explain" basis, the quality of ESG reporting is assessed by international rating agencies in ESG scores. In order to avoid measurement bias, ESG scores provided by external ratings agencies are commonly used as proxies of ESG performance. It is important to explore different theoretical perspectives in order to understand whether the board attributes affect ESG performance.

The current academic debate on regulatory regime has been polarized between a shareholder approach and a stakeholder approach (Vinten, 2001; Letza, et al., 2004; Mason & Simmons, 2013; Ho, 2021). It is obvious that the main objective of ESG reporting is to enhance the protection of interests of various stakeholders. Such stakeholder approach extends the traditional scope of shareholder approach to corporate governance by considering shareholders as one type of stakeholders with rights equal to those held by others including but not limited to employees, creditors, suppliers, customers, community and government (Money & Schepers, 2007). It is argued that such stakeholder approach to the regulatory regime is strongly linked to ESG reporting (Jamali, et al., 2008).

Some researchers synthesize a key rationale as comprising the need for ESG reporting to adopt a systemic approach to balance the interests of various stakeholders and also incorporate good ESG practices in this mindset (Mason & Simmons, 2013). It is argued that various stakeholders have legitimate expectations (Waring, 2008) and a balance of maximising shareholder value is in the best interest of the company as whole (Law, 2011).

It is argued that an effective board is at the centre of ESG performance (Charltons, 2018). Undoubtedly, the board of directors has the duty to formulate effective management systems and internal controls which can help a listed company articulate its visions, missions and strategies and grow on a sustained basis in all types of information including but not limited to financial and ESG reporting. Some practical advice have been provided by the SEHK to directors how to perform their role and responsibilities in a report 'Guidance for boards and directors' (The Stock Exchange of Hong Kong Limited, 2018a) although the guidance does not form a part of the Listing Rules (The Stock Exchange of Hong Kong Limited, 2018b).

The board effectiveness depends on a number of the board attributes. It appears that directors with independence from management and exercises oversight ESG reporting serving as a check and balance to ensure management is acting in accordance with the long term ESG objectives and goals of the listed company. In particular, directors of listed companies have the following responsibilities in relation to ESG reporting.

1. Directors have the duties to ensure a listed company to fulfill their legal and ethical responsibilities over ESG matters. For the purposes of discharging the duties, the board of directors should consider setting up some specialised board subcommittees to oversee the listed company's sustainable ESG activities and reporting from time to time.
2. Directors have the oversight responsibilities to ensure management with the requisite skills, knowledge and experience in ESG practices.
3. Directors have to ensure a listed company to operate independently from management for making decisions on ESG activities and issues.
4. Directors have to oversee the system design and implementation related to ESG activities and reporting. In particular, there is an oversight responsibility to have a check and balance of management for how the listed company is utilising the resources and processes to achieve sustainable and ESG activities in the long run.
5. Directors has to oversee management to set up effective internal control over EGS reporting and building up trust and confidence in ESG reporting between a listed company and various stakeholders (Committee of Sponsoring Organizations of the Treadway Commission, 2023)

A number of literature on the topic of ESG performance discusses the crucial role of the board of directors and its effectiveness in establishing ESG reporting or corporate social responsibility reporting which is a long term top level strategy of a company (Khan, et al., 2013; Amran, et al., 2014; Garcia-Sanchez, et al., 2015). It has been argued that the role of directors is the most important mechanism of the regulatory regime (Nordberg, 2011) and that the board structure, composition and diversity in terms of independence also greatly affect ESG performance (Ho & Wong, 2001).

Although some prior studies on board effectiveness have mainly focused on corporate governance (Kiel & Nicholson, 2003; Van den Berghe & Levrau, 2004; Finegold, et al., 2007;

Lama, 2012), it is argued that board effectiveness may also be applied to ESG reporting (Garcia-Sanchez, et al., 2014; Garcia-Torea, et al., 2016).

In the context of ESG, one would ask how board effectiveness affects ESG performance and what are the effects of board attributes, which are fundamentally determining board effectiveness, on ESG performance of listed companies in Hong Kong. The issues are investigated and related to the research aim 1 as stated in Section 1.5 investigating how the board effectiveness affect ESG reporting of listed companies in Hong Kong and the research objective 1 as stated in Section 1.5 investigating the effects of board attributes on the quality of ESG reporting in terms of ESG performance of listed companies in Hong Kong.

In some prior studies, three board attributes have been identified as important elements affecting the board effectiveness, namely the board size (Yermack, 1996; Eisenberg, et al., 1998; Kiel & Nicholson, 2003) and board independence in terms of the proportion of independent non-executive directors and separation of the roles of chairman and chief executive officer (Raheja, 2005; Gordini, 2012; Shu & Chiang, 2020) resulting in affecting the company performance including ESG performance. This study is to investigate whether the three board attributes affect ESG performance of listed companies in Hong Kong.

In addition to the aforesaid three board attributes, some extant literature has also identified some other factors such as executive compensation and industry sectors affecting the board effectiveness which may result in affecting the company performance including ESG performance. However, the study does not include executive compensation and industry sectors into consideration. Reasons are as follows.

It has been found that if executive compensation schemes which are tied to ESG metrics will improve ESG performance (Cohen, et al., 2023). As this study covers listed companies in Hong Kong, the executive compensation practices vary a lot from small, medium to large companies as well as in family controlled or non-family controlled companies. Hence, this study does not include executive compensation affecting ESG performance into consideration.

It has also been found that companies in some sensitive industry sectors which are typically characterised by social taboos, moral debates and political pressure such as tobacco, gambling, and alcohol produce a better ESG performance (Garcia, et al., 2017). As the new ESG

regulatory regime in Hong Kong has been in effect from 1 July 2020, there have been very limited available information on ESG performance for listed companies particularly in sensitive industry sectors and also there are few listed companies in such sensitive industry sectors in Hong Kong. As such, owing to the limited available samples with S&P Global ESG Scores in various sensitive industry sectors, this study does not include the factor of industry sectors affecting ESG performance into consideration.

3.4.1. Board Size and ESG Performance

Some prior studies argue that a large board size increases the board effectiveness and company performance but others are in favour of a small board size. On the one hand, it is argued that a large board size with a good mix of directors with different backgrounds, skills, knowledge and experience has more diversity and effective cohesiveness which can help directors deal with complex and challenging business situations more effectively and efficiently resulting in better strategic management and company performance (Goodstein, et al., 1994). A study by Kiel and Nicholson (2003) with a sample of 460 Australian companies found a positive association between the board size and the market-based performance and another study using fixed effects panel regression models on a sample of 108 listed banks in Europe and the United States also found that there is a positive link between the board size and ESG performance (Birindelli, et al., 2018). It is argued that the board size impacts ESG performance positively (Husted & de Sousa-Filho, 2019).

On the one hand, it is argued with the increase in the board size, the board effectiveness as well as company performance decrease. Some extant studies have found a negative association between the board size and board effectiveness which ultimately affects the company performance. Yermack (1996) is the most frequently cited study on the relationships between the board size, board effectiveness and company performance. His study of 452 large US companies across eight years period between 1984 and 1991 found a negative association between the board size and the board effectiveness resulting in affecting the company performance. In addition, a study by Eisenberg, et al., 1998 with a sample of 879 small and medium sized companies across three years of period between 1992 to 1994 also found a negative relationship between the board size and the board effectiveness resulting in affecting the company performance. It is argued that a large board size can create board management issues such as lack of coordination and communication and therefore it does not induce

cohesiveness among directors and will become a big challenging for directors to reach consensus over important strategic matters which ultimately affects the board effectiveness and company performance (Kholeif, 2009). However, another study found that no association between board structure and company performance (Klein, 1998).

The above mixed results in previous studies have not found conclusive consensus among researchers regarding the board size and company performance including ESG performance. Previous studies have presented diverse results but listed companies in Hong Kong are rarely studied. In the context of ESG, one would ask what are the effects of the board size on ESG performance of listed companies in Hong Kong. The issue is investigated and related to the research aim 1 and research objective 1 as stated in Section 1.5.

In order to achieve the research aim 1 and the research objective 1 as stated in Section 1.5, the following research question 1 and hypothesis 1A are constructed.

Research Question 1: Do the board attributes affect ESG performance of listed companies in Hong Kong?
Hypothesis 1A: Board size (independent variable) is positively related to the S&P Global ESG Score (dependent variable).

3.4.2 Board Independence (Proportion of Independent Non-executive Directors) and ESG Performance

The importance of board independence arises from the separation of ownership and management in accordance with Agency Theory. As discussed in Section 3.2.1, shareholders appoint and delegate powers to a board of directors in order to allow them to perform work in their best interests (Nordberg, 2011). However, this delegation of authority may increase the agency costs. It has been said that "without proper monitoring mechanisms in place, the board of directors tends to act for their self-interest and rarely looks after the needs of the stakeholders" (Brennan, 2003, p. 42). As such, due to the separation of ownership and control inherent within listed companies, any goal divergence or conflicts of interest would affect the board effectiveness and ultimately the company performance including ESG performance (Jensen & Meckling, 1976).

It is argued that the presence of independent non-executive directors is an important means of not only setting the standards of contemporary regulatory regime but also improving disclosure and better reporting (Butcher, 2000). As such, independent non-executive directors have become integral to an effective regulatory regime (The Hong Kong Institute of Chartered Secretaries, 2006). There is no doubt that independent non-executive directors improve the check and balance system and enhance the board's overall independence and effectiveness (Bhaumik, et al., 2019). The mechanisms that protect shareholders from potential abuses by the board, including the functions performed by independent non-executive directors, must be protected and improved (Johnstone & Goo, 2017). However, it is also important to bear in mind that the functions of independent non-executive directors cannot be performed properly if the board is controlled by the founding family with majority directors (The Hong Kong Institute of Directors, July 2012).

In the context of ESG performance, the presence of independent non-executive directors is considered to be important and favourable as it brings an effective and efficient mechanism to ensure that the ESG matters of listed companies are conducted and managed in a more transparent and unbiased manner (Shu & Chiang, 2020). Independent boards of directors serve as a catalyst to strike an effective balance between companies' financial targets and ESG responsibilities (Arayssi, et al., 2020). It is argued that a significant proportion of independent non-executive directors on a board is presumed to have greater board independence when managing business affairs (John & Senbet, 1998), in addition to providing a good check and balance system in decision-making (Fama & Jensen, 1983). As such, the board independence is very important for the board effectiveness which in turn improves the company performance including ESG performance and reporting. Some extant studies support this argument but others do not.

On the one hand, it is argued that independent non-executive directors can provide independent check and balance and therefore a higher board independence would increase the board effectiveness which in turn improve the company performance (Raheja, 2005). A study by Gordini (2012) supports this argument and finds a positive association between independent non-executive directors and the company performance due to the close monitoring mechanism to be in place as well as the contributions to the companies based on their different skills,

knowledge and experience. It is argued that independent non-executive directors impact ESG performance positively (Husted & de Sousa-Filho, 2019).

On the other hand, it is argued that independent non-executive directors do not add any value to the company at all and cannot enhance the company performance as they have limited access to the information (Lawrence & Stapledon, 1999) and are not familiar with the day-to-day business operations (Shehata, 2015). Some previous studies support this argument and find a negative association (Shu & Chiang, 2020), a weak association (Barnhart & Rosenstein, 1998) or no association between independent non-executive directors and the company performance (Hermalin & Weisbach, 1991; Bhagat & Black, 2002; Bozec, 2005; Srivastav & Singh, 2012).

The above mixed results do not have a conclusive consensus among researchers regarding board independence in terms of the proportion of independent non-executive directors and company performance including ESG performance. Previous studies have presented diverse results but listed companies in Hong Kong are rarely studied. In the context of ESG, one would ask what are the effects of the proportion of independent non-executive directors on ESG performance of listed companies in Hong Kong. The issue is investigated and related to the research aim 1 and research objective 1 as stated in Section 1.5.

In order to achieve the research aim 1 and the research objective 1 as stated in Section 1.5, the following research question 1 and hypothesis 1B are constructed.

Research Question 1: Do the board attributes affect ESG performance of listed companies in Hong Kong?
Hypothesis 1B: Proportion of independent non-executive directors (independent variable) is positively related to the S&P Global ESG Score (dependent variable).

3.4.3 Board Independence (Separation of the Roles of Chairman and CEO) and ESG Performance

The roles of chairman and chief executive officer are different. Chief executive officer is the head of the company in its day-to-day business management and is responsible for leading the company through business operation strategies and other operational decisions. The board of directors ensures chief executive officer is carrying out their duties in accordance with the

company's best interests (Vance, 1983). Chairman is the head of the board of directors. Therefore, one of the roles of chairman is to oversee, monitor and audit the works of chief executive officer to ensure that management strategies have been formulated and implemented by chief executive officer in achieving and meeting visions, missions and strategies of the company in the long term. Undoubtedly, chairman is more likely to be an effective monitor if there is a genuine separation between the role of chairman and chief executive officer in that chairman is not involved in the actual management of the company. The separation of these two roles has been argued to be one of the best ways to improve the board effectiveness (Chan, et al., 2011) especially since combining these two roles essentially puts the control of chairman in the hands of chief executive officer and management has de facto control. The effectiveness of the board's functions in monitoring and providing a check and balance would be greatly jeopardised and undermined otherwise (Brickley, et al., 1997). A previous study has found that the duality of the chairman and the chief executive officer is quite common within the board composition of listed companies in Hong Kong (Heaney, 2009).

If chairman is an independent non-executive director instead of an executive director, the board of directors would have an improved ability to assess and monitor the performance of management (Edwards & Clough, 2005) with such arrangements being particularly essential for companies with diversified businesses (Pease & McMillan, 1993). However, if there is no separation between the roles of chairman and chief executive officer, the associated benefits of board independence (including improved company performance through ESG performance and reporting) would not be realised and an undesirable concentration of power would result, which could lead to other negative consequences such as conflicts of interest (Lipton, et al., 2019). Furthermore, if the roles of chairman and chief executive officer are performed by the same person, the benefits of a check and balance system also cannot be performed effectively and efficiently (Mallin, 2019). It has been argued that boards chaired by chief executive officers are less supportive in ESG reporting (Arayssi, et al., 2020) and the duality impacts on ESG performance negatively (Husted & de Sousa-Filho, 2019).

Previous studies have presented quite consistent results but listed companies in Hong Kong are rarely studied. In the context of ESG, one would ask what are the effects of the separation of the roles of chairman and chief executive officer on ESG performance of listed companies in Hong Kong. The issue is investigated and related to the research aim 1 and research objective 1 as stated in Section 1.5.

In order to achieve the research aim 1 and the research objective 1 as stated in Section 1.5, the following research question 1 and hypotheses 1C are constructed.

Research Question 1: Do the board attributes affect ESG performance of listed companies in Hong Kong?

Hypothesis 1C: Separation of the roles of chairman and chief executive officer (independent variable) is positively related to the S&P Global ESG Score (dependent variable).

3.5 ESG Performance and Company Value

In order to investigate the value of ESG reporting, it is important to understand whether there is any relationship between ESG performance and the company value of listed companies in Hong Kong. Some extant studies show that good reporting practices and disclosures are consistent with value maximization (Cheung, et al., 2007) and lead to a subsequent increase in market valuation of listed companies in Hong Kong (Cheung, et al., 2011).

It is argued that ESG performance may lack consistency in and criteria for measurement of the nonfinancial attributes and even with quantitative ESG data, ESG performance is difficult to compare among companies and across different periods (Yoon, et al., 2018). Given that ESG information has been provided to the public on a voluntary basis, a mandatory basis or a "comply or explain" basis, the quality of ESG reporting is assessed by international rating agencies in ESG scores. In order to avoid measurement bias, ESG scores provided by external ratings agencies are commonly used as proxies of ESG performance. It is important to explore different theoretical perspectives in order to understand whether ESG performance affects the company value.

Daniel and Titman (2006) develop a model to find out the relationship between the stock returns in terms of changes in market prices and tangible and intangible information of a company. Tangible information is defined as accounting measures such as profits and cash flows and intangible information is defined as other information which is not required to be disclosed in the financial statements in accordance with legal requirements and accounting standards. Their study finds a weak relationship between stock returns and tangible information but a strong relationship between stock returns and intangible information. As

such, it is argued that such intangible information is important in explaining the difference between the market price per share and the book value per share (Daniel & Titman, 2006). In the context of ESG, ESG reporting provides intangible information to the market and therefore the company value increases from the book value per share as recorded in the financial statements to price per share as recognised by the market.

On the one hand, it is argued that ESG performance is positively correlated with the company value (Yanagi & Michels-Kim, 2018). It is hypothesized that the company value in terms of future expected financial value creation which is measured as the price-book value ratio can be synchronized with ESG performance. Gregory and Whittaker (2012) find that all dimensions of corporate social responsibility had a positive effect of the company value adopting the value relevance methodology. Furthermore, some studies argue that capital markets value the disclosure of transparent ESG reporting (Reverte, 2012; Carnevale, et al., 2012). A study using a correlation and regression analysis on 412 German company-year observations found that ESG performance has a positive impact on the company value in terms of return on assets (Velte, 2017). It is argued that there is an association between ESG performance and the company value which is moderated by the company's ESG-related disclosure (Fatemi, et al., 2018).

On the other hand, Hassel *et al.* (2005) and Semenova *et al.* (2009) examine the relationship between environmental performance and share prices using the different value relevance models and find a negative relationship in both cases.

The above mixed results do not have a conclusive consensus among researchers regarding ESG performance and the company value. Previous studies have presented diverse results but listed companies in Hong Kong are rarely studied. In the context of ESG, one would ask what is the value of ESG reporting and whether there is any relationship between the quality of ESG reporting in terms of ESG performance and the company value of listed companies in Hong Kong. The issues are investigated and related to the research aim 2 and research objective 2 as stated in Section 1.5.

In order to achieve the research aim 2 and the research objective 2 as stated in Section 1.5, the following research question 2 and hypothesis 2 have been constructed.

Research Question 2: Does ESG performance affect the company value of listed companies in Hong Kong?

Hypothesis 2: S&P Global ESG Score (independent variable) is positively related to the price-book value ratio (dependent variable).

3.6 ESG Performance and Investment Risk

Sustainability investment is growing across the world as investors diversify their investments to increasingly focus on those companies performing better in ESG practices. Long-term and institutional equity investors, resource providers and other various stakeholders want information for their own capital allocation decisions (Littan, et al., 2021). Institutional investors and rating agencies around the world are increasingly seeking and relying on ESG performance such as ESG scores or ratings to assess the investment risk.

It is argued that ESG performance may lack consistency in and criteria for measurement of the nonfinancial attributes and even with quantitative ESG data, ESG performance is difficult to compare among companies and across different periods (Yoon, et al., 2018). Given that ESG information has been provided to the public on a voluntary basis, a mandatory basis or a "comply or explain" basis, the quality of ESG reporting is assessed by international rating agencies in ESG scores. In order to avoid measurement bias, ESG scores provided by external ratings agencies are commonly used as proxies of ESG performance. It is important to explore different theoretical perspectives in order to understand whether ESG performance affects the investment risk.

As such, it is important for the board of directors to improve ESG performance from time to time so as to attract institutional investors in the long run. The important role played by institutional investors in ESG performance is well established (Ashworth & Mo, 2020) as well as the fact that improvements in ESG performance lead to listed companies in Hong Kong becoming more attractive for investments with higher market valuations (Michael & Goo, 2015).

Hong Kong is one of the major international financial centres in the world and good contemporary ESG practices are particularly important in order to remain relevant with contemporary international practices and to attract investors (Aguilera & Cuervo-Cazurra,

2009). ESG reporting is seen as essential to the growth of the financial market. It is well accepted in the market that good quality of ESG reporting contributes towards the overall well-being of a financial system (Low, 2004).

Some prior studies use some variables such as cost of equity, credit and bond ratings being the measurements for investor confidence and the investment risk. It is argued that more timely disclosures may decrease the cost of equity, possibly through a decrease in the investment risk with lower share price volatility (Botosan & Plumlee, 2002). A prior study provides evidence to show the linking governance mechanisms to higher bond ratings and such mechanisms can reduce the investment risk by mitigating agency costs and monitoring managerial performance and by reducing information asymmetry between the company and investors (Bhojraj & Sengupta, 2003). In addition, another prior study provides evidence to suggest that strong corporate governance benefit from higher credit ratings relative to companies with weaker governance mechanisms and resulting in a decrease in the investment risk (Ashbaugh-Skaife, et al., 2006).

Ball and Brown (1968) find the reaction of stock prices to unexpected changes in annual earnings in order to assess the informational content of financial information in the annual reports. It was found a positive relationship between the share price change and the earnings information in the released annual reports (Ball & Brown, 1968). Thereafter, analysing the impact of financial information on share prices has been a fertile area of research. In particular, A model has been developed including the financial and non-financial information to examine their impacts of share price volatility (Amir & Baruch, 1996). Thereafter, a number of subsequent researches have confirmed that non-financial information has great influence on the share price volatility (Trueman, et al., 2000; Rajgopal, et al., 2003).

Listed companies in Hong Kong must compete with listed companies in other major financial centres and the financial market of Hong Kong must maintain investor confidence by promoting high standards of transparency and accountability (La Porta, et al., 2000). The term of investor confidence is frequently used in literature and ESG regulations. Investor confidence is an expression of willingness to participate in financial market (Lee & Shailer, 2008). It is argued that financial market values the disclosure of transparent ESG reports (Reverte, 2012; Carnevale, et al., 2012). It is argued that an increase in investor confidence resulting in a decrease in the investment risk is enhanced by increased disclosures (Lee & Shailer, 2008). As

such, in addition to financial information as reported in the financial reports, ESG reports would provide more information for investors making their investment decisions and hence the investment risk is minimised. Good ESG performance and practices are seen as essential to the growth of the capital markets and play an important role in managing the investment risk. It is argued that with a lower share price volatility due to stable share transactions reflects a lower investment risk from the investor perspective.

Previous studies have presented quite consistent results but listed companies in Hong Kong are rarely studied. In the context of ESG, one would ask what is the value of ESG reporting and whether there is any relationship between the quality of ESG reporting in terms of ESG performance and the investment risk of listed companies in Hong Kong. The issues are investigated and related to the research aim 2 and research objective 3 as stated in Section 1.5.

In order to achieve the research aim 2 and the research objective 3 as stated in Section 1.5, the following research question 3 and hypothesis 3 are constructed.

Research Question 3: Does ESG performance affect the investment risk of listed companies in Hong Kong?
Hypothesis 3: S&P Global ESG Score (independent variable) is negatively related to the annual share price volatility (dependent variable).

3.7 Chapter Summary

Firstly, this chapter has discussed four theories related to ESG reporting, namely Agency Theory, Legitimate Theory, Institutional Theory and Stakeholder Theory. These theories provide different theoretical perspectives and discussions on why listed companies might elect to make ESG reporting voluntarily. The relevance of such theories is particularly greater in the case that there is no regulation prescribing how listed companies are to account for ESG reporting and how to disclose particular information. As discussed in Section 3.2.4, compared to Agency Theory, Legitimacy Theory and Institutional Theory, Stakeholder Theory provides more comprehensive insights into why listed companies might voluntarily elect to make some ESG disclosures.

Secondly, this chapter has discussed three theories related to regulation of ESG reporting, namely Public Interest Theory, Capture Theory and Private Interest Theory. These three theories argue to use regulation to regulate ESG reporting and their arguments are complementary to each other for explaining why regulation of ESG reporting is necessary and needed. In fact, the new ESG regulatory framework on a mandatory basis and a "comply or explain" basis adopted for listed companies in Hong Kong with effect from 1 July 2020 can be explained and is supported by these three theories.

Thirdly, this chapter has provided literature review on the effects of board attributes, which are fundamentally affecting board effectiveness, on ESG performance. Some prior studies of board attributes which affect board effectiveness, namely the board size, proportion of independent non-executive directors and separation of the roles of chairman and chief executive officer have been discussed. Thereafter, the relationships of ESG performance, the company value and investment risk have been reviewed theoretically. As such, three research questions and five hypotheses have been constructed after the literature review.

The next chapter will discuss the research methodology adopted in this study. In particular, the research approach and methods, data collection methods, sampling method and sample size, data analyses as well as research design will be discussed in detail.

Chapter 4: Research Methodology

4.1 Introduction

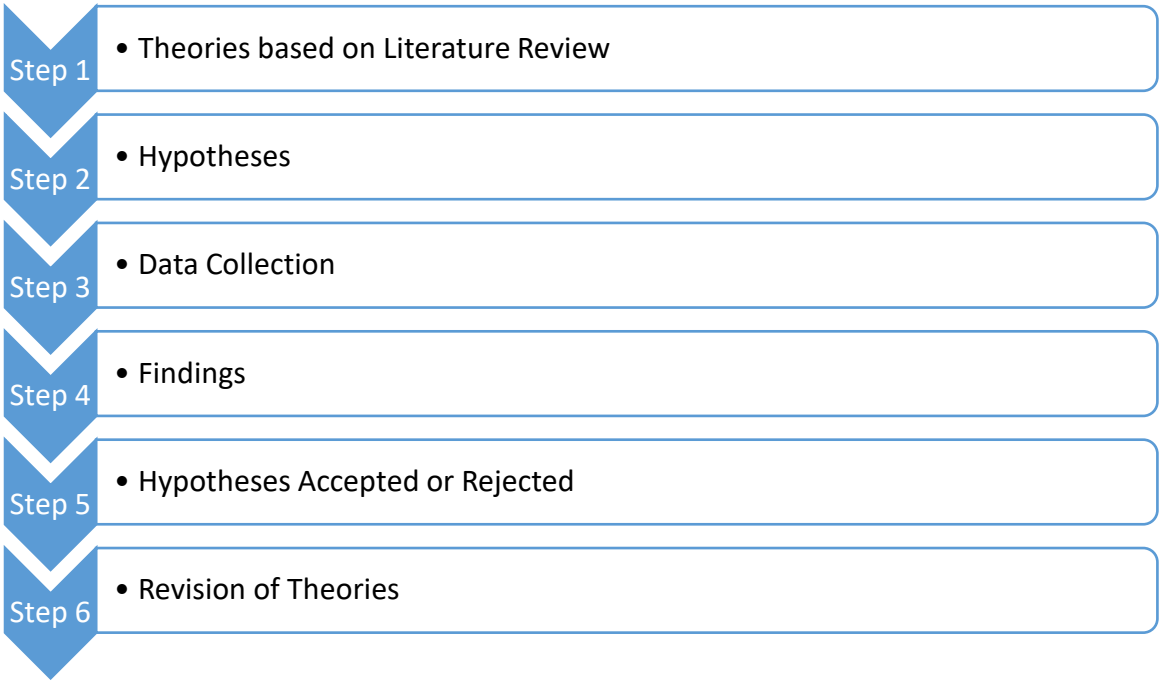
This chapter discusses research approach adopted, various research methods, data collection methods, sampling method and sample size, data analyses and the research design with nine steps in this study.

4.2 Research Approach

Positivism in an epistemological position that advocates the application of the natural science research methods to the study of social and business context. Positivism is to rely on the principles that the purpose of theory is to generate hypotheses that can be tested (i.e. the principle of deductivism) and studies can be conducted in way that is value free in the context of social and business context objectively (Bryman & Bell, 2015).

The research objectives of this study are to investigate the effects of board attributes on ESG performance, the relationship between ESG performance and the company value and the relationship between ESG performance and the investment risk through various hypotheses. The positive paradigm is chosen as the most suitable research paradigm because various hypotheses can be investigated and tested empirically (Saunders, et al., 2019).

Deductive approach is one of the most common views of the relationship between theory and research. Based on what is known about a domain and the theoretical considerations within it, hypotheses are deduced and tested empirically. In this study, deductive approach is adopted and the process of deduction is as follows (Bryman & Bell, 2015).



4.3 Research Methods

Broadly speaking, there are three research methods used in business research, namely a quantitative research method, a qualitative research method and a mixed research method (a combination of quantitative and qualitative research).

In this study, a quantitative research method has been used. The quantitative research method is a research method that emphasises data quantification. Reasons for using quantitative research method instead of the qualitative research method and a mixed research method (a combination of the quantitative research method and qualitative research method) are as follows.

The quantitative research method emphasises a deductive approach to the relationship between theory and research with the emphasis on the testing of theory (Bryman & Bell, 2015). As discussed in Chapter 3, this study is to test Stakeholder Theory based on the literature review in the context of ESG reporting. Therefore, a deduction approach has been used instead of an induction approach used in the qualitative research approach. Moreover, the quantitative research method adopts an epistemological orientation of natural scientific model in particular positivism which argues that natural sciences are progressing through the accumulation of facts in order to produce generalisations (Bryman & Bell, 2015). This study employs the quantitative research method and has been designed in accordance with the positivism to make empirical inquiry based on the argument that the social world exists externally to the researcher and its

properties can be measured directly through observations instead of using the qualitative research method which adopts an epistemological orientation in particular interpretivism and emphasises the way in which individuals interpret the social and business world (Bryman & Bell, 2015).

Furthermore, the quantitative research method adopts an ontological orientation of objectivism takes a view of social and business reality as an external, objective reality (Bryman & Bell, 2015). In this study, the research holds that the business reality exists independently of consciousness and assumes that there is an objective reality in the business world and instead of using the qualitative research method which adopts an ontological orientation of constructionism and takes a view of social and business reality as a constantly shifting emergent property of the creation of an individual (Bryman & Bell, 2015).

The quantitative research method can use a large amount of quantitative data over a longer period of time which increases the credibility whereas the qualitative research method has some fundamental problem such as a small sample size and reliability issue. (Lune & Berg, 2016). By using the quantitative research method, the sample of this study consists of 211 listed companies from 12 different industry sectors with a two-year penal for 2020 and 2021 totalling 422 observations.

This study was conducted during the COVID-19 pandemic. Owing to various limitations during such extraordinary period, it would not be appropriate, practicable, effective and efficient in using the research method by sending a questionnaire to a listed company requesting for information, interviewing senior executives and/or conducting observations because:

- During the COVID-19 pandemic, it would be impossible to conduct interviews and/or observations.
- For listed companies, most of the financial and non-financial data are share price sensitive information which is not allowed to be disclosed privately at law;
- It is very hard to invite a responsible officer of a listed company to agree to fill in a questionnaire and the response rate is expected to be very low;
- The respondents may intend to disclose some ESG information in their favour but are not willing to disclose some unfavourable ESG information; and
- The information provided by the respondents may be subjective and biased.

In addition, the results of a study using a quantitative research method can be generalised. Generalisation means that the results of a study can be applied to other subjects, groups or conditions (Kerlinger & Lee, 1999). That is, by using the quantitative research method, the results can have a broader application as opposed to the qualitative research method which uses some research tools for a small case study (such as questionnaires, interviews or observations) may produce findings that are possible indicative of trends worthy of replication by further research but one cannot make a firm or exaggerated claim on the basis of small and perhaps unrepresentative samples (Gray, 2017). In addition, the qualitative research method may use a longer time to collect data but may not produce suitable explanations of research phenomena (Cohen, et al., 2017).

Collected data under the quantitative research method must be reliable and valid. Reliability is defined as the degree to which a research instrument is able to not only produce consistent results but also provide an indication of consistency between two measures of the same thing (Black, 1998). For a research tool to be reliable, it is expected that it gives us the same results when something has been measured at different times.

There are two differences between scales and indexes. Scales involve a set of similar items with identical ratings whereas indexes have components that are different from each other and measured in different ways. Subjective constructs are assessed by scales whereas objectively measurable values are combined by indexes (Pelz, 2020).

The most common ways of determining reliability (as employed and reported in research) include but are not limited to the test-retest reliability (Pierce & Gardner, 2011), internal consistency reliability (Sakaran & Bougie, 2013) and inter-judge reliability (Gray, 2017). In practice, a common test used for assessing reliability is Cronbach's alpha (Bryman & Bell, 2015). A value of 0.7 or above in Cronbach's alpha is considered acceptable and efficient (Schutte, et al., 2000).

In this study, the dependent and independent variables are not scales and the data collected and used in this study are secondary data which are derived mainly from audited financial reports, ESG reports, corporate governance reports and from websites of reputable organisations such as the SEHK and S&P Global. As a result, the items in the measurement instrument are not interrelated and reliability is not an issue in this study meaning that the calculation of

Cronbach's alpha is not necessary. In contrast, the qualitative research method has some fundamental problem of reliability owing to a small sample size (Lune & Berg, 2016).

In addition to reliability, validity is also very important to be considered in the research design. Validity is concerned with whether a research instrument measures what it is intended to measure and also the integrity of the conclusions that are generated from a study. The central question around validity is whether a measure of a concept really measures that concept at all (Gray, 2017). The nature of validity is the direction of causality. This study uses careful definition of the research through some previous academic studies to assess the validity (Saunders, et al., 2019). Moreover, extant literature can also be used to assess the validity (Li, et al., 2006; Cheung, et al., 2010; Cheung, et al., 2011; Lei & Song, 2012; Cheng, et al., 2015).

The factor analysis can be used to determine which groups of items may constitute a unidimensional set (DeVellis, 2003). The items from the scale should be either retained or deleted based on the factor loading results (Kumar, 2015). The factor analysis is not applicable to this study because the measurement instruments are indexes but not scales.

All in all, having taken all factors into consideration, the quantitative research method is adopted and used as it is more appropriate, practicable, effective and efficient in the context of this study instead of the qualitative research method or the mixed research method which also includes the qualitative research method.

4.3.1 Data Collection Methods

This research is an empirical study in which various quantitative research methods are used. This study uses the following secondary data for data collection purposes.

(1) Data Collection for Research Question 1

<u>Dependent Variable: ESG Score</u>

Presently, ESG reporting is not yet standardised and ESG performance is not easy to be assessed. It is argued that ESG performance may lack consistency in and criteria for measurement of the nonfinancial attributes and even with quantitative ESG data, ESG

performance is difficult to compare among companies and across different periods (Yoon, et al., 2018). In order to avoid measurement bias, ESG scores provided by an external ratings agencies are commonly used as proxies of ESG performance.

There are various ESG scores or ratings published by different ESG score or rating providers provide stakeholders with tools to evaluate ESG performance and each of them has pros and cons. ESG score or rating providers use available data and information to produce a company's ESG score or rating. Generally speaking, a higher ESG score (or a lower ESG risk rating) indicates that a better ESG performance and risk management. However, different providers use different methodologies, criteria and methods to score or rate a company and hence it is unavoidable that ESG scores or ratings provided by different providers may be inconsistent with each other.

As a result, it is important to determine which scores or ratings provided by a provider should be used to represent ESG performance in the context of this study. There are six well-known ESG scores or ratings for companies provided by different rating agencies., Having considered the pros and cons of six well-known ESG scores or ratings, five of them, namely "Moody's ESG Scores", "MSCI ESG Ratings", "Refinitiv ESG Company Scores", "Morningstar Sustainalytics Company ESG Risk Ratings" and "Hong Kong Quality Assurance Agency Sustainability Rating" are not suitable for this research study. Reasons are as follows:

Moody's ESG Scores are not available to the public but provided to paid subscribers only (Moody's, 2022). Therefore, they are not suitable for this research study.

MSCI ESG Ratings provide ESG letter grades only but not scores (MSCI, 2022). Therefore, they are not suitable for this research study.

Refinitiv ESG Company Scores provide the latest year of ESG scores without any prior year scores (Refinitiv, 2022). Therefore, they are not suitable for this research study.

Morningstar Sustainalytics Company ESG Risk Ratings provide the latest year of ESG risk ratings without any prior year risk ratings (Morningstar Sustainalytics, 2022). Therefore, they are not suitable for this research study.

Hong Kong Quality Assurance Agency (HKQAA) Sustainability Rating provides ESG ratings only for a selected and limited number of large listed companies (Hang Seng Indexes, 2022b). Therefore, it is not suitable for this research study.

In this study, the S&P Global ESG Score is chosen to measure a company's ESG performance but not the other five ESG scores or ratings as discussed above. Reasons for choosing the S&P Global ESG Score are as follows:

The S&P Global Score is a relative score which comprehensively measures a company's ESG performance on and management of ESG risks, opportunities and impacts informed by a combination of company disclosures, media and stakeholder analysis, modelling approaches and in-depth company engagement via the S&P Global Corporate Sustainability Assessment. The S&P Global ESG Score uses a double materiality approach whereby a sustainability issue is considered to be material if it presents a significant impact on not only environmental, social and governance issues but also value drivers, competitive position and shareholder value creation in the long run. Furthermore, it can be used to compare different companies' ESG performance within the same industry classification (S&P Global, 2022). As such, ESG performance is proxied by the S&P Global ESG Score in this study.

The S&P Global ESG Score provided by S&P Global is environmental, social and governance data set which provides company level, dimensional level and criteria level scores based on the S&P Global Corporate Sustainability Assessment process as well as an evaluation of companies' ESG practices on a yearly basis. Drawing upon over 20 years of experience of analysing sustainability's impact on a company's value creation in the long run, it is well recognised in the market that the S&P Global ESG Score is one of the most advanced ESG scoring methodologies today. Leverage the S&P Global ESG Score can gain insight into a wide range of ESG data that is comparable across the companies in the same industry and further allows for easy aggregation at the portfolio level (S&P Global, 2022). In addition, the S&P Global ESG Score provides the latest two years ESG scores covering from small, medium to large listed companies in Hong Kong. Therefore, the S&P Global ESG Score is suitable for this research study in terms of scope and context. As such, ESG performance is proxied by the S&P Global ESG Score. Data are collected from the public available information provided by the S&P Global on the website www.marketplace.spglobal.com/en/datasets/s-p-global-esg-scores-(171).

Listed companies are subject to the disclosure requirements under the new regulatory framework for ESG reporting in Hong Kong with effect from 1 July 2020. Therefore, this study has chosen the first year available 2020 ESG scores based on the published 2020 annual results by listed companies which have been available within four months after the financial year of 2020 (i.e. by April 2021) under the Listing Rules. The external international agencies would normally take one or two months after the company's annual results were released to the public to prepare and publish 2020 ESG scores (i.e. by June 2021). Based on this time frame, 2021 ESG scores are available by June 2022.

For the panel regression analysis, this study has used 2020 ESG scores (available by June 2021) and 2021 ESG scores (available by June 2022) but not thereafter such as 2022 ESG scores (available by June 2023) because this study has scheduled to collect all relevant data by December 2022 and then to have data analysis and discussions completed in April 2023 aiming at finishing all chapters of the thesis and submission of it in August 2023. Therefore, owing to the limitations of the availability of ESG scores, this study has used 2020 and 2021 ESG scores for panel regression analysis (but not including 2022 ESG scores available by June 2023 which was outside the data collection, analysis and discussion time frame of this study). In order to have novelty, new insights and contributions to the research after the newly implemented regulatory framework for ESG reporting in Hong Kong, a sample consists of 211 listed companies from 12 different industry sectors with a two-year penal for 2020 and 2021 totalling 422 company-year observations based on latest available information within the research time frame of this study.

Independent Variables: Board Size, Proportion of Independent Non-executive Directors and Roles of Chairman and Chief Executive Officer

Data are collected and/or calculated from the information in the annual financial reports, ESG reports, corporate governance reports and websites of the respective listed companies as well as from the public available information on the website www.webb-site.com/dbpub.

Control Variables: Company Size, Leverage, Profitability and Age

Data are collected and/or calculated from the information in the annual financial reports, ESG reports, corporate governance reports and websites of the respective listed companies as well as from the public available information on the website www.webb-site.com/dbpub.

(2) Data Collection for Research Question 2

Dependent Variable: Price-book Value Ratio

In this study, the price-book value ratio is chosen as the proxy for the company value. The price-book value ratio is defined as the market capitalisation divided by the equity attributable to shareholders (Hoggett, et al., 2018). Data for market capitalisation are collected from the public available information provided by Yahoo Finance on the website www.finance.yahoo.com/quote and data for the equity attributable to shareholders are collected from the information in the annual financial reports and websites of the respective listed companies.

Independent Variable: S&P Global ESG Scores

As discussed in Section 4.3.1(1), data are collected from the public available information provided by the S&P Global on the website www.marketplace.spglobal.com/en/datasets/s-p-global-esg-scores-(171).

Control Variables: Company Size, Leverage, Profitability and Age

As discussed in Section 4.3.1(1), data are collected and/or calculated from the information in the annual financial reports, ESG reports, corporate governance reports and websites of the respective listed companies as well as from the public available information on the website www.webb-site.com/dbpub.

(3) Data Collection for Research Question 3

Dependent Variable: Annualised Share Price Volatility

In this study, the annual share price volatility is chosen to be the proxy for the investment risk. The annual share price volatility is defined as the square root of the number of trading days during the year multiplied by the standard deviation of daily changes in share price (Boyte-White, 2020). Daily share prices are collected from the public available information by the Hong Kong Exchanges and Clearing Limited (HKEx) on the website www.hkex.com.hk and by Yahoo Finance on the website www.finance.yahoo.com/quote.

Independent Variable: S&P Global ESG Scores

As discussed in Section 4.3.1(1), data are collected from the public available information provided by the S&P Global on the website www.marketplace.spglobal.com/en/datasets/s-p-global-esg-scores-(171).

Control Variables: Company Size, Leverage, Profitability and Age

As discussed in Section 4.3.1(1), data are collected and/or calculated from the information in the annual financial reports, ESG reports, corporate governance reports and websites of the respective listed companies as well as from the public available information on the website www.webb-site.com/dbpub.

4.3.2 Sampling Method and Sample Size

There are many different sampling methods including but not limited to a simple random sampling, a stratified random sampling and a cluster sampling under the probability samples (Selvanathan & Selvanathan, 2011). The Hang Seng Composite Index (HSCI), which is composed of about 500 listed companies, offers a comprehensive Hong Kong market benchmark that covers about 95% of the total market capitalisation of listed companies in Hong Kong (Hang Seng Indexes, 2022a). There are 12 different industry sectors, namely Consumer Discretionary, Consumer Staples, Healthcare, Conglomerates, Information Technology, Properties & Construction, Financials, Utilities, Telecommunications, Industries, Materials

and Energy under the 12 Hang Seng Composite Industry Indexes (HSCII) which are derived from the HSCI. Therefore, it appears that a stratified random sampling is the best sampling method used by taking some samples from each of the 12 stratified industry sectors (MacGillivray, et al., 2014). However, owing to the limited availability of the S&P Global ESG Scores under the HSCI listed companies for the years of 2020 and 2021, all 211 listed companies' ESG Scores available are chosen for each year from 12 different industry sectors as shown in Table 4 in this study.

In order to determine the sample size, there are many factors need to be considered including the desired confidence level, acceptable sampling error and proportion in order to determine the minimum sample size (Levine, et al., 2011). First of all, Central Limit Theorem provides that when the sample size is at least 30, the sampling distribution of the mean is approximately normal for many population distributions (Berenson, et al., 2016) and the sample size of greater than 30 is considered statistically sufficient in practice (McClave & Sincich, 2000).

Moreover, a "Table for Determining Minimum Returned Sample Size for a Given Population Size for Continuous and Categorical Data" provides that for categorical data with a population size of about 500 listed companies under the HSCI in this study, a margin of error equals 0.05, p equals 0.50 and t equals 1.96, the minimum sample size is 218 (Bartlett, et al., 2001). However, as discussed above, owing to the limited availability of the S&P Global ESG Scores under the HSCI listed companies for the years of 2020 and 2021, it appears that all 211 listed companies' ESG Scores available are chosen for each year from 12 different industry sectors are close enough to the minimum sample size of 218.

In addition, there are also some other justifications to indicate that the 211 sampled listed companies are reasonably sufficient in this study. As a general rule recommended to determine the sample size for testing individual independent variable in multiple regression is 104+n where n is number of independent variables in the model (Tabachnick & Fidell, 1996). In this study, the numbers of independent variables (including control variables) in the panel regression models for research questions one, two and three are 7, 5 and 5, respectively. Hence the 211 sampled listed companies are reasonably sufficient in this study. All in all, the sample in this study consists of 211 listed companies from 12 different industry sectors with a two-year panel of 2020 and 2021 totalling 422 company-year observations.

Table 4: Hang Seng Composite Industry Indexes – Sampling

Hang Seng Industry Classification	Number of Listed Companies (as at 6 March 2022)	Sample Size	Percentage
Consumer Discretionary	94	28	29.79%
Consumer Staples	28	15	53.57%
Healthcare	75	20	26.67%
Conglomerates	8	4	50.00%
Information Technology	47	15	31.91%
Properties and Construction	97	31	31.96%
Financials	53	37	69.81%
Utilities	28	18	64.29%
Telecommunications	9	3	33.33%
Industrials	37	24	64.86%
Materials	19	10	52.63%
Energy	11	6	54.55%
All Industry Sectors	506	211	41.70%

4.4 Data Analyses

Data used in this study are panel data covering the reporting periods ended 2020 and 2021. In panel data, individuals (i.e. listed companies in Hong Kong in this study) are observed repeatedly at different periods in time (i.e. years 2020 and 2021 in this study). Panel data is a two-dimensional concept which is seen as a combination of cross-sectional and time-series data. Cross-sectional data is described as one observation of a company with a dependent variable and independent variables at a specific point in time. Time-series data observes one object recurrently over time.

As panel data combines the cross-sectional and time series data, previous researchers often used the panel data regression for their studies (Greene, 2003; Hall & Wall, 2019). In this study, panel data consists of observations on multiple companies where each listed company is to be observed at two time periods of the years 2020 and 2021.

<u>Panel Data Screening</u>

Panel data are screened prior to the analysis to minimise the effect of outliers. An investigation is conducted to check the outlier is not the result of an error in measuring and recording. For

the purpose of minimising the effect of outliers in this study, the extreme variations in the values of company size (total assets) and age (number of listing years) are transformed into natural logarithms to reduce the cases of anticipated outliers before performing any test and analysis. Any outliers detected are to be retained but the values would be reduced and consequently their ability to produce a distorting effect has been minimised (Tabachnick & Fidell, 1996).

In addition, panel data are screened to check whether there is an unacceptable high multicollinearity. Multicollinearity is tested by regressing each of the independent variables against other independent variables. A coefficient covariance matrix between different independent variables is conducted and used to see whether there is any multicollinearity issue.

Three Panel Regression Models

There are three types of panel regression models, namely the pooled ordinary least squares (OLS) regression model, the fixed effects panel regression model and the random effects panel regression model. A simple panel data regression equation is as follows (Stock & Watson, 2019):

$Y_{it} = \beta_0 + \beta_1 X_{it} + \varepsilon_{it}$
Y = Dependent variable
β = Coefficient
X = independent variable
ε = error variable (consisting of individual effects of unobserved independent variables and idiosyncratic error)
i = 1, 2 …… N
t: = 1, 2

The pooled OLS regression model assumes that there is no correlation between the independent variables and the individual effects of unobserved independent variables. Such model assumes that there is no problem of endogeneity caused by unobserved heterogeneity. However, even though this assumption holds true, the individual effects of the unobserved independent variables may have a serial correlation over time. This model ignores time and

individual characteristics and focuses only on the dependencies between the companies (Brugger, 2021).

The fixed effects panel regression model assumes the individual effects of unobserved independent variables as constant over time. Such model shows how multiple observations over time on the same company can be used to control for the individual effects of unobserved independent variables that differ across companies but are constant over time. In other words, if the individual effects of unobserved independent variables do not change over time, any changes in the dependent variable are due to influences other than these fixed characteristics (Stock & Watson, 2019). Because the unobserved heterogeneity can be controlled, the fixed effects panel regression model allows heterogeneity to be existent (Brugger, 2021).

The random effects panel regression model assumes that the individual effects of unobserved independent variables as random variables over time. As such, they are able to switch between the pooled OLS model and fixed effects panel regression model and can focus on both dependencies between as well as within companies (Brugger, 2021).

Determining the Panel Data Regression Model

For panel regression, the first procedure is to determine the right model between the pooled OLS regression model, the fixed effects panel regression model and the random effects panel regression model. There are two steps to be conducted called the redundant fixed effects test and the Hausman test.

Redundant Fixed Effects Test:

Firstly, the redundant fixed effects test is used to determine the right model between the pooled OLS regression model and the fixed effects panel regression model

The null and alternative hypotheses are:
H_0: Pooled OLS regression model is appropriate
H_A: Fixed effects panel regression model is appropriate

Decision criteria:

Reject H_0: If the probability value for cross-section F is less than 0.05
Accept H_0: If the probability value for cross-section F is greater than 0.05

Hausman Test:

Secondly, the Hausman test is used to determine the right model between the fixed effects panel regression model and the random effects panel regression model.

The null and alternative hypotheses are:
H_0: Random effects panel regression model is appropriate
H_A: Fixed effects panel regression model is appropriate

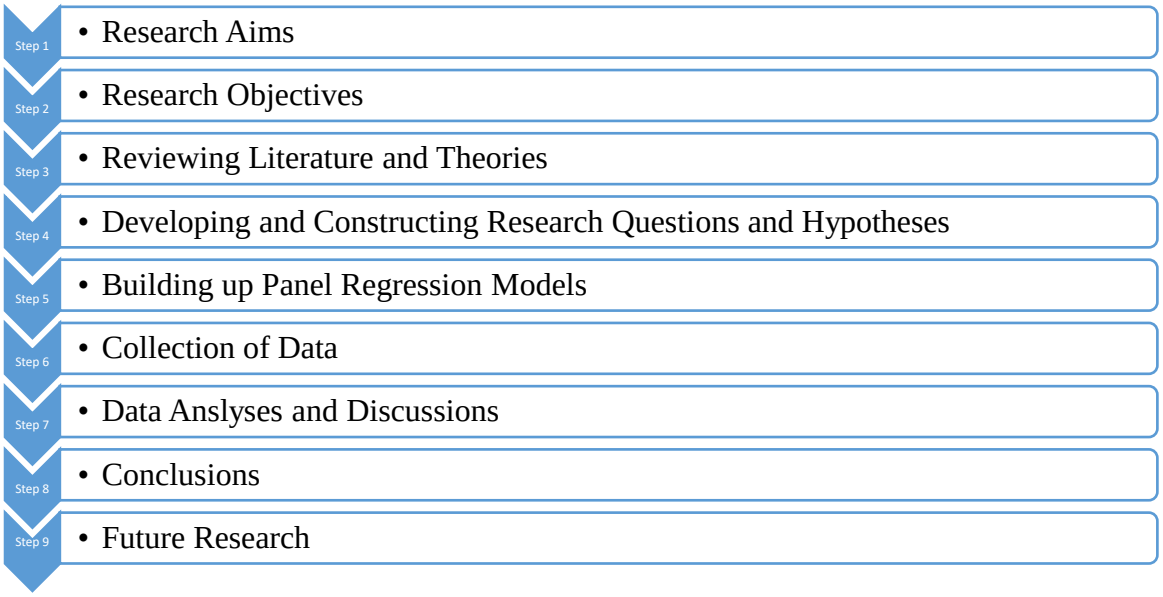
Decision criteria:
Reject H_0: If the probability value for cross-section random is less than 0.05
Accept H_0: If the probability value for cross-section random is greater than 0.05

Descriptive and Inferential Statistical Analyses

Firstly, descriptive statistic results (such as measures of central tendency and standard deviation) for each dependent, independent and control variables are summarised and analysed. Secondly, in order to answer the research questions 1, 2 and 3 and testing the hypotheses 1A, 1B, 1C, 2 and 3 as stated in Section 1.6, inferential statistic results (such as hypothesis testing, panel regression models, redundant fixed effects test, Hausman test, normality test, testing of residuals, Durbin-Watson test of autocorrelation, F-test of the analysis of variance, coefficient covariance and t-test) are analysed using the Microsoft Excel and EViews 12 Student Version (EViews).

4.5 Research Design

The overall research design for this study is summarised as follows:



Various steps of the overall research design are discussed in detail in this section.

Step 1 – Research Aims

Based on the identification of the issues and areas of interest, two research aims are established as stated in Section 1.5.

Step 2 – Research Objectives

In order to achieve the research aims, three research objectives are formulated as stated in Section 1.5.

Step 3 – Reviewing Literature and Theories

Having reviewed relevant literature and theories in Chapter 3, some academic research gaps in ESG reporting and ESG performance are identified in particular related to the listed companies in Hong Kong.

Step 4 - Developing and Constructing Research Questions and Hypotheses

Three research questions 1, 2 and 3 which are capable of being researched are developed and five hypotheses 1A, 1B, 1C, 2 and 3 are constructed to be tested statistically accordingly as stated in Section 1.6.

Research Question 1 and Hypotheses 1A, 1B and 1C:

The research question 1 as stated in Section 1.6 is to investigate whether the board attributes affect ESG performance of listed companies in Hong Kong. The board attributes can be

measured in many variables. In this study, three board attributes are used, namely the board size, proportion of independent non-executive directors and separation of the roles of chairman and chief executive officer, which are fundamentally affecting the board effectiveness. Accordingly, three hypotheses are constructed as follows:

Hypothesis 1A: Board size (independent variable) is positively related to the S&P Global ESG Score (dependent variable)
Hypothesis 1B: Proportion of independent non-executive directors (independent variable) is positively related to the S&P Global ESG Score (dependent variable).
Hypothesis 1C: Separation of the roles of chairman and chief executive officer (independent variable) is positively related to the S&P Global ESG Score (dependent variable).

Research Question 2 and Hypothesis 2:

The research question 2 as stated in Section 1.6 is to investigate whether ESG performance affects the company value of listed companies in Hong Kong. It is argued that ESG performance is correlated with the company value (Yanagi & Michels-Kim, 2018). In response to the increasing demand for ESG reporting and for the purposes of justifying why it is vital for directors to improve ESG performance, it is important to understand whether ESG performance affects the company value.

In this study, the company value is measured in the price-book value ratio. It is hypothesized that future company value creation based on equity spread over the long run can be synchronized with ESG performance. As such, the hypothesis 2 is constructed as follows:

Hypothesis 2: S&P Global ESG Score (independent variable) is positively related to the price-book value ratio (dependent variable).

Research Question 3 and Hypothesis 3:

The research question 3 as stated in Section 1.6 is to investigate whether ESG performance affects the investment risk of listed companies in Hong Kong. Some prior studies argue that financial markets value the disclosure of transparent ESG reports (Reverte, 2012; Carnevale, et al., 2012) and ESG performance would affect the investment risk. In order to substantiate

that directors have to put more efforts in improving ESG performance aiming at minimising the investment risk which is in the best interests of the company, it is important to understand whether ESG performance affects the investment risk.

In this study, the investment risk is measured in the annualised share price volatility. It is hypothesized that the investment risk can be synchronized with ESG performance. As such, the hypothesis 3 is constructed as follows:

Hypothesis 3: S&P Global ESG Score (independent variable) is negatively related to the annual share price volatility (dependent variable).

Step 5 – Building up Panel Regression Models

The research question 1 as stated in Section 1.6 is to investigate whether board attributes affect ESG performance of listed companies in Hong Kong. As such a panel regression model is constructed as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \beta_6 X_{6t} + \beta_7 X_{7t} + \varepsilon_{it}$$

Y = Standards & Poor's Global (S&P Global) ESG Score
β = Coefficient
X_1 = Board size
X_2 = Proportion of independent non-executive directors
X_3 = Roles of chairman and chief executive officer
X_4 = Company size
X_5 = Leverage
X_6 = Profitability
X_7 = Age
ε = error variable (consisting of individual effects of unobserved independent variables and idiosyncratic error)
i = 1, 2 …… N
t: = 1, 2

The research question 2 as stated in Section 1.6 is to investigate whether ESG performance affects the company value of listed companies in Hong Kong. As discussed, the company value is measured in the price-book value ratio in this study. As such, a panel regression model is constructed as follows:

$Y_{it} = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \varepsilon_{it}$

Y = Price-book value ratio

β = Coefficient

X_1 = S&P Global ESG Score

X_2 = Company size

X_3 = Leverage

X_4 = Profitability

X_5 = Age

ε = error variable (consisting of individual effects of unobserved independent variables and idiosyncratic error)

i = 1, 2 …… N

t = 1, 2

The research question 3 as stated in Section 1.6 is to investigate whether ESG performance affects the investment risk of listed companies in Hong Kong. As discussed, the investment risk is measured in the annual share price volatility in this study. As such, a panel regression equation is constructed as follows:

$Y_{it} = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \varepsilon_{it}$

Y= Annualised share price volatility

β = Coefficient

X_1 = S&P Global ESG Score

X_2 = Company size

X_3 = Leverage

X_4 = Profitability

X_5 = Age

ε = error variable (consisting of individual effects of unobserved independent variables and idiosyncratic error)

i = 1, 2 …… N

t = 1, 2

Step 6 – Collection of Data

This research is an empirical study in which various quantitative research methods are used. This study uses secondary data for data collection purposes (Smith, 2006). Details are discussed in Section 4.3.1.

Step 7 – Data Analyses and Discussions

Research Question 1 and Hypotheses 1A, 1B and 1C as stated in Section 1.6:

Descriptive statistics are used to describe and summarise different sets of data. Inferential statistics are used to investigate how the board attributes affect ESG performance of listed companies in Hong Kong. The dependent variable is the S&P Global ESG Score and the independent variables are three board attributes, namely the board size, proportion of independent non-executive directors and roles of chairman and chief executive officer together with some control variables, namely the company size, leverage, profitability and age are also incorporated in the panel regression model. The hypotheses 1A, 1B and 1C are tested statistically.

Research Question 2 and Hypothesis 2 as stated in Section 1.6:

Descriptive statistics are used to describe and summarise different sets of data. Inferential statistics are used to investigate whether ESG performance affects the company value of listed companies in Hong Kong. The dependent variable is the company value measured in the price-book value ratio and the independent variable is the S&P Global ESG Score and some control variables, namely the company size, leverage, profitability and age are also incorporated in the panel regression model. The hypothesis 2 is tested statistically.

Research Question 3 and Hypothesis 3 as stated in Section 1.6:

Descriptive statistics are used to describe and summarise different sets of data. Inferential statistics are used to investigate whether ESG performance affects the investment risk of listed

companies in Hong Kong. The dependent variable is the investment risk measured in the annualised share price volatility and the independent variable is the S&P Global ESG Score and some control variables, namely the company size, leverage, profitability and age are also incorporated in the panel regression model. The hypothesis 3 is tested statistically.

Step 8 – Conclusions

Based on the key findings, results and discussions in this study, some conclusions are drawn.

Step 9 – Future Research

Future research opportunities of ESG reporting and its quality are identified.

4.6 Chapter Summary

Firstly, this chapter has discussed the research approach to this study in six steps, namely theories based on literature review, hypotheses, data collection, data analyses and discussions, hypotheses accepted or rejected and revision of theories.

Secondly, this chapter has discussed that having considered the pros and cons as well as some limitations in this study, the quantitative research method has been chosen. In addition, the reasons for not using the qualitative research method and mixed research method (which includes the qualitative research method) are discussed in detail.

Thirdly, this chapter has discussed the data collection methods for the research questions 1, 2 and 3 as stated in Section 1.6 and the sampling method chosen and the sample size determination.

Fourthly, this chapter has discussed data analysis with detailed discussions on the panel data screening, three panel regression models, determination of the panel regression model statistically, descriptive and inferential statistic results and analyses.

Fifthly, this chapter has discussed the overall research design in nine steps, namely the research aims, research objectives, reviewing literature and theories, developing and constructing research questions and hypotheses, building up panel regression models,

collection of data, data analyses and discussions using descriptive and inferential statistics, conclusions and future research.

The next chapter will build up three panel regression models with specifications for the purposes of investigating the effects of board attributes on ESG performance, the relationship between ESG performance and the company value as well as the relationship between ESG performance and the investment risk of listed companies in Hong Kong.

Chapter 5: Panel Regression Models and Specifications

5.1 Introduction

This chapter is to build up three panel regression models with specifications for the purposes of investigating the effects of board attributes on ESG performance, the relationship between ESG performance and the company value as well as the relationship between ESG performance and the investment risk of listed companies in Hong Kong.

5.2 Effects of Board Attributes on ESG Performance (Panel Regression Model I)

As discussed in Section 3.4, in some prior studies, three board attributes have been identified as important elements affecting the board effectiveness, namely the board size (Yermack, 1996; Eisenberg, et al., 1998; Kiel & Nicholson, 2003) and the proportion of independent non-executive directors and separation of the roles of chairman and chief executive officer (Raheja, 2005; Gordini, 2012; Shu & Chiang, 2020) resulting in affecting the company performance including ESG performance.

This section is to build up a panel regression model to investigate whether these three board attributes affect ESG performance of listed companies in Hong Kong.

As such, the following panel regression model is built for research question 1 and hypotheses 1A, 1B and 1C as stated in Section 1.6.

Research Question 1: Do the board attributes affect ESG performance of listed companies in Hong Kong?

Hypothesis 1A: Board size (independent variable) is positively related to the S&P Global ESG Score (dependent variable).

Hypothesis 1B: Proportion of independent non-executive directors (independent variable) is positively related to the S&P Global ESG Score (dependent variable).

Hypothesis 1C: Separation of the roles of chairman and chief executive officer (independent variable) is positively related to the S&P Global ESG score (dependent variable).

A panel regression model is constructed as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \beta_6 X_{6t} + \beta_7 X_{7t} + \varepsilon_{it}$$

Y = S&P Global ESG Score

β = Coefficient

X_1 = Board size

X_2 = Proportion of independent non-executive directors

X_3 = Roles of chairman and chief executive officer

X_4 = Company size

X_5 = Leverage

X_6 = Profitability

X_7 = Age

ε = error variable (consisting of individual effects of unobserved independent variables and idiosyncratic error)

i = 1, 2 …… N

t: = 1, 2

Dependent Variable – S&P Global ESG Score

As discussed in Section 4.3.1, the S&P Global ESG Scores, which are provided by an international well-known rating agency S&P Global, are regarded as one of the most reliable information available on assessing ESG performance and hence the S&P Global ESG Scores for the sample listed companies in Hong Kong are used to be the dependent variable.

Independent Variable 1 – Board Size

There is no any legal restriction on the number of directors on the board. As discussed in Section 3.4.1, the prior studies have not found a conclusive consensus among researchers regarding the effects of the board size on company performance. This independent variable is used to test whether there is any relationship between ESG score and the board size. In this study, the board size is measured in the number of directors.

Independent Variable 2 – Proportion of Independent Non-executive Directors

The board consists of executive directors, non-executive directors and independent non-executive directors and must include at least three independent non-executive directors. In addition, at least of the independent non-executive directors must have appropriate professional qualifications (Listing Rules 3.10). Moreover, the board should include different types of directors with different knowledge, skills and experience. It is a mandatory requirement that a listed company must appoint independent non-executive directors representing at least one-third of the board (Listing Rules 3.10A). The existing regulatory regime in Hong Kong requires a minimum proportion of independent non-executive directors on the board.

Generally speaking, the more the number of independent non-executive directors, the more effective the board in exercising independent judgement on business affairs is expected. In order to protect the minority shareholder interests as well as various stakeholders' interests in the long run, a board should include a high proportion of independent non-executive directors (Lei & Song, 2012). As such, it appears that a higher proportion of independent non-executive directors on board may greatly influence ESG performance especially for those disclosures are voluntary and on a "comply or explain" basis and at the end may affect the overall ESG performance which is reflected in ESG scores. However, as discussed in Section 3.4.2, the prior studies do not have a conclusive consensus among researchers regarding the effects of the proportion of independent non-executive directors on company performance. This independent variable is used to test whether there is any relationship between ESG score and proportion of independent non-executive directors of listed companies in Hong Kong.

In this study, the proportion of independent non-executive directors is defined as the number of independent non-executive directors divided by the total number of directors on the board.

Independent Variable 3 – Roles of Chairman and Chief Executive Officer

In November 2018, it was found by the SEHK that the compliance rate for the separation of the roles of chairman and chief executive officer was the lowest amongst others (The Stock Exchange of Hong Kong Limited, 2018c). It is believed that no separation of the two roles may greatly affect ESG performance as there is lacking of a good check and balance system.

As the separation of the roles of chairman and chief executive officer is a categorical variable, a dummy variable should be used. If a particular condition is met, a value of 1 is assigned;

otherwise a value of zero is assigned (Render, et al., 2012). In this study, there are two categorical variables, namely with separation or without separation of the roles of chairman and chief executive officer and therefore only one dummy variable is needed as follows:

$X_3 = 0$	The roles of chairman and chief executive officer are not performed by the same person
$X_3 = 1$	The roles of chairman and chief executive officer are performed by the same person

This independent variable is used to test whether the there is any relationship between ESG score and separation of the roles of chairman and independent non-executive directors.

Control Variables

There are likely some other variables which impact on ESG score. While there may be an infinite number of variables which can affect ESG score, four control variables, namely the company size, leverage, profitability and age which are most widely used as control variables in the literature, have been considered to be particular important and are chosen in this study (Margolis, et al., 2007). The purpose of incorporating these four control variables is to neutralise the effect of extraneous factors and increase the reliability of the analysis of the effect from the independent variables of interest on ESG score. If the model does not include these four control variables into consideration, it may overstate the importance of the independent variables because some influences from other variables will load on those independent variables. A brief description of these four control variables and the rationale adopted for the selection are as follows.

Control Variable 1 – Company Size

Compliance with ESG framework and standards is costly and time consuming (Krishnan, et al., 2008). Generally speaking, larger companies can get access to more resources in dealing with ESG issues because they have more resources required to meet those ESG reporting challenges. In addition, larger companies are more likely to be analysed and followed up by investment professionals and therefore they are under more pressure to comply with ESG reporting requirements in particular those disclosures on a voluntary basis and a “comply or explain” basis. Moreover, management of a larger company is required to demonstrate to diversified

shareholders including institutional investors and other various stakeholders that the company has good ESG performance. It is hypothesised that larger listed companies are able (in terms of resources) and more willing (in terms of fulfilling the different expectations of stakeholders) to improve ESG performance.

In this study, the company size is defined as the total assets as shown in the statement of financial position of the listed company as of the reporting date. The values of total assets in Hong Kong dollars (or converted from a foreign currency into Hong Kong dollars at an exchange rate as of the reporting date) are transformed using the natural logarithm to reduce skewness and outliers so as to increase normality.

Control Variable 2 – Leverage

A high leveraged company is more likely than a low leverage company to have financial difficulties (Titman, et al., 2019). Generally speaking, the leverage is viewed as a monitoring mechanism in which the higher the leverage is, the greater will be the pressure on companies to perform well in order to meet debt and interest repayment obligations. In addition, the leverage affects further debt raising capability and interest rates imposed by financial institutions. Leverage is viewed as an important signal of risk level. As a result, it appears that a higher leveraged company has to demonstrate to stakeholders, in particular creditors and investors, that it has good management systems to deal with various business challenges including ESG in the short and long term. It is hypothesised that a higher leveraged listed company may spend more resources to improve ESG performance.

In this study, the leverage is defined as a measure of a company's level of total debt relative to its total assets as shown in the statement of financial position as of the reporting date. It is calculated by dividing total debt by total assets.

Control Variable 3 – Profitability

Generally speaking, companies with higher profitability will have more resources in particular financial resources to deal with ESG issues. In addition, companies with higher profitability are more likely to be analysed and followed up by investment professionals and therefore they are under more pressure to improve ESG performance. As such, in order to increase their competitive advantages in the long term, it is hypothesised that listed companies are more likely

to use more resources to improve ESG performance to meet the expectations of various stakeholders.

In this study, the profitability is measured in the return on equity which is defined as the profit attributable to shareholders divided by the average equity attributable to shareholders during the financial year (Cunningham, et al., 2019).

Control Variable 4 – Age

Undoubtedly, it takes time for a company to establish and improve its ESG management system. It appears that a listed company with a longer history has more well-structured internal systems, policies and practices to deal with challenging ESG issues. In addition, the longer a company listed on the SEHK, management may incline to achieve better ESG performance in order to maintain the reputation and image established over the time. It is hypothesised that companies listed on the SEHK longer may want to improve ESG performance more than others.

In this study, the age of a company is defined as the number of listing years on the Main Board of the SEHK. This control variable measured in the number of years is transformed using the natural logarithms to reduce skewness and outliers so as to increase normality.

5.3 ESG Performance and Company Value (Panel Regression Model II)

For the purpose of achieving the research aim 2 and research objective 2 as stated in Section 1.5, this section is to investigate the value of ESG reporting and the relationship between the quality of ESG reporting in terms of ESG performance and the company value of listed companies in Hong Kong.

In response to the increasing demand for finding the value of ESG reporting and substantiating that directors have to put more efforts in improving ESG performance, it is important to understand whether ESG performance affects the company value. As discussed in Section 3.5, some prior studies have found that corporate social responsibility reporting has a positive effect of the company value adopting the value relevance methodology (Gregory & Whittaker, 2012) and the capital market values the disclosure of transparent ESG reporting (Reverte, 2012;

Carnevale, et al., 2012; Yanagi & Michels-Kim, 2018). However, some other prior studies have found a negative or no association of them at all (Hassel, et al., 2005; Semenova, et al., 2009).

In order to answer the research question 2 as sated in Section 1.6, this chapter is to build up a panel regression model to investigate whether ESG performance affects the company value of listed companies in Hong Kong.

As such, the following panel regression model is built for research question 2 and hypothesis 2 as stated in Section 1.6.

Research Question 2: Does ESG performance affect the company value of listed companies in Hong Kong?

Hypothesis 2: S&P Global ESG Score (independent variable) is positively related to the price-book value ratio (dependent variable).

A panel regression model is constructed as follows:

$Y_{it} = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \varepsilon_{it}$

Y = Price-book value ratio

β = Coefficient

X_1 = S&P Global ESG Score

X_2 = Company size

X_3 = Leverage

X_4 = Profitability

X_5 = Age

ε = error variable (consisting of individual effects of unobserved independent variables and idiosyncratic error)

i = 1, 2 …… N

t = 1, 2

<u>Dependent Variable – Price-book Value Ratio</u>

In this study, the dependent variable is the company value. There are many different methods to measure the company value. One of the common methods used is the price-book value of which the data can be obtained accurately from the information available to the public at large. The price value of a listed company is defined as the book value of shareholders' equity plus market value added, which is equal to the market capitalisation of the listed company (Yanagi & Michels-Kim, 2021). The price-book value ratio is defined as the market capitalisation divided by the equity attributable to shareholders (Hoggett, et al., 2018). The book value per share in the financial statements which are prepared in accordance with the accounting standards reflects the internal financial position of a listed company. If the price-book value is more than one, this means the market price per share is more than the book value per share of the listed company. In this situation, the market is willing to pay for one share of the listed company more than the book value per share recorded in the financial statements. That implies that there must be some information other than the financial information in which the market will value it to be important for determining the company value. It is hypothesized that the company value in terms of future expected financial value creation which is measured in the price-book value ratio can be synchronized with ESG performance.

Independent Variable – S&P Global ESG Score

In this study, ESG performance is measured in terms of the S&P Global ESG Score. As discussed in Section 4.3.1, the S&P Global ESG Score is regarded as one of the most reliable information available on assessing ESG performance and hence the S&P Global ESG Score for the sample listed companies in Hong Kong is used to be the independent variable being a proxy for ESG performance.

Control variables

There are likely some other variables which impact on the price-book value ratio. While there may be an infinite number of variables which can affect price-book value ratio, four control variables, namely the company size, leverage, profitability and age, which are most widely used as control variables in the literature, are considered to be particular important and chosen in this study (Margolis, et al., 2007). The purpose of incorporating these four control variables is to neutralise the effect of extraneous factors and increase the reliability of the analysis of the effect from the independent variable of interest (i.e. the S&P Global ESG Score) on the price-

book value ratio. If the model does not include these four control variables into consideration, it may overstate the importance of the S&P Global ESG Score because some influences from other variables will load on it. A brief description of these four control variables and the rationale adopted for the selection are as follows.

Control Variable 1: Company Size

Larger listed companies are more well-established and have built up heaps of tangible and intangible assets. Hence, they can get access to more resources in terms of tangible and intangible assets which can be used more effectively and efficiently in building up their competitive advantages in the marketplace in the long term. As such, they are likely to be able to create more value in the long term due to more effective and efficient in allocation of resources than those of smaller listed companies. Hence, the company size may be related to the price-book value ratio. It is hypothesised that a larger listed company may have a larger price-book value ratio whereas a smaller listed company may have a smaller price-book value ratio.

In this study, the company size is defined as the total assets as shown in the statement of financial position of the company as of the reporting date. The values of total assets in Hong Kong dollars (or converted from a foreign currency into Hong Kong dollars at an exchange rate as of the reporting date) are transformed using the natural logarithm to reduce skewness and outliers so as to increase normality.

Control Variable 2: Leverage

The leverage is viewed as an important signal of risk level. Lenders and creditors assess the financial position and prospects of a company in the process of assessing the borrowing capacity and credibility. Unless a listed company has a sound financial position in the short term as well as good business prospects in the long term, lenders and creditors are not willing to lend or provide any banking facilities. A higher leveraged listed company with a higher borrowing capacity should have proven a higher credibility in terms of credit rating as well as proven good business prospects in the long term which can generate more value to stakeholders than the existing book value. As a result, the leverage may be related to the price-book value

ratio. It is hypothesised that a higher leveraged listed company may have a larger price-book value whereas a lower leveraged listed company may have a smaller price-book value ratio.
In this study, the leverage is defined as a measure of a company's level of total debt relative to its total assets as shown in the statement of financial position as of the reporting date. It is calculated by dividing total debt by total assets.

Control Variable 3 – Profitability

Listed companies with higher profitability with more financial and other resources are likely to be able to deal with ESG issues. In addition, the value of higher profitability is more likely to be reflected in the price-book value ratio. As such, in order to increase the competitive advantages in the long term, it appears that listed companies are more willing to use more resources to improve the ESG performance in order to show proven good business prospects in the long term which can generate more value to stakeholders than the existing book value. As a result, the profitability may be related to the price-book value ratio. It is hypothesised that a listed company with a larger profitability may have a larger price-book value ratio whereas a listed company with smaller profitability may have a lower price-book value ratio.

In this study, the leverage is defined as a measure of a company's level of total debt relative to its total assets as shown in the statement of financial position as of the reporting date.

Control Variable 4 – Age

Undoubtedly, it takes time for a company to establish and improve the company value in terms of the price-book value ratio. It appears that a listed company with a longer history has more well-structured internal systems, policies and practices to deal with challenging ESG issues. Moreover, the longer a company listed on the Main Board of the SEHK, the management is under more pressure to prove a better company value in order to maintain the reputation and image established over the time. As such, those companies listed on the Main Board of the SEHK longer may want to improve the price-book value ratio more than others. As a result, the age in terms of the number of listing years may be related to the price-book value ratio. It is hypothesised that a company listed on the Main Board of the SEHK longer may have a larger price-book value ratio whereas a company listed on the Main Board of the SEHK shorter may have a smaller price-book value ratio.

In this study, the age of a company is defined as the number of listing years on the Main Board of the SEHK. This control variable measured in the number of listing years is transformed using the natural logarithms to reduce skewness and outliers so as to increase normality.

5.4 ESG Performance and Investment Risk (Panel Regression Model III)

For the purpose of achieving the research aim 2 and research objective 3 as stated in Section 1.5, the section is to investigate the value of ESG reporting and the relationship between the quality of ESG reporting in terms of ESG performance and the investment risk of listed companies in Hong Kong. In order to find the value of ESG reporting and substantiate that directors have to put more efforts in improving ESG performance aiming at minimising the investment risk which is in the best interests of the listed company as a whole, it is important to understand whether ESG performance affects the investment risk.

As discussed in Section 3.6, some prior studies argue that the financial markets value the disclosure of transparent ESG reports (Reverte, 2012; Carnevale, et al., 2012) and the disclosure of non-financial information has great influence on the investment risk affecting share price volatility (Amir & Baruch, 1996; Trueman, et al., 2000; Rajgopal, et al., 2003).

In order to answer the research question 3 as stated in Section 1.6, this section is to build up a panel regression model to investigate whether ESG performance affects the investment risk of listed companies in Hong Kong.

As such, a panel regression model is built up for the following research question 3 and hypothesis 3.

Research question 3: Does ESG performance affect the investment risk of listed companies in Hong Kong?

Hypothesis 3: S&P Global ESG Score (independent variable) is negatively related to the annual share price volatility (dependent variable).

A panel regression equation is constructed as follows:

$Y_{it} = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \varepsilon_{it}$

Y= Annualised share price volatility

β = Coefficient

X_1 = S&P Global ESG Score

X_2 = Company size

X_3 = Leverage

X_4 = Profitability

X_5 = Age

ε = error variable (consisting of individual effects of unobserved independent variables and idiosyncratic error)

i = 1, 2 …… N

t = 1, 2

Dependent Variable – Annualised Share Price Volatility

The dependent variable is the investment risk. In this study, the annualised share price volatility is used as a proxy for the investment risk. That is, the lower the annual share price volatility means a lower investment risk from the investor perspective. The annual share price volatility is defined as the square root of the number of trading days during the year multiplied by the standard deviation of daily changes in share price (Boyte-White, 2020).

Independent Variable – S&P Global ESG Score

ESG performance is measured in terms of the S&P Global ESG Score. As discussed in Section 4.3.1, the S&P Global ESG Score is regarded as one of the most reliable information available on assessing ESG performance and hence the S&P Global ESG Score for the sample listed companies in Hong Kong is used to be the independent variable being a proxy for ESG performance.

Control Variables

There are likely some other variables which impact on the annualised share price volatility. While there may be an infinite number of variables which can affect the annualised share price

volatility, four control variables, namely the company size, leverage, profitability and age, which are most widely used as control variables in the literature, are considered to be particular important and chosen in this study (Margolis, et al., 2007). The purpose of incorporating these four control variables is to neutralise the effect of extraneous factors and increase the reliability of the analysis of the effect from the independent variable of interest (i.e. the S&P Global ESG Score) on the annualised share price volatility. If the model does not include these four control variables into consideration, it may overstate the importance of S&P Global ESG Score because some influences from other variables will load on it. A brief description of these four control variables and the rationale adopted for the selection are as follows.

Control Variable 1: Company Size

Larger listed companies can get access to more resources in building up their competitive advantages in the marketplace and are likely to be more financial stable and less risky than those of smaller listed companies (Downes & Russ, 2005). In addition, larger companies are more likely to be analysed and followed up by investment professionals and therefore there should be fewer surprises on result announcements from time to time. As a result, the company size is likely related to the annual share price volatility. It is hypothesised that a larger listed company may have a lower annualised share price volatility whereas a smaller listed company may have a higher annualised share price volatility.

In this study, the company size is defined as the total assets as shown in the statement of financial position of the company as of the reporting date. The values of total assets in Hong Kong dollars (or converted from a foreign currency into Hong Kong dollars at an exchange rate as of the reporting date) are transformed using the natural logarithm to reduce skewness and outliers so as to increase normality.

Control Variable 2: Leverage

The leverage is viewed as an important signal of risk level. The higher the leverage results in the higher level of insolvency and default risk. Therefore, the leverage has potential to affect the investor perceptions on the risk assessments which may in turn affect the annualised share price volatility. As a result, the leverage is likely related to the annual share price volatility. It is hypothesised that a listed company with a higher leverage may have a higher annualised

share price volatility whereas a listed company with a lower leverage may have a lower annualised share price volatility.

In this study, the leverage is defined as a measure of a company's level of total debt relative to its total assets as shown in the statement of financial position as of the reporting date. It is calculated by dividing total debt by total assets.

Control Variable 3 – Profitability

The profitability is viewed as a signal of business success of a company. A higher profitability reduces the investment risk from the perspective of investors which may be reflected in lower annual share price volatility. As such, in order to reduce the investment risk, listed companies are more willing to use more resources to improve the ESG performance in order to show proven good business prospects in the long term which can generate more value to stakeholders with a lower investment risk. As a result, the profitability is likely related to the investment risk. It is hypothesised that a listed company with a higher profitability may have a lower annual share price volatility whereas a listed company with a lower profitability may have a higher annual share price volatility.

In this study, the profitability is measured in terms of the return on equity which is equal to the profit attributable to shareholders divided by the average equity attributable to shareholders during the financial year (Cunningham, et al., 2019).

Control Variable 4 – Age

Undoubtedly, it takes time for a company to establish the market reputation and competitive advantages with a lower investment risk. It appears that a listed company with a longer history has more well-structured internal systems, policies and practices to deal with challenging ESG issues. Moreover, the longer a company listed on the Main Board of the SEHK, the management is under more pressure from various stakeholders in particular the shareholders and investors to prove that the listed company with a lower investment risk and is worth for investment in the long run. It appears that those companies listed on the Main Board of the SEHK longer may want to lower the investment risk more than others.

As result, the age in terms of the number of listing years is likely related to the annual share price volatility. It is hypothesised that a company listed on the Main Board of the SEHK longer may have a lower annual share price volatility whereas a company listed on the Main Board of the SEHK shorter may have a higher annual share price volatility.

In this study, the age of a company is defined as the number of listing years on the Main Board of the SEHK. This control variable measured in the number of years is transformed using the natural logarithms to reduce skewness and outliers so as to increase normality.

5.5 Chapter Summary

Firstly, this chapter has discussed how to build up a panel regression model with specifications in order to achieve the research aim 1 and research objective 1 as stated in Section 1.5 for the purposes of answering the research question 1 and testing the hypotheses 1A, 1B and 1C as stated in Section 1.6 in relation to the effects of board attributes on ESG performance.

Secondly, this chapter has discussed how to build up a panel regression model with specifications in order to achieve the research aim 2 and research objective 2 as stated in Section 1.5 for the purposes of answering the research question 2 and testing the hypothesis 2 as stated in Section 1.6 in relation to the relationship between the quality of ESG reporting in terms of ESG performance and company value.

Thirdly, this chapter has discussed how to build up a panel regression model in order to achieve the research aim 2 and research objective 3 as stated in Section 1.5 for the purposes of answering the research question 3 and testing the hypothesis 3 as stated in Section 1.6 in relation to the relationship between the quality of ESG reporting in terms of ESG performance and investment risk.

The next chapter will summarise, discuss and analyse the descriptive statistical results of 10 dependent, independent and control variables in this study including the S&P Global ESG Score, board size, proportion of independent non-executive directors, roles of chairman and chief executive officer, company size, leverage, profitability, age, price-book value ratio and annual share price volatility.

Chapter 6: Analysis and Discussion of Descriptive Statistical Results

6.1 Introduction

For the three research questions and five hypotheses as stated in Section 1.6, there are altogether 10 dependent, independent and control variables, namely the S&P Global ESG Score, board size, proportion of independent non-executive directors, roles of chairman and chief executive officer, company size, leverage, profitability, age, price-book value ratio and annual share price volatility in this study. This chapter summarises, discusses and analyses the descriptive statistical results of all variables in this study

6.2 Descriptive Statistical Results and Discussions

The descriptive statistics results and discussions of the ten variables are as follows.

6.2.1 S&P Global ESG Score

As shown in Table 6.1, the S&P Global ESG Scores for all industry sectors on average for 2020 and 2021 were 23.15 and 28.80, respectively. There was a S&P Global ESG Score increase of 24.41% from 2020 to 2021. In addition, the ranges of the S&P Global ESG Score for all industry sectors were from 0 to 77 for 2020 and from 10 to 79 for 2021. Listed companies improved their ESG performance across the years. The results show that there has been an increasing trend in the S&P Global ESG Score over time.

Table 6.1: Summary Descriptive Statistics of S&P Global ESG Score

Hang Seng Industry Classification	S&P Global ESG Score (2020) Sample Size	Min	Max	Mean	Standard Deviation	S&P Global ESG Score (2021) Sample Size	Min	Max	Mean	Standard Deviation
Consumer Discretionary	28	2	66	20.64	13.97	28	12	65	25.54	13.07
Consumer Staples	15	3	76	25.27	21.39	15	10	77	29.67	19.51
Healthcare	20	4	29	14.65	5.71	20	12	46	22.35	10.01
Conglomerates	4	13	61	30.50	21.13	4	12	70	36.25	25.06
Information Technology	15	5	57	24.87	13.12	15	13	49	28.40	11.86
Properties and Construction	31	5	75	27.77	18.56	31	15	79	35.48	17.73
Financials	37	1	68	24.68	15.69	37	13	67	29.62	14.92
Utilities	18	6	77	36.61	21.35	18	10	77	40.39	20.27
Telecommunications	3	18	34	25.67	8.02	3	23	33	29.00	5.29
Industries	24	0	34	15.92	7.28	24	13	38	21.88	7.54
Materials	10	5	20	12.40	4.53	10	10	43	21.10	10.66
Energy	6	13	31	20.50	5.96	6	15	41	25.50	8.69
All Industry Sectors	211	0	77	23.15	15.91	211	10	79	28.80	15.41

6.2.2 Board Size

As shown in Table 6.2, the numbers of directors for all industry sectors on average for 2020 and 2021 were 10.57 and 10.71, respectively. There was a very slightly number of directors increase of 1.32% from 2020 to 2021. In addition, the ranges of the number of directors for all industry sectors were from 6 to 20 for 2020 and from 5 to 20 for 2021. The results show that the number of directors has been very stable over time.

Table 6.2: Summary Descriptive Statistics of Board Size

	Number of Directors (2020)					**Number of Directors (2021)**				
Hang Seng Industry Classification	Sample Size	Min	Max	Mean	Standard Deviation	Sample Size	Min	Max	Mean	Standard Deviation
Consumer Discretionary	28	6	20	9.46	3.04	28	6	20	10.14	3.39
Consumer Staples	15	7	15	9.93	2.37	15	7	16	9.93	2.55
Healthcare	20	6	15	10.10	2.86	20	6	14	10.10	2.85
Conglomerates	4	12	20	15.00	3.46	4	12	20	14.75	3.77
Information Technology	15	6	16	8.67	2.38	15	6	16	8.47	2.33
Properties and Construction	31	7	20	11.39	3.52	31	7	18	11.03	3.07
Financials	37	6	18	12.35	2.82	37	5	18	12.76	2.77
Utilities	18	7	17	11.28	2.85	18	7	18	11.50	2.87
Telecommunications	3	8	11	9.00	1.73	3	8	11	9.00	1.73
Industries	24	7	17	9.67	2.58	24	7	17	9.75	2.52
Materials	10	7	13	10.20	1.99	10	8	13	10.70	1.57
Energy	6	7	11	8.33	1.51	6	6	12	8.33	2.25
All Industry Sectors	211	6	20	10.57	3.07	211	5	20	10.71	3.07

6.2.3 Proportion of Independent Non-executive Directors

As shown in Table 6.3, the proportions of independent non-executive directors for all industry sectors on average for 2020 and 2021 were 41.58% and 41.32%, respectively. There was a very slightly proportion of independent non-executive directors decrease of 0.63% from 2020 to 2021. In addition, the ranges of the proportion of independent non-executive directors for all industry sectors were from 30% to 90% for 2020 and from 30% to 92.31% for 2021. The results show that the proportion of independent non-executive directors has been very stable over time.

Table 6.3: Summary Descriptive Statistics of Proportion of Independent Non-executive Directors

	Proportion of INEDs (2020)					**Proportion of INEDs (2021)**				
Hang Seng Industry Classification	Sample Size	Min	Max	Mean	Standard Deviation	Sample Size	Min	Max	Mean	Standard Deviation
Consumer Discretionary	28	33.33%	70.00%	43.12%	9.94%	28	33.33%	70.00%	43.51%	10.46%
Consumer Staples	15	33.33%	50.00%	39.47%	6.38%	15	33.33%	50.00%	39.30%	6.40%
Healthcare	20	33.33%	72.73%	41.60%	9.12%	20	33.33%	72.73%	41.03%	9.22%
Conglomerates	4	35.71%	41.67%	38.27%	3.03%	4	33.33%	41.67%	39.17%	3.97%
Information Technology	15	33.33%	72.73%	43.68%	9.98%	15	33.33%	70.00%	43.50%	9.19%
Properties and Construction	31	30.00%	69.23%	40.09%	8.52%	31	30.00%	76.92%	40.65%	9.61%
Financials	37	30.77%	90.00%	44.36%	13.88%	37	33.33%	92.31%	43.11%	14.50%
Utilities	18	33.33%	58.33%	39.72%	6.87%	18	33.33%	58.33%	39.73%	6.89%
Telecommunications	3	36.36%	50.00%	41.29%	7.57%	3	36.36%	37.50%	37.12%	0.66%
Industries	24	33.33%	66.67%	40.31%	8.24%	24	33.33%	57.14%	39.66%	7.51%
Materials	10	33.33%	46.15%	39.18%	4.11%	10	33.33%	50.00%	39.73%	6.35%
Energy	6	33.33%	50.00%	42.00%	5.88%	6	33.33%	50.00%	41.79%	5.37%
All Industry Sectors	211	30.00%	90.00%	41.58%	9.49%	211	30.00%	92.31%	41.32%	9.74%

6.2.4 Roles of Chairman and Chief Executive Officer

As shown in Table 6.4, the numbers of companies with no separation of the roles of chairman and chief executive officer for all industries for 2020 and 2021 were 53 and 53, respectively. There was no change in the number of companies with no separation of the roles of chairman and chief executive officer over time. On the one hand, the numbers of companies with no separation of the roles of chairman and chief executive officer for the industries, namely Consumer Discretionary, Consumer Staples and Utilities slightly decreased over time. On the other hand, the numbers of companies with no separation of the roles of chairman and chief executive officer for the industries, namely Information Technology, Financials and Industrials slightly increased over time.

Table 6.4: Summary Descriptive Statistics of Roles of Chairman and Chief Executive Officer

Hang Seng Industry Classification	Sample Size	Chairman = CEO (2020) (No separation of the roles)	Sample Size	Chairman = CEO (2021) (No separation of the roles)
Consumer Discretionary	28	8	28	6
Consumer Staples	15	7	15	6
Healthcare	20	12	20	12
Conglomerates	4	1	4	1
Information Technology	15	6	15	8
Properties and Construction	31	8	31	8
Financials	37	0	37	1
Utilities	18	3	18	2
Telecommunications	3	0	3	0
Industries	24	5	24	6
Materials	10	2	10	2
Energy	6	1	6	1
All Industry Sectors	211	53	211	53

6.2.5 Company Size

As shown in Table 6.5, the company size (natural logarithms of total assets) for all industry sectors on average for 2020 and 2021 were 18.98 and 19.13, respectively. There was a very slightly company size increase of 0.79% from 2020 to 2021. In addition, the ranges of the company size for all industry sectors were from 15.07 to 24.40 for 2020 and from 15.18 to 24.49 for 2021. The results show that the company size has been very stable over time.

Table 6.5: Summary Descriptive Statistics of Company Size

	Company Size (2020)					**Company Size (2021)**				
Hang Seng Industry Classification	Sample Size	Min	Max	Mean	Standard Deviation	Sample Size	Min	Max	Mean	Standard Deviation
Consumer Discretionary	28	16.40	19.77	17.99	0.96	28	16.67	19.80	18.12	0.94
Consumer Staples	15	15.27	18.79	17.27	1.10	15	15.43	18.83	17.37	1.10
Healthcare	20	15.07	19.73	17.06	1.13	20	15.18	19.84	17.37	1.05
Conglomerates	4	19.89	23.00	21.12	1.33	4	19.89	23.09	21.15	1.37
Information Technology	15	16.36	21.18	18.28	1.34	15	16.43	21.41	18.45	1.36
Properties and Construction	31	16.56	21.60	19.55	1.23	31	16.69	21.59	19.66	1.16
Financials	37	17.81	24.40	21.44	1.71	37	17.97	24.49	21.56	1.68
Utilities	18	18.31	20.10	18.99	0.53	18	18.36	20.24	19.09	0.52
Telecommunications	3	18.45	21.44	19.90	1.50	3	18.51	21.54	19.95	1.52
Industries	24	16.49	19.74	18.19	0.97	24	16.87	20.04	18.36	0.90
Materials	10	17.08	19.26	18.43	0.76	10	17.68	19.36	18.62	0.66
Energy	6	18.15	21.63	20.00	1.30	6	18.31	21.84	20.27	1.31
All Industry Sectors	211	15.07	24.40	18.98	1.85	211	15.18	24.49	19.13	1.81

6.2.6 Leverage

As shown in Table 6.6, the leverages for all industry sectors on average for 2020 and 2021 were 20.28% and 20.24%, respectively. There was a very slightly leverage decrease of 0.20% from 2020 to 2021. In addition, the ranges of leverage for all industry sectors were from 0.06% to 95.77% for 2020 and from 0.10% to 111.59% for 2021. The results show that the leverage has been very stable over time.

Table 6.6: Summary Descriptive Statistics of Leverage

	Leverage (2020)					**Leverage (2021)**				
Hang Seng Industry Classification	Sample Size	Min	Max	Mean	Standard Deviation	Sample Size	Min	Max	Mean	Standard Deviation
Consumer Discretionary	28	2.07%	95.77%	30.08%	23.28%	28	1.53%	111.59%	29.17%	26.40%
Consumer Staples	15	0.32%	46.93%	11.39%	13.90%	15	0.21%	43.16%	12.23%	14.43%
Healthcare	20	0.45%	30.10%	10.14%	9.12%	20	0.21%	28.74%	12.14%	8.62%
Conglomerates	4	15.57%	35.43%	25.15%	10.35%	4	15.33%	33.96%	24.46%	9.87%
Information Technology	15	0.12%	23.90%	10.94%	7.75%	15	0.14%	25.93%	11.34%	8.94%
Properties and Construction	31	1.94%	39.09%	20.22%	9.86%	31	0.77%	36.71%	19.81%	9.35%
Financials	37	0.06%	68.70%	15.04%	16.76%	37	0.10%	68.72%	15.27%	16.72%
Utilities	18	3.89%	53.73%	32.53%	15.87%	18	3.65%	59.45%	33.95%	16.68%
Telecommunications	3	3.86%	43.64%	26.98%	20.67%	3	3.09%	41.91%	25.45%	20.07%
Industries	24	1.56%	50.91%	19.33%	10.89%	24	3.28%	33.77%	18.95%	8.15%
Materials	10	10.26%	47.32%	33.20%	12.07%	10	4.83%	46.06%	29.61%	12.81%
Energy	6	11.44%	36.69%	25.55%	10.59%	6	10.77%	34.09%	23.77%	9.59%
All Industry Sectors	211	0.06%	95.77%	20.28%	16.31%	211	0.10%	111.59%	20.24%	16.53%

6.2.7 Profitability

As shown in Table 6.7, the profitability (return on equity) percentages for all industry sectors on average for 2020 and 2021 were 12.33% and 11.39%, respectively. There was a profitability percentage decrease of 7.62% from 2020 to 2021. In addition, the ranges of profitability percentage for all industry sectors were from -66.10% to 470.21% for 2020 and from -74.41% to 100.89% for 2021. The results show that the profitability percentage has been fluctuating a lot over time.

Table 6.7: Summary Descriptive Statistics of Profitability

	Return on Equity (2020)					**Return on Equity (2021)**				
Hang Seng Industry Classification	Sample Size	Min	Max	Mean	Standard Deviation	Sample Size	Min	Max	Mean	Standard Deviation
Consumer Discretionary	28	-47.78%	470.21%	20.73%	89.63%	28	-74.41%	68.70%	6.74%	25.51%
Consumer Staples	15	5.01%	48.33%	17.57%	11.22%	15	7.74%	35.54%	17.10%	7.41%
Healthcare	20	-66.10%	25.30%	0.41%	22.96%	20	-39.05%	62.11%	7.24%	22.92%
Conglomerates	4	-4.10%	8.95%	4.29%	5.75%	4	1.27%	9.85%	6.35%	3.66%
Information Technology	15	-4.87%	52.23%	14.04%	13.85%	15	-21.08%	29.77%	9.83%	12.67%
Properties and Construction	31	-9.83%	33.50%	12.45%	10.19%	31	0.45%	24.89%	10.43%	6.66%
Financials	37	2.05%	24.72%	10.45%	4.11%	37	4.61%	25.44%	10.71%	3.46%
Utilities	18	0.51%	24.53%	10.43%	5.97%	18	-13.71%	41.90%	10.07%	12.20%
Telecommunications	3	3.49%	14.00%	9.02%	5.28%	3	3.90%	12.82%	8.86%	4.54%
Industries	24	5.79%	33.46%	17.21%	8.94%	24	-16.40%	100.89%	21.28%	24.89%
Materials	10	0.88%	15.62%	7.86%	4.66%	10	-0.67%	32.08%	13.13%	10.55%
Energy	6	1.55%	12.97%	7.19%	4.21%	6	0.82%	26.88%	11.78%	8.67%
All Industry Sectors	211	-66.10%	470.21%	12.33%	34.13%	211	-74.41%	100.89%	11.39%	16.13%

6.2.8 Age

As shown in Table 6.8, the ages (natural logarithms of number of listing years) for all industry sectors on average for 2020 and 2021 were 2.41 and 2.53, respectively. In addition, the ages for all industry sectors were from 0 to 4.39 for 2020 and from 0.69 to 4.41 for 2021.

Table 6.8: Summary Descriptive Statistics of Age

	Age (2020)					**Age (2021)**				
Hang Seng Industry Classification	Sample Size	Min	Max	Mean	Standard Deviation	Sample Size	Min	Max	Mean	Standard Deviation
Consumer Discretionary	28	0.69	3.85	2.45	0.78	28	1.10	3.87	2.56	0.68
Consumer Staples	15	0.00	3.85	2.26	1.22	15	0.69	3.87	2.43	1.02
Healthcare	20	0.00	3.89	1.47	1.17	20	0.69	3.91	1.77	0.95
Conglomerates	4	2.56	4.11	3.52	0.68	4	2.64	4.13	3.55	0.65
Information Technology	15	0.69	3.43	2.38	0.83	15	1.10	3.47	2.50	0.71
Properties and Construction	31	0.69	4.19	2.43	0.97	31	1.10	4.20	2.56	0.86
Financials	37	0.00	4.39	2.28	0.81	37	0.69	4.41	2.41	0.71
Utilities	18	1.79	4.09	3.14	0.65	18	1.95	4.11	3.19	0.61
Telecommunications	3	0.69	3.14	2.01	1.23	3	1.10	3.18	2.19	1.04
Industries	24	1.61	3.87	2.62	0.49	24	1.79	3.89	2.70	0.45
Materials	10	0.69	3.30	2.36	0.93	10	1.10	3.33	2.50	0.79
Energy	6	2.64	3.09	2.89	0.18	6	2.71	3.14	2.94	0.17
All Industry Sectors	211	0.00	4.39	2.41	0.94	211	0.69	4.41	2.53	0.81

6.2.9 Price-book Value Ratio

As shown in Table 6.9, the price-book value ratios for all industry sectors on average for 2020 and 2021 were 1.46 and 1.50, respectively. There was a price-book value ratio increase of 2.74% from 2020 to 2021. In addition, the ranges of price-book value ratio for all industry sectors were from -7.89 to 6.31 for 2020 and from -3.64 to 9.81 for 2021. The results show that the price-book value ratio has been fluctuating a lot over time.

Table 6.9: Summary Descriptive Statistics of Price-book Value Ratio

	Price-book Value Ratio (2020)					**Price-book Value Ratio (2021)**				
Hang Seng Industry Classification	Sample Size	Min	Max	Mean	Standard Deviation	Sample Size	Min	Max	Mean	Standard Deviation
Consumer Discretionary	28	-7.89	4.59	1.07	1.95	28	-3.64	9.81	1.37	1.98
Consumer Staples	15	1.00	1.54	1.11	0.18	15	1.00	1.61	1.12	0.20
Healthcare	20	1.00	1.74	1.10	0.17	20	1.00	1.44	1.11	0.11
Conglomerates	4	1.23	3.08	2.01	0.80	4	1.17	3.17	1.96	0.88
Information Technology	15	1.00	2.36	1.25	0.34	15	1.00	1.75	1.23	0.24
Properties and Construction	31	1.00	3.27	1.67	0.67	31	1.00	3.19	1.64	0.62
Financials	37	1.00	6.31	1.99	1.00	37	1.00	6.17	2.01	0.99
Utilities	18	1.00	2.72	1.65	0.51	18	1.01	2.80	1.71	0.58
Telecommunications	3	1.00	2.08	1.41	0.58	3	1.00	2.17	1.46	0.62
Industries	24	0.23	2.66	1.26	0.40	24	1.00	1.69	1.26	0.20
Materials	10	1.00	1.94	1.39	0.32	10	1.02	1.92	1.34	0.27
Energy	6	1.11	2.12	1.47	0.40	6	1.12	2.10	1.43	0.38
All Industry Sectors	211	-7.89	6.31	1.46	0.95	211	-3.64	9.81	1.50	0.94

6.2.10 Annual Share Price Volatility

As shown in Table 6.10, the annualised share price volatility percentages for all industry sectors on average for 2020 and 2021 were 42.71% and 41.02%, respectively. There was an annualised share price volatility percentage decrease of 3.96% from 2020 to 2021. In addition, the ranges of annualised share price volatility percentage for all industry sectors were from 13.20% to 86.41% for 2020 and from 8.34% to 85.47% for 2021. There was no significant change in the annual share price volatility across the years. The results show that the annual share price volatility has been quite stable over time.

Table 6.10: Summary Descriptive Statistics of Annual Share Price Volatility

	Annual Share Price Volatility (%) (2020)					**Annual Share Price Volatility (%) (2021)**				
Hang Seng Industry Classification	Sample Size	Min	Max	Mean	Standard Deviation	Sample Size	Min	Max	Mean	Standard Deviation
Consumer Discretionary	28	24.97%	72.81%	47.95%	8.77%	28	14.96%	67.27%	46.70%	11.21%
Consumer Staples	15	28.75%	55.19%	33.38%	7.70%	15	23.94%	67.05%	36.53%	10.59%
Healthcare	20	33.87%	83.12%	50.11%	11.06%	20	27.40%	85.47%	56.09%	14.33%
Conglomerates	4	32.65%	38.95%	35.43%	3.13%	4	21.15%	31.19%	27.31%	4.71%
Information Technology	15	35.14%	81.23%	54.76%	15.10%	15	28.15%	64.27%	48.30%	11.65%
Properties and Construction	31	23.16%	51.85%	37.90%	7.56%	31	21.54%	60.94%	37.64%	11.63%
Financials	37	17.69%	64.79%	36.85%	10.11%	37	15.67%	68.86%	28.66%	9.49%
Utilities	18	13.20%	56.31%	32.32%	9.50%	18	8.34%	68.85%	32.81%	16.20%
Telecommunications	3	24.29%	37.03%	31.39%	6.50%	3	14.06%	25.66%	21.67%	6.59%
Industries	24	26.35%	86.41%	48.61%	13.84%	24	22.75%	80.65%	47.87%	14.42%
Materials	10	36.75%	77.42%	50.89%	11.53%	10	36.20%	69.85%	53.92%	12.90%
Energy	6	30.55%	59.77%	39.79%	10.41%	6	30.64%	66.24%	45.72%	13.80%
All Industry Sectors	211	13.20%	86.41%	42.71%	12.35%	211	8.34%	85.47%	41.02%	15.19%

6.3 Chapter Summary

This chapter has summarised, discussed and analysed the descriptive statistical results of 10 variables in this study, namely the S&P Global ESG Score, board size, proportion of independent non-executive directors, roles of chairman and chief executive officer, company size, leverage, profitability, age, price-book value ratio and annual share price volatility.

The next chapter will conduct some inferential statistical tests, namely the redundant fixed effects test and the Hausman test, assess the required conditions for the error variable as well as assess the three panel regression models statistically as well as discuss, analyse the inferential statistical results with regard to the three research questions and five hypotheses in this study.

Chapter 7: Discussion of Inferential Statistical Test Results

7.1 Introduction

The chapter conducts some inferential statistical tests, namely the redundant fixed effects test and Hausman test to determine the right model for panel regression, assesses the required conditions for the error variable as well as assesses the three panel regression models statistically. Thereafter, the inferential statistical results and discussions with regard to the three research questions and five hypotheses in this study are provided.

7.2 Inferential Statistical Tests of Panel Regression Models

Several statistical steps and tests are conducted in order to determine a right panel regression model to be chosen as statistically significant, fit and useful for analysis in this study.

7.2.1 Step 1: Determining the Right Model for Panel Regression

There are three panel regression models, namely the pooled OLS regression model, the fixed effects panel regression model and the random effects panel regression model. For panel regression, the first procedure is to determine the right model between the pooled OLS regression model, the fixed effects panel regression model and the random effects panel regression model. There are two steps conducted, including the redundant fixed effects test and the Hausman test.

7.2.1.1 For Research Question 1

The results for the three panel regression models for the research question 1 are shown in Tables 7.1, 7.2 and 7.3, respectively.

Table 7.1: Summary Inferential Statistics of Pooled OLS Regression Model

Dependent Variable: S&P GLOBAL ESG SCORE Method: Pooled Least Squares
Date: 03/15/23 Time: 12:04 Sample: 2020 2021
Included observations: 422
Cross-sections included: 8
Total pool (balanced) observations: 3376

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-23.44385	2.879534	-8.141542	0.0000
BOARD SIZE	0.984841	0.087605	11.24184	0.0000
PROPORTION OF INEDS	46.68389	2.655501	17.58006	0.0000
ROLES OF CHAIRMAN AND CEO	0.430993	0.604652	0.712795	0.4760
COMPANY SIZE	0.557155	0.151740	3.671771	0.0002
LEVERAGE	2.281725	1.535069	1.486398	0.1373
PROFITABILITY	-0.018858	0.009426	-2.000755	0.0455
AGE	3.452329	0.297196	11.61635	0.0000

R-squared	0.185086	Mean dependent var	25.97393
Adjusted R-squared	0.183393	S.D. dependent var	15.88035
S.E. of regression	14.35049	Akaike info criterion	8.167811
Sum squared resid	693593.9	Schwarz criterion	8.182324
Log likelihood	-13779.27	Hannan-Quinn criter.	8.173000
F-statistic	109.2791	Durbin-Watson stat	1.137680
Prob(F-statistic)	0.000000		

Table 7.2: Summary Inferential Statistics of Fixed Effects Panel Regression Model

Dependent Variable: S&P GLOBAL ESG SCORE Method: Panel Least Squares
Date: 03/15/23 Time: 12:07 Sample: 2020 2021
Periods included: 2
Cross-sections included: 213
Total panel (unbalanced) observations: 422

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-215.2671	59.43659	-3.621795	0.0004
BOARD SIZE	-0.444074	0.457584	-0.970477	0.3330
PROPORTION OF INEDS	12.34340	13.66419	0.903340	0.3674
ROLES OF CHAIRMAN AND CEO	1.549908	2.359629	0.656844	0.5120
COMPANY SIZE	10.13192	3.349221	3.025156	0.0028
LEVERAGE	-26.88928	11.54486	-2.329112	0.0208
PROFITABILITY	-0.022361	0.018345	-1.218959	0.2243
AGE	21.25970	3.709870	5.730580	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.947528	Mean dependent var		25.97393
Adjusted R-squared	0.890640	S.D. dependent var		15.89684
S.E. of regression	5.257037	Akaike info criterion		6.462929
Sum squared resid	5582.560	Schwarz criterion		8.571699
Log likelihood	-1143.678	Hannan-Quinn criter.		7.296251
F-statistic	16.65595	Durbin-Watson stat		4.019048
Prob(F-statistic)	0.000000			

Table 7.3: Summary Inferential Statistics of Random Effects Panel Regression Model

Dependent Variable: S&P GLOBAL ESG SCORE Method: Panel EGLS (Cross-section random effects)
Date: 03/15/23 Time: 12:08
Sample: 2020 2021
Periods included: 2
Cross-sections included: 213
Total panel (unbalanced) observations: 422
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-33.01976	10.50419	-3.143484	0.0018
BOARD SIZE	0.545708	0.274165	1.990434	0.0472
PROPORTION OF INEDS	27.34045	8.209828	3.330210	0.0009
ROLES OF CHAIRMAN AND CEO	1.749877	1.681739	1.040517	0.2987
COMPANY SIZE	1.312810	0.558291	2.351480	0.0192
LEVERAGE	-2.029984	5.188637	-0.391237	0.6958
PROFITABILITY	-0.002687	0.015899	-0.168992	0.8659
AGE	6.802164	1.064559	6.389653	0.0000

	Effects Specification	
	S.D.	Rho
Cross-section random	13.35921	0.8659
Idiosyncratic random	5.257037	0.1341

Weighted Statistics

R-squared	0.144785	Mean dependent var	7.008914
Adjusted R-squared	0.130325	S.D. dependent var	6.218700
S.E. of regression	5.763277	Sum squared resid	13751.16
F-statistic	10.01266	Durbin-Watson stat	2.182546
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.135088	Mean dependent var	25.97393
Sum squared resid	92018.58	Durbin-Watson stat	0.326157

Redundant Fixed Effects Test:

Firstly, the redundant fixed effects test is used to determine the right model between the pooled OLS regression model and the fixed effects panel regression model.

The null and alternative hypotheses are:
H_0: Pooled OLS regression model is appropriate
H_A: Fixed effects panel regression model is appropriate

Decision criteria:
Reject H_0: If the probability value for cross-section F is less than 0.05
Accept H_0: If the probability value for cross-section F is greater than 0.05

As shown in Table 7.4, the probability value for cross-section F is 0.0000. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, the redundant fixed effects test results shows that the fixed effects panel regression model should be used instead of the pooled OLS regression model. Then, a second test, the Hausman test is conducted to determine whether the fixed effects panel regression model or the random effects panel regression model should be used.

Table 7.4: Summary Inferential Statistics of Redundant Fixed Effects Test

Redundant Fixed Effects Tests Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	13.844977	(212,202)	0.0000
Cross-section Chi-square	1157.460583	212	0.0000

Cross-section fixed effects test equation:
Dependent Variable: S&P GLOBAL ESG SCORE Method: Panel Least Squares
Date: 03/15/23 Time: 12:14 Sample: 2020 2021
Periods included: 2
Cross-sections included: 213
Total panel (unbalanced) observations: 422

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-23.44385	8.213117	-2.854439	0.0045
BOARD SIZE	0.984841	0.249870	3.941409	0.0001
PROPORTION OF INEDS	46.68389	7.574124	6.163602	0.0000
ROLES OF CHAIRMAN AND CEO	0.430993	1.724612	0.249907	0.8028
COMPANY SIZE	0.557155	0.432799	1.287329	0.1987
LEVERAGE	2.281725	4.378384	0.521134	0.6026
PROFITABILITY	-0.018858	0.026884	-0.701468	0.4834
AGE	3.452329	0.847673	4.072713	0.0001

R-squared	0.185086	Mean dependent var	25.97393
Adjusted R-squared	0.171308	S.D. dependent var	15.89684
S.E. of regression	14.47130	Akaike info criterion	8.200987
Sum squared resid	86699.24	Schwarz criterion	8.277669
Log likelihood	-1722.408	Hannan-Quinn criter.	8.231289
F-statistic	13.43276	Durbin-Watson stat	0.392885
Prob(F-statistic)	0.000000		

Hausman Test:

Secondly, the Hausman test is used to determine the right model between the fixed effects panel regression model and the random effects panel regression model.

The null and alternative hypotheses are:
H_0: Random effects panel regression model is appropriate
H_A: Fixed effects panel regression model is appropriate

Decision criteria:
Reject H_0: If the probability value for cross-section random is less than 0.05
Accept H_0: If the probability value for cross-section random is greater than 0.05

As shown in Table 7.5, the probability value for cross-section random is 0.0000. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, the Hausman test result shows that the fixed effects panel regression model should be used instead of the random effects panel regression model.

Table 7.5: Summary Inferential Statistics of Hausman Test

Correlated Random Effects - Hausman Test Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	85.380721	7	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
BOARD SIZE	-0.444074	0.545708	0.134216	0.0069
PROPORTION OF INEDS	12.343401	27.340454	119.308719	0.1698
ROLES OF CHAIRMAN AND CEO	1.549908	1.749877	2.739602	0.9038
COMPANY SIZE	10.131918	1.312810	10.905595	0.0076
LEVERAGE	-26.889283	-2.029984	106.361903	0.0159
PROFITABILITY	-0.022361	-0.002687	0.000084	0.0316
AGE	21.259704	6.802164	12.629846	0.0000

Cross-section random effects test equation: Dependent Variable: S&P GLOBAL ESG SCORE Method: Panel Least Squares
Date: 03/15/23 Time: 12:17 Sample: 2020 2021
Periods included: 2
Cross-sections included: 213
Total panel (unbalanced) observations: 422

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-215.2671	59.43659	-3.621795	0.0004
BOARD SIZE	-0.444074	0.457584	-0.970477	0.3330
PROPORTION OF INEDS	12.34340	13.66419	0.903340	0.3674
ROLES OF CHAIRMAN AND CEO	1.549908	2.359629	0.656844	0.5120
COMPANY SIZE	10.13192	3.349221	3.025156	0.0028
LEVERAGE	-26.88928	11.54486	-2.329112	0.0208
PROFITABILITY	-0.022361	0.018345	-1.218959	0.2243
AGE	21.25970	3.709870	5.730580	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.947528	Mean dependent var	25.97393
Adjusted R-squared	0.890640	S.D. dependent var	15.89684
S.E. of regression	5.257037	Akaike info criterion	6.462929
Sum squared resid	5582.560	Schwarz criterion	8.571699
Log likelihood	-1143.678	Hannan-Quinn criter.	7.296251
F-statistic	16.65595	Durbin-Watson stat	4.019048
Prob(F-statistic)	0.000000		

In summary, based on statistical results of the redundant fixed effects test and the Hausman test, the fixed effects panel regression model should be chosen for the research question 1 as stated in Section 1.6.

7.2.1.2 For Research Question 2

The results for the three panel regression models for the research question 2 are shown in Tables 7.6, 7.7 and 7.8, respectively.

Table 7.6: Summary Inferential Statistics of Pooled OLS Regression Model

Dependent Variable: PRICE BOOK VALUE RATIO Method: Pooled Least Squares
Date: 03/15/23 Time: 12:50 Sample: 2020 2021
Included observations: 422
Cross-sections included: 6
Total pool (balanced) observations: 2532

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.597159	0.143503	-11.12978	0.0000
S&P GLOBAL ESG SCORE	0.001851	0.000899	2.058414	0.0397
COMPANY SIZE	0.166040	0.007728	21.48537	0.0000
LEVERAGE	1.918629	0.084129	22.80592	0.0000
PROFITABILITY	-0.019411	0.000518	-37.45909	0.0000
AGE	-0.117893	0.016523	-7.134988	0.0000
R-squared	0.476423	Mean dependent var		1.478859
Adjusted R-squared	0.475387	S.D. dependent var		0.945846
S.E. of regression	0.685078	Akaike info criterion		2.083798
Sum squared resid	1185.531	Schwarz criterion		2.097629
Log likelihood	-2632.088	Hannan-Quinn criter.		2.088816
F-statistic	459.7018	Durbin-Watson stat		1.237296
Prob(F-statistic)	0.000000			

Table 7.7: Summary Inferential Statistics of Fixed Effects Panel Regression Model

Dependent Variable: PRICE BOOK VALUE RATIO Method: Panel Least Squares
Date: 03/15/23 Time: 12:55 Sample: 2020 2021
Periods included: 2
Cross-sections included: 213
Total panel (unbalanced) observations: 422

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.386320	3.156768	0.439158	0.6610
S&P GLOBAL ESG SCORE	0.001157	0.003674	0.315012	0.7531
COMPANY SIZE	-0.024063	0.179460	-0.134083	0.8935
LEVERAGE	3.154929	0.613540	5.142172	0.0000
PROFITABILITY	-0.008672	0.000966	-8.974295	0.0000
AGE	-0.006159	0.205670	-0.029946	0.9761
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.958719	Mean dependent var		1.478859
Adjusted R-squared	0.914808	S.D. dependent var		0.946781
S.E. of regression	0.276344	Akaike info criterion		0.571951
Sum squared resid	15.57869	Schwarz criterion		2.661551
Log likelihood	97.31831	Hannan-Quinn criter.		1.397698
F-statistic	21.83295	Durbin-Watson stat		4.019048
Prob(F-statistic)	0.000000			

Table 7.8: Summary Inferential Statistics of Random Effects Panel Regression Model

Dependent Variable: PRICE BOOK VALUE RATIO Method: Panel EGLS (Cross-section random effects)
Date: 03/15/23 Time: 12:57
Sample: 2020 2021
Periods included: 2
Cross-sections included: 213
Total panel (unbalanced) observations: 422
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.743809	0.456021	-3.823967	0.0002
S&P GLOBAL ESG SCORE	0.001214	0.002169	0.559566	0.5761
COMPANY SIZE	0.170780	0.024642	6.930342	0.0000
LEVERAGE	1.878188	0.244692	7.675732	0.0000
PROFITABILITY	-0.011960	0.000816	-14.65345	0.0000
AGE	-0.119832	0.051328	-2.334639	0.0200

	Effects Specification S.D.	Rho
Cross-section random	0.608108	0.8288
Idiosyncratic random	0.276344	0.1712

Weighted Statistics

R-squared	0.423944	Mean dependent var	0.454448
Adjusted R-squared	0.417020	S.D. dependent var	0.382075
S.E. of regression	0.290854	Sum squared resid	35.19207
F-statistic	61.23044	Durbin-Watson stat	1.895600
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.432604	Mean dependent var	1.478859
Sum squared resid	214.1254	Durbin-Watson stat	0.311547

Redundant Fixed Effects Test:

Firstly, the redundant fixed effects test is used to determine the right model between the pooled OLS regression model and the fixed effects panel regression model.

The null and alternative hypotheses are:

H_0: Pooled OLS regression model is appropriate

H_A: Fixed effects panel regression model is appropriate

Decision criteria:

Reject H_0: If the probability value for cross-section F is less than 0.05

Accept H_0: If the probability value for cross-section F is greater than 0.05

As shown in Table 7.9, the probability value for cross-section F is 0.0000. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, the redundant fixed effects test result shows that the fixed effects panel regression model should be used instead of the pooled OLS regression model. Then, a second test, the Hausman test is conducted to determine whether the fixed effects regression model or the random effects regression model should be used.

Table 7.9: Summary Inferential Statistics of Redundant Fixed Effects Test

Redundant Fixed Effects Tests Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	11.242382	(212,204)	0.0000
Cross-section Chi-square	1071.999410	212	0.0000

Cross-section fixed effects test equation:
Dependent Variable: PRICE BOOK VALUE RATIO Method: Panel Least Squares
Date: 03/15/23 Time: 13:00 Sample: 2020 2021
Periods included: 2
Cross-sections included: 213
Total panel (unbalanced) observations: 422

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.597159	0.353616	-4.516650	0.0000
S&P GLOBAL ESG SCORE	0.001851	0.002216	0.835339	0.4040
COMPANY SIZE	0.166040	0.019043	8.719124	0.0000
LEVERAGE	1.918629	0.207307	9.255024	0.0000
PROFITABILITY	-0.019411	0.001277	-15.20153	0.0000
AGE	-0.117893	0.040716	-2.895498	0.0040

R-squared	0.476423	Mean dependent var	1.478859
Adjusted R-squared	0.470130	S.D. dependent var	0.946781
S.E. of regression	0.689183	Akaike info criterion	2.107495
Sum squared resid	197.5886	Schwarz criterion	2.165007
Log likelihood	-438.6814	Hannan-Quinn criter.	2.130222
F-statistic	75.70703	Durbin-Watson stat	0.516390
Prob(F-statistic)	0.000000		

Hausman Test:

Secondly, the Hausman test is used to determine the right model between the fixed effects panel regression model and the random effects panel regression model.

The null and alternative hypotheses are:

H_0: Random effects panel regression model is appropriate

H_A: Fixed effects panel regression model is appropriate

Decision criteria:

Reject H_0: If the probability value for cross-section random is less than 0.05

Accept H_0: If the probability value for cross-section random is greater than 0.05

As shown in Table 7.10, the probability value for cross-section random is 0.0000. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, the Hausman test result shows that the fixed effects panel regression model should be used instead of the random effects regression model.

Table 7.10: Summary Inferential Statistics of Hausman Test

Correlated Random Effects - Hausman Test Equation: Untitled Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		50.267047	5	0.0000
Cross-section random effects test comparisons: Variable	Fixed	Random		
			Var(Diff.)	Prob.
S&P GLOBAL ESG SCORE	0.001157	0.001214	0.000009	0.9848
COMPANY SIZE	-0.024063	0.170780	0.031599	0.2730
LEVERAGE	3.154929	1.878188	0.316558	0.0233
PROFITABILITY	-0.008672	-0.011960	0.000000	0.0000
AGE	-0.006159	-0.119832	0.039666	0.5682
Cross-section random effects test equation: Dependent Variable: PRICE_BOOK_VALUE_RATIO Method: Panel Least Squares Date: 03/15/23 Time: 13:03 Sample: 2020 2021 Periods included: 2 Cross-sections included: 213 Total panel (unbalanced) observations: 422				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.386320	3.156768	0.439158	0.6610
S&P GLOBAL ESG SCORE	0.001157	0.003674	0.315012	0.7531
COMPANY SIZE	-0.024063	0.179460	-0.134083	0.8935
LEVERAGE	3.154929	0.613540	5.142172	0.0000
PROFITABILITY	-0.008672	0.000966	-8.974295	0.0000
AGE	-0.006159	0.205670	-0.029946	0.9761
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.958719	Mean dependent var		1.478859
Adjusted R-squared	0.914808	S.D. dependent var		0.946781
S.E. of regression	0.276344	Akaike info criterion		0.571951
Sum squared resid	15.57869	Schwarz criterion		2.661551
Log likelihood	97.31831	Hannan-Quinn criter.		1.397698
F-statistic	21.83295	Durbin-Watson stat		4.019048
Prob(F-statistic)	0.000000			

In summary, based on statistical results of the redundant fixed effects test and the Hausman test, the fixed effects panel regression model should be chosen for the research question 2 as stated in Section 1.6.

7.2.1.3 For Research Question 3

The results for the three panel regression models for the research question 3 are shown in Tables 7.11, 7.12 and 7.13, respectively.

Table 7.11: Summary Inferential Statistics of Pooled OLS Regression Model

Dependent Variable: ANNUAL SHARE PRICE VOLATILITY Method: Pooled Least Squares
Date: 03/15/23 Time: 16:16 Sample: 2020 2021
Included observations: 422
Cross-sections included: 6
Total pool (balanced) observations: 2532

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	111.7534	2.361823	47.31661	0.0000
S&P GLOBAL ESG SCORE	-0.202070	0.014800	-13.65313	0.0000
COMPANY SIZE	-3.050573	0.127191	-23.98422	0.0000
LEVERAGE	1.764094	1.384615	1.274068	0.2028
PROFITABILITY	0.001162	0.008528	0.136243	0.8916
AGE	-2.753405	0.271944	-10.12490	0.0000

R-squared	0.337615	Mean dependent var	41.86872
Adjusted R-squared	0.336304	S.D. dependent var	13.84016
S.E. of regression	11.27523	Akaike info criterion	7.685461
Sum squared resid	321132.6	Schwarz criterion	7.699292
Log likelihood	-9723.794	Hannan-Quinn criter.	7.690479
F-statistic	257.4989	Durbin-Watson stat	1.333701
Prob(F-statistic)	0.000000		

Table 7.12: Summary Inferential Statistics of Fixed Effects Panel Regression Model

Dependent Variable: ANNUAL SHARE PRICE VOLATILITY Method: Panel Least Squares
Date: 03/15/23 Time: 16:21 Sample: 2020 2021
Periods included: 2
Cross-sections included: 213
Total panel (unbalanced) observations: 422

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-24.62620	83.94079	-0.293376	0.7695
S&P GLOBAL ESG SCORE	-0.024833	0.097701	-0.254172	0.7996
COMPANY SIZE	4.180010	4.771979	0.875949	0.3821
LEVERAGE	2.152841	16.31448	0.131959	0.8951
PROFITABILITY	-0.008584	0.025695	-0.334075	0.7387
AGE	-5.142147	5.468928	-0.940248	0.3482
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.863677	Mean dependent var		41.86872
Adjusted R-squared	0.718667	S.D. dependent var		13.85385
S.E. of regression	7.348196	Akaike info criterion		7.133077
Sum squared resid	11015.18	Schwarz criterion		9.222677
Log likelihood	-1287.079	Hannan-Quinn criter.		7.958824
F-statistic	5.955978	Durbin-Watson stat		4.019048
Prob(F-statistic)	0.000000			

Table 7.13: Summary Inferential Statistics of Random Effects Panel Regression Model

Dependent Variable: ANNUAL SHARE PRICE VOLATILITY Method: Panel EGLS (Cross-section random effects)
Date: 03/15/23 Time: 16:22 Sample: 2020 2021
Periods included: 2
Cross-sections included: 213
Total panel (unbalanced) observations: 422
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	110.5227	7.281602	15.17836	0.0000
S&P GLOBAL ESG SCORE	-0.166009	0.041088	-4.040282	0.0001
COMPANY SIZE	-3.034323	0.392443	-7.731887	0.0000
LEVERAGE	1.731880	4.126422	0.419705	0.6749
PROFITABILITY	0.000351	0.019013	0.018479	0.9853
AGE	-2.766212	0.833138	-3.320234	0.0010

	Effects Specification S.D.	Rho
Cross-section random	8.650822	0.5809
Idiosyncratic random	7.348196	0.4191

Weighted Statistics

R-squared	0.236605	Mean dependent var	21.59432
Adjusted R-squared	0.227430	S.D. dependent var	8.376520
S.E. of regression	7.393446	Sum squared resid	22739.83
F-statistic	25.78688	Durbin-Watson stat	2.028995
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.335869	Mean dependent var	41.86872
Sum squared resid	53663.21	Durbin-Watson stat	0.859788

Redundant Fixed Effects Test:

Firstly, the redundant fixed effects test is used to determine the right model between the pooled OLS regression model and the fixed effects panel regression model.

The null and alternative hypotheses are:

H_0: Pooled OLS regression model is appropriate

H_A: Fixed effects panel regression model is appropriate

Decision criteria:

Reject H_0: If the probability value for cross-section F is less than 0.05

Accept H_0: If the probability value for cross-section F is greater than 0.05

As shown in Table 7.14, the probability value for cross-section F is 0.0000. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, the redundant fixed effects test result shows that the fixed effects panel regression model should be used instead of the pooled OLS regression model. Then, a second test, the Hausman test is conducted to determine whether the fixed effects regression model or the random effects regression model should be used.

Table 7.14: Summary Inferential Statistics of Redundant Fixed Effects Test

Redundant Fixed Effects Tests Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	3.713319	(212,204)	0.0000
Cross-section Chi-square	667.106092	212	0.0000

Cross-section fixed effects test equation:
Dependent Variable: ANNUAL SHARE PRICE VOLATILITY Method: Panel Least Squares
Date: 03/15/23 Time: 16:24 Sample: 2020 2021
Periods included: 2
Cross-sections included: 213
Total panel (unbalanced) observations: 422

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	111.7534	5.819923	19.20187	0.0000
S&P GLOBAL ESG SCORE	-0.202070	0.036470	-5.540668	0.0000
COMPANY SIZE	-3.050573	0.313419	-9.733197	0.0000
LEVERAGE	1.764094	3.411923	0.517038	0.6054
PROFITABILITY	0.001162	0.021015	0.055290	0.9559
AGE	-2.753405	0.670115	-4.108853	0.0000

R-squared	0.337615	Mean dependent var	41.86872
Adjusted R-squared	0.329654	S.D. dependent var	13.85385
S.E. of regression	11.34279	Akaike info criterion	7.709158
Sum squared resid	53522.10	Schwarz criterion	7.766670
Log likelihood	-1620.632	Hannan-Quinn criter.	7.731885
F-statistic	42.40679	Durbin-Watson stat	0.872195
Prob(F-statistic)	0.000000		

Hausman Test:

Secondly, the Hausman test is used to determine the right model between the fixed effects panel regression model and the random effects panel regression model.

The null and alternative hypotheses are:

H_0: Random effects panel regression model is appropriate

H_A: Fixed effects panel regression model is appropriate

Decision criteria:

Reject H_0: If the probability value for cross-section random is less than 0.05

Accept H_0: If the probability value for cross-section random is greater than 0.05

As shown in Table 7.15, the probability value for cross-section random is 0.0595. Therefore, the null hypothesis is accepted. That is, the Hausman test result shows that the random effects panel regression model should be used instead of the fixed effects panel regression model.

Table 7.15: Summary Inferential Statistics of Hausman Test

Correlated Random Effects - Hausman Test Equation: Untitled Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		10.618673	5	0.0595
Cross-section random effects test comparisons:				
Variable	Fixed	Random		
			Var(Diff.)	Prob.
S&P GLOBAL ESG SCORE	-0.024833	-0.166009	0.007857	0.1112
COMPANY SIZE	4.180010	-3.034323	22.617777	0.1293
LEVERAGE	2.152841	1.731880	249.135044	0.9787
PROFITABILITY	-0.008584	0.000351	0.000299	0.6052
AGE	-5.142147	-2.766212	29.215056	0.6602
Cross-section random effects test equation: Dependent Variable: ANNUAL_SHARE_PRICE_VOLATILITY Method: Panel Least Squares Date: 03/15/23 Time: 16:26 Sample: 2020 2021 Periods included: 2 Cross-sections included: 213 Total panel (unbalanced) observations: 422				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-24.62620	83.94079	-0.293376	0.7695
S&P GLOBAL ESG SCORE	-0.024833	0.097701	-0.254172	0.7996
COMPANY SIZE	4.180010	4.771979	0.875949	0.3821
LEVERAGE	2.152841	16.31448	0.131959	0.8951
PROFITABILITY	-0.008584	0.025695	-0.334075	0.7387
AGE	-5.142147	5.468928	-0.940248	0.3482
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.863677	Mean dependent var		41.86872
Adjusted R-squared	0.718667	S.D. dependent var		13.85385
S.E. of regression	7.348196	Akaike info criterion		7.133077
Sum squared resid	11015.18	Schwarz criterion		9.222677
Log likelihood	-1287.079	Hannan-Quinn criter.		7.958824
F-statistic	5.955978	Durbin-Watson stat		4.019048
Prob(F-statistic)	0.000000			

In summary, based on statistical results of the redundant fixed effects test and the Hausman test, the random effects panel regression model is chosen for the research question 3 as stated in Section 1.6.

7.2.2 Step 2: Assessing Required Conditions for the Error Variable

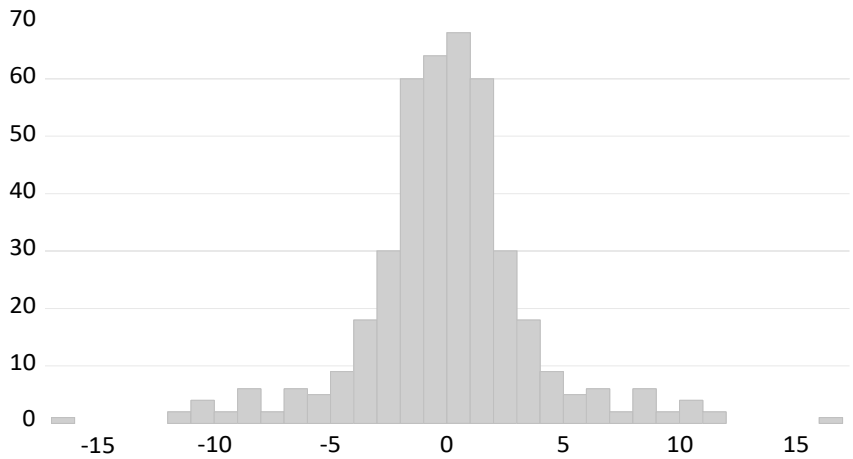
Having determined that the panel regression model should be used for each research question, the next step is to assess whether the following required conditions for the error variable are met statistically.

7.2.2.1 For Research Question 1

Condition 1: The probability distribution of the error variable (ε) is normal.

The method to check the normality of the error variable is to prepare a histogram of the residuals to see whether the error variable is normally distributed. As shown in Table 7.16, the probability distribution of the error variable in the histogram is resemble to a bell shape, it suggests that the error variable is approximately normal distributed. The results show that the condition 1 is met.

Table 7.16: Summary Inferential Statistics of Residuals Diagnostics Histogram – Normality Test



Series: Standardized Residuals	
Sample 2020 2021	
Observations 422	
Mean	-8.42e-17
Median	0.000000
Maximum	16.49660
Minimum	-16.49660
Std. Dev.	3.641461
Skewness	4.54e-17
Kurtosis	6.195611
Jarque-Bera	179.5598
Probability	0.000000

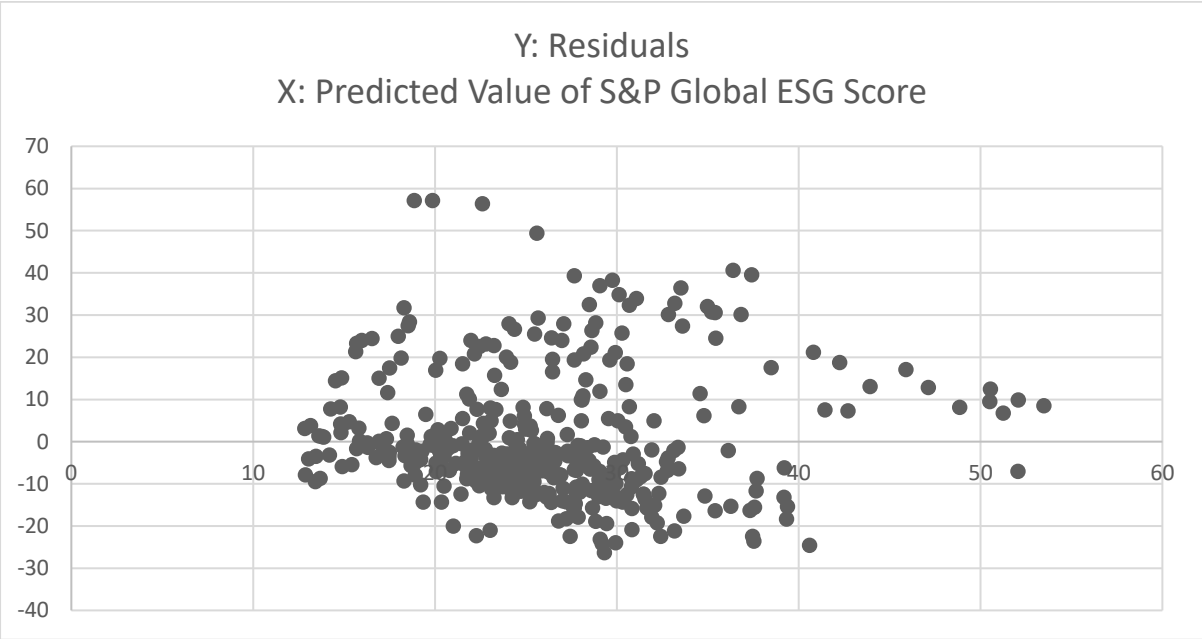
Condition 2: The mean of the error distribution is zero (i.e. E(ε) = 0).

As shown in the above Table 7.16, the mean of the error distribution in histogram is -8.42e-17 which means it is very small and close to zero. The results show that the condition 2 is met.

Condition 3: The standard deviation of the error variable (σ_ε) is a constant no matter what the value of x is. When this requirement is met, the condition is called homoscedasticity. When this requirement is violated, the condition is called heteroscedasticity.

The method is to check whether the standard deviation of the error variable is constant by plotting the residuals against the predicted value of the S&P Global ESG Score. As shown in Table 7.17, there is no apparent change in the variation of the residuals against the predicted value of S&P Global ESG Score. That is, there is no evidence to show that the variance of the error variable is small when the predicted value of the S&P Global ESG Score is small and the variance of the error variable is large when the predicted value of S&P Global ESG Score is large. There is evidence to infer that there is no heteroscedasticity. Therefore, the results show that the condition 3 is met.

Table 7.17: Summary Inferential Statistics of Residuals and Predicted Value of S&P Global ESG Score



Condition 4: The error variables are independent. That is, the value of the error variable at one point does not affect the value of the error variable at another point. Durbin-Watson test is used to determine whether any autocorrelation between the error variables exists.

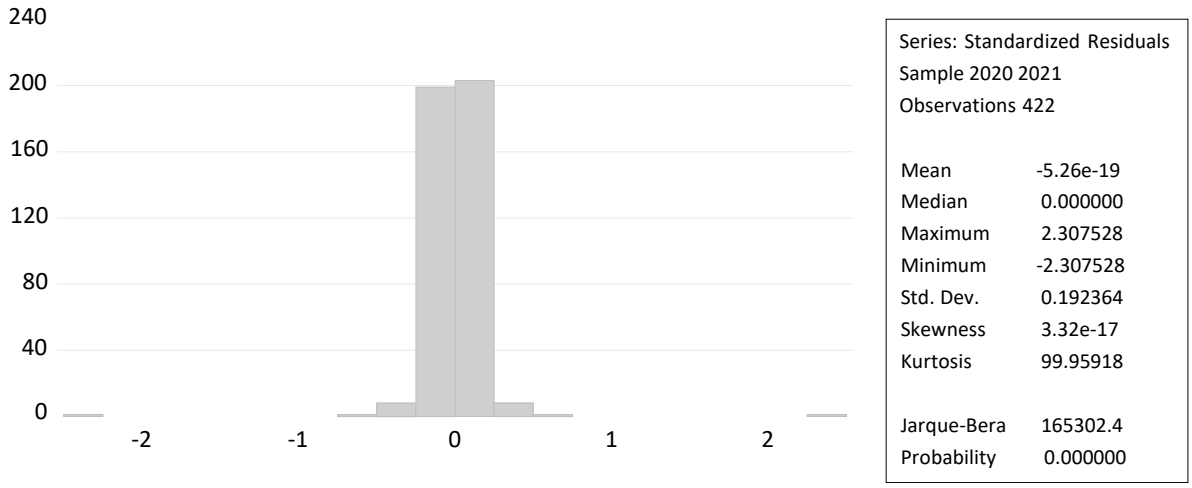
For n = 211, k = 7 and α = 0.05, from the Durbin-Watson Statistic Table, the lower critical value (d_L) is 1.56 and the upper critical value (d_U) is 1.73. As shown in Table 7.2, the Durbin-Watson statistic is 4.019048 which is greater than the upper critical value. That is, there is no evidence of autocorrelation between the error variables exists at 0.05 level of significance. Therefore, the results show that the condition 4 is met.

7.2.2.2 For Research Question 2

Condition 1: The probability distribution of the error variable (ε) is normal.

The method to check the normality of the error variable is to prepare a histogram of the residuals to see whether the error variable is normally distributed. As shown in Table 7.18, the probability distribution of the error variable in the histogram is resemble to a bell shape, it suggests that the error variable is approximately normal distributed. Therefore, the condition 1 is met.

Table 7.18: Summary Inferential Statistics of Residuals Diagnostics Histogram – Normality Test



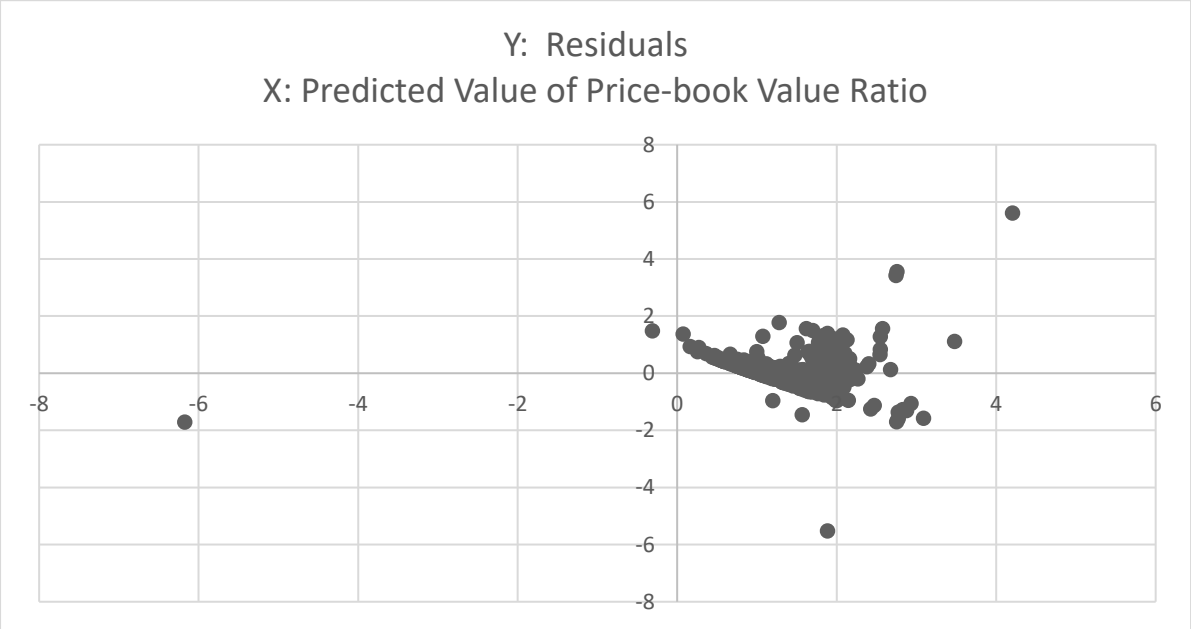
Condition 2: The mean of the error distribution is zero (i.e. E(ε) = 0).

As shown in the above Table 7.18, the mean of the error distribution in histogram is -5.26e-19 which means it is very small and close to zero. Therefore, the condition 2 is met.

Condition 3: The standard deviation of the error variable (σ_ε) is a constant no matter what the value of x is. When this requirement is met, the condition is called homoscedasticity. When this requirement is violated, the condition is called heteroscedasticity.

The method is to check whether the standard deviation of the error variable is constant by plotting the residuals against the predicted value of price-book value ratio. As shown in Table 7.19, there is no apparent change in the variation of the residuals against the predicted value of price-book value ratio. That is, there is no evidence to show that the variance of the error variable is small when the predicted value of the price-book value ratio is small and the variance of the error variable is large when the predicted value of price-book value ratio is large. That is, there is no heteroscedasticity. Therefore, the condition 3 is met.

Table 7.19: Summary Inferential Statistics of Residuals and Predicted Value of Price-book Value Ratio



Condition 4: The error variables are independent. That is, the value of the error variable at one point does not affect the value of the error variable at another point. The Durbin-Watson test is used to determine whether any autocorrelation between the error variables exists.

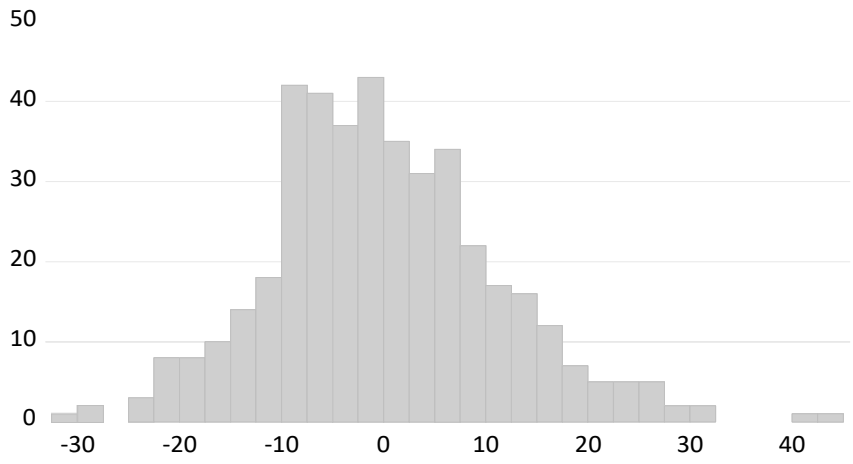
For n = 211, k = 5 and α = 0.05, from the Durbin-Watson Statistic Table, the lower critical value (d_L) is 1.58 and the upper critical value (d_U) is 1.75. As shown in the above Table 7.7, the Durbin-Watson statistic is 4.019048 which is greater than the upper critical value. That is, there is no evidence of autocorrelation between the error variables exists at 0.05 level of significance. Therefore, the condition 4 is met.

7.2.2.3 For Research Question 3

Condition 1: The probability distribution of the error variable (ε) is normal.

The method to check the normality of the error variable is to prepare a histogram of the residuals to see whether the error variable is normally distributed. As shown in Table 7.20, the probability distribution of the error variable in the histogram is resemble to a bell shape, it suggests that the error variable is approximately normal distributed. Therefore, this condition 1 is met.

Table 7.20: Summary Inferential Statistics of Residuals Diagnostics Histogram – Normality Test



Series: Standardized Residuals	
Sample 2020 2021	
Observations 422	
Mean	0.032546
Median	-0.862940
Maximum	42.87754
Minimum	-31.89499
Std. Dev.	11.29004
Skewness	0.418381
Kurtosis	3.684719
Jarque-Bera	20.55508
Probability	0.000034

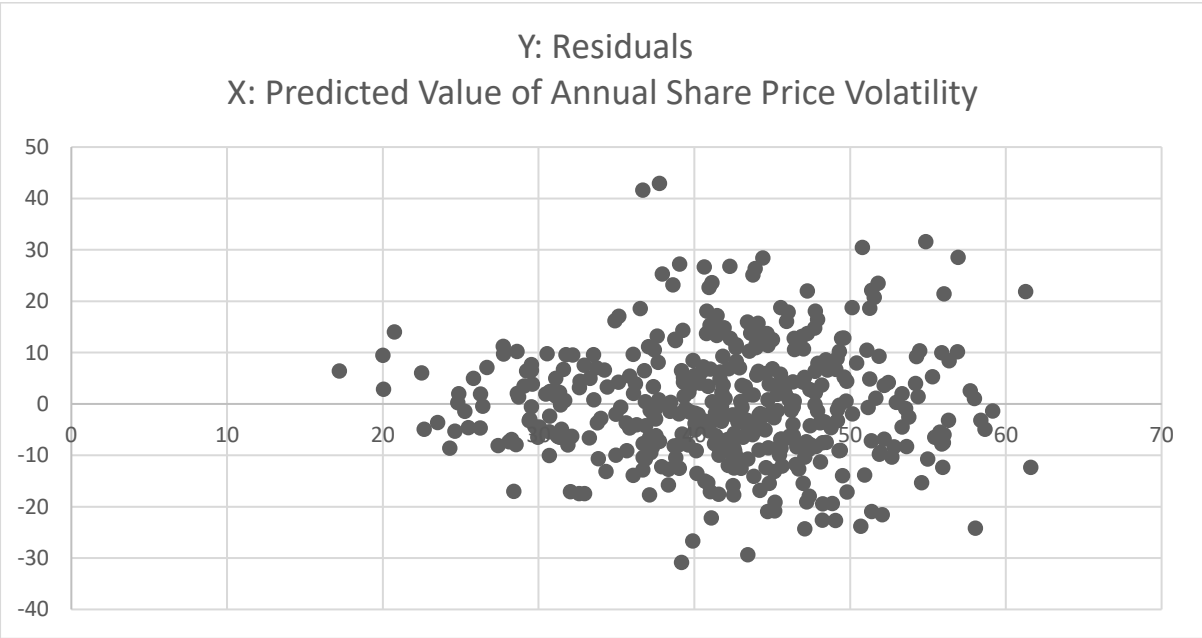
Condition 2: The mean of the error distribution is zero (i.e. E(ε) = 0).

As shown in the above Table 7.20, the mean of the error distribution in histogram is 0.032546 which is close to zero. Therefore, this condition 2 is met.

Condition 3: The standard deviation of the error variable (σ_ε) is a constant no matter what the value of x is. When this requirement is met, the condition is called homoscedasticity. When this requirement is violated, the condition is called heteroscedasticity.

The method is to check whether the standard deviation of the error variable is constant by plotting the residuals against the predicted value of annual share price volatility. As shown in Table 7.21, there is no apparent change in the variation of the residuals against the predicted value of annual share price volatility. That is, there is no evidence to show that the variance of the error variable is small when the predicted value of the annual share price volatility is small and the variance of the error variable is large when the predicted value of the annual share price volatility is large. That is, there is no heteroscedasticity. Therefore, this condition 3 is met.

Table 7.21: Summary Inferential Statistics of Residuals and Predicted Value of Annual Share Price Volatility



Condition 4: The error variables are independent. That is, the value of the error variable at one point does not affect the value of the error variable at another point. The Durbin-Watson test is used to determine whether any autocorrelation between the error variables exists.

For n = 211, k = 5 and $\alpha = 0.05$, from the Durbin-Watson Statistic Table, the lower critical value (d_L) is 1.58 and the upper critical value (d_U) is 1.75. As shown in above Table 7.13, the Durbin-Watson statistic is 2.028995 which is greater than the upper critical value. That is, there is no evidence of autocorrelation between the error variables exists at 0.05 level of significance. Therefore, the condition 4 is met.

7.2.3 Step 3: Assessing the Panel Regression Model Statistically

As there is more than one independent variable in each panel regression model, the issue of multicollinearity needs to be considered. Multicollinearity is a condition where the independent variables are highly correlated, which distorts the t-tests of the coefficients not only making the interpretation of the coefficients problematic but also resulting in determining with difficulties whether any of the independent variables are linearly related to the dependent variable (Selvanathan & Selvanathan, 2011). The effect of multicollinearity, if present, may cause the statistical inference incorrect.

7.2.3.1 For Research Question 1

As shown in Table 7.22, the figures of coefficient covariance between the independent variables are small. As such, there is evidence to infer that there is no multicollinearity issue.

Table 7.22: Summary Inferential Statistics of Coefficient Covariance Matrix

Coefficient Covariance Matrix

	C	BOARD SIZE	PROPORTION OF INEDS	ROLES OF CHAIRMAN AND CEO	COMPANY SIZE	LEVERAGE
C	3532.709	-3.846842	-135.8499	-2.585592	-195.9292	-59.32363
BOARD SIZE	-3.846842	0.209383	1.130922	-0.010263	0.096614	-0.054369
PROPORTION OF INEDS	-135.8499	1.130922	186.7100	-2.483018	2.143370	-8.099355
ROLES OF CHAIRMAN AND CEO	-2.585592	-0.010263	-2.483018	5.567848	0.156617	-0.449721
COMPANY SIZE	-195.9292	0.096614	2.143370	0.156617	11.21728	3.018802
LEVERAGE	-59.32363	-0.054369	-8.099355	-0.449721	3.018802	133.2839
PROFITABILITY	0.143764	0.000352	-0.004140	5.40E-05	-0.008985	0.070826
AGE	123.7087	-0.272745	3.159609	-0.227531	-8.117987	-8.805545

	PROFITABILITY	AGE
C	0.143764	123.7087
BOARD SIZE	0.000352	-0.272745
PROPORTION OF INEDS	-0.004140	3.159609
ROLES OF CHAIRMAN AND CEO	0.000054	-0.227531
COMPANY SIZE	-0.008985	-8.117987
LEVERAGE	0.070826	-8.805545
PROFITABILITY	0.000337	0.002828
AGE	0.002828	13.76313

In addition, the multicollinearity does not affect the F-test of the analysis of variance (ANOVA) nor does it inhibit from developing a multiple regression model that fits the data well (Selvanathan & Selvanathan, 2011). As such, F-test of the analysis of variance (ANOVA) is used to assess whether the fixed effects panel regression model chosen is statistically significant, fit and useful for analysis in this study.

The null and alternative hypotheses are:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$

H_A: At least one of the above β is not equal to zero

Decision criteria:

Reject H_0: If the probability value is less than 0.05

Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.2, the probability value (F-statistic) is 0.000000. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, there is evidence to infer that the fixed effects panel regression model is fit and useful.

7.2.3.2 For Research Question 2

As shown in Table 7.23, the figures of coefficient covariance between the independent variables are small. As such, there is evidence to infer that there is no multicollinearity issue.

Table 7.23: Summary Inferential Statistics of Coefficient Covariance Matrix

Coefficient Covariance Matrix

	C	S&P GLOBAL ESG SCORE	COMPANY SIZE	LEVERAGE	PROFITABILITY	AGE
C	9.965186	0.002871	-0.562380	-0.106422	0.000465	0.277306
S&P GLOBAL ESG SCORES	0.002871	1.35E-05	-0.000137	0.000354	2.85E-07	-0.000275
COMPANY SIZE	-0.562380	-0.000137	0.032206	0.005067	-2.80E-05	-0.019394
LEVERAGE	-0.106422	0.000354	0.005067	0.376432	0.000203	-0.031223
PROFITABILITY	0.000465	2.85E-07	-2.80E-05	0.000203	9.34E-07	3.70E-06
AGE	0.277306	-0.000275	-0.019394	-0.031223	3.70E-06	0.042300

In addition, the multicollinearity does not affect the F-test of the analysis of variance (ANOVA) nor does it inhibit from developing a multiple regression model that fits the data well (Selvanathan & Selvanathan, 2011). As such, F-test of the analysis of variance (ANOVA) is used to assess whether the fixed effects panel regression model chosen is statistically significant, fit and useful for analysis in this study.

The null and alternative hypotheses are:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$

H_A: At least one of the above β is not equal to zero

Decision criteria:

Reject H_0: If the probability value is less than 0.05

Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.7, the probability value (F-statistic) is 0.000000. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, there is evidence to infer that the fixed effects panel regression model is statistically significant, fit and useful.

7.2.3.3 For Research Question 3

As shown in Table 7.24, the figures of coefficient covariance between the independent variables are small. As such, there is evidence to infer that there is no multicollinearity issue.

Table 7.24: Summary Inferential Statistics of Coefficient Covariance Matrix

Coefficient Covariance Matrix

	C	S&P GLOBAL ESG SCORE	COMPANY SIZE	LEVERAGE	PROFITABILITY	AGE
C	53.02172	0.017647	-2.716339	-2.760131	-0.006051	-0.240616
S&P GLOBAL ESG SCORES	0.017647	0.001688	-0.002140	0.000807	2.09E-05	-0.008537
COMPANY SIZE	-2.716339	-0.002140	0.154011	-0.014337	0.000162	-0.064794
LEVERAGE	-2.760131	0.000807	-0.014337	17.02736	-0.003758	-0.158924
PROFITABILITY	-0.006051	2.09E-05	0.000162	-0.003758	0.000361	-0.000444
AGE	-0.240616	-0.008537	-0.064794	-0.158924	-0.000444	0.694118

In addition, the multicollinearity does not affect the F-test of the analysis of variance (ANOVA) nor does it inhibit from developing a multiple regression model that fits the data well (Selvanathan & Selvanathan, 2011). As such, F-test of the analysis of variance (ANOVA) is used to assess whether the random effects panel regression model chosen is statistically significant, fit and useful for analysis in this study.

The null and alternative hypotheses are:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$

H_A: At least one of the above β is not equal to zero

Decision criteria:

Reject H_0: If the probability value is less than 0.05

Accept H_0: If the probability value is greater than 0.05

As shown in above Table 7.13, the probability value (F-statistic) is 0.000000. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, there is evidence

to infer that the random effects panel regression model is statistically significant, fit and useful for analysis in this study.

7.3 Inferential Statistical Results and Discussions

After conducting various statistical tests in Section 7.2, the panel regression model is chosen for each research question to be appropriate, the four required conditions for the error variable to be met as well as such model to be statistically significant, fit and useful for analysis in this study. The inferential statistics results and discussions are provided for each research question as follows.

7.3.1 For Research Question 1

The statistical results of the fixed effects panel regression model as shown in the above Table 7.2 are as follows:

$$Y = -215.2671 - 0.444074X_1 + 12.34340X_2 + 1.549908X_3 + 10.13192X_4 - 26.88928X_5 - 0.022361X_6 + 21.25970X_7 + \varepsilon$$

Y = S&P Global ESG Score
β = Coefficient
X_1 = Board size
X_2 = Proportion of independent non-executive directors
X_3 = Roles of chairman and chief executive officer
X_4 = Company size
X_5 = Leverage
X_6 = Profitability
X_7 = Age
ε = error variable (consisting of individual effects of unobserved independent variables and idiosyncratic error)

This section is to analyse and discuss the statistics results of the fixed effects panel regression model. A t-test is applied for each coefficient of independent variables to determine whether

there is evidence to infer any relationship between the independent variables and the dependent variable.

Independent Variables – Board Size, Proportion of Independent Non-executive Directors and Roles of Chairman and Chief Executive Officer

For the research question 1 as stated in Section 1.6, the dependent variable is the S&P Global ESG Score and there are three independent variables, namely the board size, proportion of independent non-executive directors and roles of chairman and chief executive officer. A t-test is applied for each coefficient of the independent variables to determine whether there is evidence to infer any relationship between the independent variable and the dependent variables.

<u>Board Size</u>

The null and alternative hypotheses are:
H_0: $\beta_1 = 0$
H_A: $\beta_1 \neq 0$

Decision criteria:
Reject H_0: If the probability value is less than 0.05
Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.2, the probability value is 0.3330 showing that it is not statistically significant. Therefore, the null hypothesis is accepted. The results do not support the hypothesis 1A as stated in Section 1.6. That is, there is no evidence to infer that the board size is statistically significant and positively related to the S&P Global ESG Score keeping the effects of other control variables to be constant.

<u>Proportion of Independent Non-executive Directors</u>

The null and alternative hypotheses are:
H_0: $\beta_2 = 0$
H_A: $\beta_2 \neq 0$

Decision criteria:

Reject H_0: If the probability value is less than 0.05

Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.2, the probability value is 0.3674 showing that it is not statistically significant. Therefore, the null hypothesis is accepted. The results do not support the hypothesis 1B as stated in Section 1.6. That is, there is no evidence to infer that the proportion of independent non-executive directors is statistically significant and positively related to the S& P Global ESG Score keeping the effects of other control variables to be constant.

<u>Roles of Chairman and Chief Executive Officer</u>

The null and alternative hypotheses are:

H_0: $\beta_3 = 0$

H_A: $\beta_3 \neq 0$

Decision criteria:

Reject H_0: If the probability value is less than 0.05

Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.2, the probability value is 0.5120 showing that it is not statistically significant. Therefore, the null hypothesis is accepted. That is, there is no evidence to infer that the roles of chairman and chief executive officer performed by the same person is statistically significant and related to the S&P Global ESG Score. As this is a dummy variable, in other words, there is evidence to infer that the separation of the roles of chairman and chief executive officer is statistically significant and related to the S&P Global ESG Score. In addition, the coefficient of the roles of chairman and chief executive officer as a dummy variable is 1.549908 showing that the separation of the roles of chairman and chief executive officer and the S&P Global ESG Score is positively related. The results suggest that listed companies with the separation of the roles of chairman and chief executive officer, the higher is the S&P Global ESG Score.

The results support the hypothesis 1C as stated in Section 1.6. That is, there is evidence to infer that the separation of the roles of chairman and chief executive officer is statistically significant and positively related to the S&P Global ESG Score keeping the effects of other control variables to be constant.

All in all, having conducted statistical tests for the hypotheses 1A, 1B and 1C as stated in Section 1.6, the results do not support hypotheses 1A and 1B but support the hypothesis 1C. To address the research question 1 as stated in Section 1.6, the results suggest that two board attributes in this study, namely the board size and board independence in terms of the proportion of independent non-executive directors do not affect ESG performance of listed companies in Hong Kong. However, the results suggest that the board independence in terms of the separation of the roles of chairman and chief executive officer affects positively ESG performance of listed companies in Hong Kong.

As discussed in Section 3.4.3, combining the roles of chairman and chief executive officer will put control of chairman in the hands of chief executive officer and management has de facto control. The effectiveness of the board's functions of monitoring and check and balance would be greatly jeopardised and undermined (Brickley, et al., 1997). It is argued that such separation can avoid an undesirable concentration of power. (Lipton, et al., 2019). If the roles of chairman and chief executive officer are performed by the same person, conflicts of interest would exist and the check and balance function cannot be performed effectively and efficiently (Mallin, 2019). The results of this study support the prior studies that the separation of the roles of chairman and chief executive officer would enhance the board effectiveness which ultimately affects the ESG performance.

The results support that the separation of the roles of chairman and chief executive officer would enhance the board effectiveness which ultimately affects ESG performance. That is, the board attribute in terms of the separation of chairman and chief executive officer affects positively ESG performance of listed companies in Hong Kong.

Owing to the scope of this study, the board attributes are measured in terms of the board size, proportion of independent non-executive directors and roles of chairman and chief executive officer. Although the results primarily suggest that only one of three board attributes affects ESG performance, it is important to note that some other board attributes may affect ESG

performance. Therefore, it is possible that there is statistically significant correlation between other board attributes and the S&P Global ESG Score.

When interpretating and analysing the statistical results, it is also important to note that there may be a problem of endogeneity caused by unobserved heterogeneity. The unobserved dependency of other independent variable(s) is called unobserved heterogeneity and the correlation between the independent variable(s) and the unobserved independent variable(s) in the error term is called endogeneity (Brugger, 2021). The problem of endogeneity occurs when there is a correlation between an independent variable and the unobserved independent variable(s) in the error term. It presents a challenge of obtaining an unbiased coefficient β and investigation of any causal relationship (Love, 2011). As such, this study does not suggest that a listed company with the separation of the roles of chairman and chief executive office has caused a higher S&P Global ESG Score. Instead, the results primarily suggest that there is a statistically significant positive correlation between the separation of the roles of chairman and chief executive officer and the S&P Global ESG Score. That is, the board independence in terms of the separation of the roles of chairman and chief executive officer affects positively ESG performance of listed companies in Hong Kong. The statistically significant positive correlation indicates the tendencies present in the data but there is no evidence to imply a causation effect (Berenson, et al., 2009). It is important to interpret and analyse the statistical results with caution which are subject to some assumptions and limitations.

Control Variables – Company Size, Leverage, Profitability and Age

For the research question 1 as stated in Section 1.6, the dependent variable is the S&P Global ESG Score and there are four control variables, namely the company size, leverage, profitability and age. A t-test is applied for each coefficient of the four control variables to determine whether there is evidence to infer any relationship between them.

<u>Company Size</u>

A t-test is conducted for the coefficient of the company size to determine whether there is evidence to infer any relationship between the company size and the S&P Global ESG Score.

The null and alternative hypotheses are:

H_0: $\beta_4 = 0$

H_A: $\beta_4 \neq 0$

Decision criteria:

Reject H_0: If the probability value is less than 0.05

Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.2, the probability value is 0.0028 showing that it is statistically significant. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, there is evidence to infer that the company size is statistically significant and related to the S&P Global ESG Score. In addition, the coefficient of the company size is 10.13192 showing that the company size and the S&P Global ESG Score is positively related.

Based on the statistical results, there is evidence to infer that the company size is statistically significant and positively related to the S&P Global ESG Score. The result suggests that a listed company with a larger company size, the higher is the S&P Global ESG Score. The results are consistent with what we discussed in Section 5.2 that larger companies are able (in terms of resources) and more willing (in terms of fulfilling the different expectations of stakeholders) to improve ESG performance resulting in a higher S&P Global ESG Score.

<u>Leverage</u>

A t-test is conducted for the coefficient of the leverage to determine whether there is evidence to infer any relationship between the leverage and the S&P Global ESG Score.

The null and alternative hypotheses are:

H_0: $\beta_5 = 0$

H_A: $\beta_5 \neq 0$

Decision criteria:

Reject H_0: If the probability value is less than 0.05

Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.2, the probability value is 0.0208 showing that it is statistically significant. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, there is evidence to infer that the leverage is statistically significant and related to the S&P Global ESG Score. In addition, the coefficient of the leverage is -26.88928 showing that the leverage and the S&P Global ESG Score is negatively related.

The results show a negative relationship between the leverage and the S&P Global ESG Score and do not support that a higher leverage company (with a higher risk) has a higher S&P Global ESG Score. As such, the results are inconsistent with what we discussed in Section 5.2 that a higher leveraged company might spend more resources to improve ESG performance resulting in a higher S&P Global ESG Score.

Profitability

A t-test is conducted for the coefficient of the profitability to determine whether there is evidence to infer any relationship between the profitability and the S&P Global ESG Score.

The null and alternative hypotheses are:
H_0: $\beta_6 = 0$
H_A: $\beta_6 \neq 0$

Decision criteria:
Reject H_0: If the probability value is less than 0.05
Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.2, the probability value is 0.2243 showing that it is not statistically significant. Therefore, the null hypothesis is accepted. That is, there is no evidence to infer that the profitability is statistically significant and related to the S&P Global ESG Score.

Age

A t-test is conducted for the coefficient of the age to determine whether there is evidence to infer any relationship between the age and the S&P Global ESG Score.

The null and alternative hypotheses are:

H_0: $\beta_7 = 0$

H_A: $\beta_7 \neq 0$

Decision criteria:

Reject H_0: If the probability value is less than 0.05

Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.2, the probability value is 0.0000 showing that it is statistically significant. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, there is evidence to infer that the age is statistically significant and related to the S&P Global ESG Score. In addition, the coefficient of the age is 21.25970 showing that the age and the S&P Global ESG Score is positively related.

Based on the statistical results, there is evidence to infer that the age is statistically significant and positively related to the S&P Global ESG Score. The results suggest that a listed company with a longer history of listing, the higher is the S&P Global ESG Score. As such, the result is consistent with what we discussed in Section 5.2 that a company listed on the SEHK longer might want to improve ESG performance more than others resulting in a higher S&P Global ESG Score.

7.3.2 For Research Question 2

The statistical results of the fixed effects panel regression model as shown in the above Table 7.7 are as follows:

$$Y = 1.386320 + 0.001157X_1 - 0.024063X_2 + 3.154929X_3 - 0.008672X_4 - 0.006159X_5 + \varepsilon$$

Y = Price-book value ratio

β = Coefficient

X_1 = S&P Global ESG Score

X_2 = Company size

X_3 = Leverage

X_4 = Profitability

X_5 = Age

ε = error variable (consisting of individual effects of unobserved independent variables and idiosyncratic error)

This section is to analyse and discuss the statistics results of the fixed effects panel regression model. The research question 2 of this study as stated in Section 1.6 is to investigate whether ESG performance affects the company value (which is measured in terms of the price-book value ratio) of listed companies in Hong Kong and the hypothesis 2 as stated in Section 1.6 is that the S&P Global ESG Score is positively related to the price-book value ratio. A t-test is applied for each coefficient of independent variable (including control variables) to determine whether there is evidence to infer any relationship between them.

Independent Variable – S&P Global ESG Score

For the research question 2 as stated in Section 1.6, the dependent variable is the price-book value ratio (company value) and the independent variable is the S&P Global ESG Score. A t-test is applied for the coefficient of the S&P Global ESG Score to determine whether there is evidence to infer any relationship between the S&P Global ESG Score and the price-book value ratio.

The null and alternative hypotheses are:

H_0: $\beta_1 = 0$

H_A: $\beta_1 \neq 0$

Decision criteria:

Reject H_0: If the probability value is less than 0.05

Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.7, the probability value is 0.7531 showing that it is not statistically significant. Therefore, the null hypothesis is accepted. That is, there is no evidence to infer that the S&P Global ESG Score is statistically significant and related to the price-book value ratio keeping the effects of other control variables to be constant. In addition, the results do not support the hypothesis 2 as stated in Section 1.6 because there is no evidence to infer

that the S&P Global ESG Score is positively related to the price-book value ratio keeping the effects of other control variables to be constant. To address the research question 2 as stated in Section 1.6, the results do not support that ESG performance affect the company value of listed companies in Hong Kong.

Although the results primarily suggest that the S&P Global ESG Score is not statistically significant and related to the price-book value ratio, it is important to note that the price-book value ratio is one of the methods to measure the company value. In fact, the company value can be measured in different accounting measures and the price-book value ratio is only one of them. Owing to the scope of this study, the company value is measured in terms of the price-book value. Although the results show that there is no statistically significant correlation between the S&P Global ESG Score and the price-book value ratio, there is no evidence to infer that there is no statistically significant relationship between ESG performance and the company value if the company value is measured in other accounting measures.

When interpretating and analysing the statistical results, it is also important to note that there may be a problem of endogeneity caused by unobserved heterogeneity. The unobserved dependency of other independent variable(s) is called unobserved heterogeneity and the correlation between the independent variable(s) and the unobserved independent variable(s) in the error term is called endogeneity (Brugger, 2021). The problem of endogeneity occurs when there is a correlation between an independent variable and the unobserved independent variable(s) in the error term. It presents a challenge of obtaining an unbiased coefficient β and investigation of a causal relationship (Love, 2011). It is important to interpret and analyse the statistical results with caution which are subject to some assumptions and limitations.

Control Variables – Company Size, Leverage, Profitability and Age

For the research question 2 as stated in Section 1.6, the dependent variable is the price-book value ratio (company value) and there are four control variables, namely the company size, leverage, profitability and age. A t-test is applied for each coefficient of the four control variables to determine whether there is evidence to infer any relationship between them.

Company Size

A t-test is conducted for the coefficient of the company size to determine whether there is evidence to infer any relationship between the company size and the price-book value ratio.

The null and alternative hypotheses are:
H_0: $\beta_2 = 0$
H_A: $\beta_2 \neq 0$

Decision criteria:
Reject H_0: If the probability value is less than 0.05
Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.7, the probability value is 0.8935 showing that it is not statistically significant. Therefore, the null hypothesis is accepted. That is, there is no evidence to infer that the company size is statistically significant and related to the price-book value ratio.

Leverage

A t-test is conducted for the coefficient of the leverage to determine whether there is evidence to infer any relationship between the leverage and the price-book value ratio.

The null and alternative hypotheses are:
H_0: $\beta_3 = 0$
H_A: $\beta_3 \neq 0$

Decision criteria:
Reject H_0: If the probability value is less than 0.05
Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.7, the probability value is 0.0000 showing that it is statistically significant. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, there is evidence to infer that the leverage is statistically significant and related to the

price-book value ratio. In addition, the coefficient of the leverage is 3.154929 showing that the leverage and the price-book value ratio is positively related.

Based on the statistical results, there is evidence to infer that the leverage is statistically significant and positively related the price-book value ratio. The results suggest that a listed company with a higher level of leverage, the higher is the price-book value ratio. The results are consistent with what we discussed in Section 5.3 that a higher leveraged listed company with a higher borrowing capacity should have proven a higher credibility in terms of credit rating as well as proven good business prospects in the long term which can generate more company value to stakeholders than the existing book value. As a result, a higher leveraged listed company may have a higher price-book value ratio.

Profitability

A t-test is conducted for the coefficient of the profitability to determine whether there is evidence to infer any relationship between the profitability and the price-book value ratio.

The null and alternative hypotheses are:
H_0: $\beta_4 = 0$
H_A: $\beta_4 \neq 0$

Decision criteria:
Reject H_0: If the probability value is less than 0.05
Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.7, the probability value is 0.0000 showing that it is statistically significant. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, there is evidence to infer that the profitability is statistically significant and related to the price-book value ratio. In addition, the coefficient of the profitability is -0.008672 showing that the profitability and the price-book value ratio is negatively related.

The results suggest that a listed company with a higher profitability, the lower is the price-book value ratio. As such, the results are inconsistent with what we discussed in Section 5.3 that a more profitable listed company should have a higher price-book value ratio. Nevertheless, it is

important to note that the coefficient of the profitability is -0.008672 which is too small to draw statistical inference that the profitability is negatively related to the price-book value ratio.

Age

A t-test is conducted for the coefficient of the age to determine whether there is evidence to infer any relationship between the age and the price-book value ratio.

The null and alternative hypotheses are:
H_0: $\beta_5 = 0$
H_A: $\beta_5 \neq 0$

Decision criteria:
Reject H_0: If the probability value is less than 0.05
Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.7, the probability value is 0.9761 showing that it is not statistically significant. Therefore, the null hypothesis is accepted. That is, there is no evidence to infer that the age is statistically significant and related to the price-book value ratio.

7.3.3 For Research Question 3

The statistical results of the random effects panel regression model as shown in the above Table 7.13 are as follows:

$$Y = 110.5227 - 0.166009X_1 - 3.034323X_2 + 1.731880X_3 + 0.000351X_4 - 2.766212X_5 + \varepsilon$$

Y= Annualised share price volatility

β = Coefficient
X_1 = S&P Global ESG Score
X_2 = Company size
X_3 = Leverage
X_4 = Profitability
X_5 = Age

ε = error variable (consisting of individual effects of unobserved independent variables and idiosyncratic error)

This section is to analyse and discuss the statistical results of the random effects panel regression model. The research question 3 as stated in Section 1.6 is to investigate whether ESG performance affects the investment risk of listed companies in Hong Kong and the hypothesis 3 as stated in Section 1.6 is to investigate whether the S&P Global ESG Score is negatively related the annual share price volatility. A t-test is applied for each coefficient of independent variable (including control variables) to determine whether there is evidence to infer any relationship between each them

Independent Variable - S&P Global ESG Score

For the research question 3 as stated in Section 1.6, the dependent variable is the investment risk which is measured in the annual share price volatility and the independent variable is the S&P Global ESG Score. A t-test is applied for the coefficient of the S&P Global ESG Score to determine whether there is evidence to infer any relationship between the S&P Global ESG Score and the annual share price volatility.

The null and alternative hypotheses are:
H_0: $\beta_1 = 0$
H_A: $\beta_1 \neq 0$

Decision criteria:
Reject H_0: If the probability value is less than 0.05
Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.13, the probability value is 0.0001 showing that it is statistically significant. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, there is evidence to infer that the S&P Global ESG Score is statistically significant and related to the annual share price volatility keeping the effects of other control variables to be constant. In addition, as shown in the above Table 7.13, the coefficient of the S&P Global ESG Score is -0.166009 showing that the S&P Global ESG Score is negatively related to the annual share price volatility. Consequently, the results support that the hypothesis 3 as stated in

Section 1.6 should be accepted. That is, the S&P Global ESG Score is negatively related to the annual share price volatility. The results suggest that a listed company with a higher/lower S&P Global ESG Score would have a lower/higher annualised share price volatility.

To address the research question 3 as stated in Section 1.6, the results shows that ESG performance affects the investment risk of listed companies in Hong Kong. The results suggest that a listed company with a better ESG performance, the lower is the investment risk. The results support the stakeholder theory view that having good ESG performance would benefit the stakeholders of companies in terms of a lower investment risk which is measured in the annualised share price volatility in this study.

When interpretating and analysing the statistical results, it is also important to note that there may be a problem of endogeneity caused by unobserved heterogeneity. The unobserved dependency of other independent variable(s) is called unobserved heterogeneity and the correlation between the independent variable(s) and the unobserved independent variable(s) in the error term is called endogeneity (Brugger, 2021). The problem of endogeneity occurs when there is a correlation between an independent variable and the unobserved independent variable(s) in the error term. It presents a challenge of obtaining an unbiased coefficient β and investigation of a causal relationship (Love, 2011). This study does not suggest that a listed company with a higher S&P Global ESG Score has caused a lower annual share price volatility. Instead, the results primarily suggest that there is statistically significant negative correlation between the S&P Global ESG Score and the annual share price volatility. That is, a listed company with a higher/lower S&P Global ESG Score would have a lower/higher annualised share price volatility. The statistically significant negative correlation indicates the tendencies present in the data but there is no evidence to imply a causation effect (Berenson, et al., 2009). It is important to interpret and analyse the statistical results with caution which are subject to some assumptions and limitations.

Control Variables - Company Size, Leverage, Profitability and Age

For the research question 3 as stated in Section 1.6, the dependent variable is the annual share price volatility and there are four control variables, namely the company size, leverage, profitability and age. A t-test is applied for each coefficient of the company size, leverage,

profitability and age to determine whether there is evidence to infer any relationship between them.

Company Size

A t-test is conducted for the coefficient of the company size to determine whether there is evidence to infer any relationship between the company size and the annual share price volatility.

The null and alternative hypotheses are:
H_0: $\beta_2 = 0$
H_A: $\beta_2 \neq 0$

Decision criteria:
Reject H_0: If the probability value is less than 0.05
Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.13, the probability value is 0.0000 showing that it is statistically significant. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, there is evidence to infer that the company size is statistically significant and related to the annual share price volatility. In addition, the coefficient of the company size is -3.034323 showing that the company size and the annual share price volatility is negatively related.

The results suggest that the larger the company size, the lower is the annualised share price volatility. The results are consistent with what we discussed in Section 5.4 that larger listed companies can get access more resources which enable them to run their business to be more financial stable and less risky compared to small listed companies even in the tough and unexpectedly difficult and challenging business environment other than their own particular individual company risk (Downes & Russ, 2005).

Leverage

A t-test is conducted for the coefficient of the leverage to determine whether there is evidence to infer any relationship between the leverage and the annual share price volatility.

The null and alternative hypotheses are:

H_0: $\beta_3 = 0$

H_A: $\beta_3 \neq 0$

Decision criteria:

Reject H_0: If the probability value is less than 0.05

Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.13, the probability value is 0.6749 showing that it is not statistically significant. Therefore, the null hypothesis is accepted. That is, there is no evidence to infer that the leverage is statistically significant and related to the annual share price volatility.

Profitability

A t-test is conducted for the coefficient of the profitability to determine whether there is evidence to infer any relationship between the profitability and the annual share price volatility .

The null and alternative hypotheses are:

H_0: $\beta_4 = 0$

H_A: $\beta_4 \neq 0$

Decision criteria:

Reject H_0: If the probability value is less than 0.05

Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.13, the probability value is 0.9853 showing that it is not statistically significant. Therefore, the null hypothesis is accepted. That is, there is no evidence to infer that the profitability is statistically significant and related to the annual share price volatility.

Age

A t-test is conducted for the coefficient of the age to determine whether there is evidence to infer any relationship between the age and the annual share price volatility.

The null and alternative hypotheses are:

H_0: $\beta_5 = 0$

H_A: $\beta_5 \neq 0$

Decision criteria:

Reject H_0: If the probability value is less than 0.05

Accept H_0: If the probability value is greater than 0.05

As shown in the above Table 7.13, the probability value is 0.0010 showing that it is statistically significant. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. That is, there is evidence to infer that the age is statistically significant and related to annual share price volatility. In addition, the coefficient of the age is -2.766212 showing that the age and the annual share price volatility is negatively related. The results also suggest that a listed company with a longer period of listing, the lower is the annual share price volatility. The results are consistent with what we discussed in Section 5.4 that a listed company with a longer period of listing is likely to build up a company reputation and better relationships with different stakeholders so that more investors are more confident to invest in those listed companies with a lower annual share price volatility.

7.4 Chapter Summary

This chapter has conducted some inferential statistical tests on panel regression models to order to determine which model is the most appropriate one for each research question in this study.

In relation to the board attributes affecting ESG performance, the fixed effects panel regression model is chosen to be the most appropriate model to achieve the research aim 1 and research objective 1 as stated in Section 1.5 as well as to answer the research question 1 and to test the hypotheses 1A, 1B and 1C as stated in Section 1.6. Thereafter, this chapter has discussed and analysed the inferential statistical results. The results show that hypotheses 1A and 1B as stated in Section 1.6 are rejected and suggest that there is no statistically significant correlation between the board size or proportion of independent non-executive directors and the S&P Global ESG Score after taking the effects of other control variables to be constant. However, the results show that hypothesis 1C as stated in Section 1.6 is accepted and suggest that there is a statistically significant positive correlation between the separation of the roles of chairman

and chief executive officer and the S&P Global ESG Score and after taking the effects of other control variables to be constant. In other words, the results suggest that the separation of the roles of chairman and chief executive office affects ESG performance of listed companies in Hong Kong. In addition, the results also suggest that there are statistically significant correlations between each of the three control variables, namely the company size, leverage and age and the S&P Global ESG Score.

In relation to ESG performance affecting the company value, the fixed effects panel regression model is chosen to be the most appropriate model to achieve the research aim 2 and research objective 2 as stated in Section 1.5 as well as to answer the research question 2 and to test the hypothesis 2 as stated in Section 1.6. Thereafter, this chapter has discussed and analysed the inferential statistical results. The results show that hypothesis 2 as stated in Section 1.6 is rejected and suggest that there is no statistically significant correlation between ESG performance and the company value after taking the effects of other control variables to be constant. In other words, the results suggest that ESG performance does not affect the company value of listed companies in Hong Kong. However, the results suggest that two control variables, namely the leverage and profitability (although the coefficient of the profitability is small) have statistically significant correlations with the company value.

In relation to ESG performance affecting the investment risk, the random effects panel regression model is chosen to be the most appropriate model to achieve the research aim 2 and research objective 3 as stated in Section 1.5 as well as to answer the research question 3 and to test the hypothesis 3 as stated in Section 1.6. Thereafter, this chapter has discussed and analysed the inferential statistical results. The results show that hypothesis 3 as stated in Section 1.6 is accepted and suggest that there is statistically significant correlation between ESG performance and the investment risk after taking the effects of other control variables to be constant. In other words, the results suggest that ESG performance affects investment risk negatively of listed companies in Hong Kong. However, the results suggest that two control variables, namely the company size and age have statistically significant correlations with the investment risk.

The next chapter will present the key findings and implications of this study, draw conclusions, make recommendations, identify research limitations of this study as well as future research opportunities.

Chapter 8: Research Findings and Conclusions

8.1 Introduction

This chapter discusses the key findings and implications of this study related and compared to the findings in prior extant research results particularly exploring the results of this study whether they are aligning or diverging from existing scholarly works as stated in the literature review. In addition, the chapter provides in-depth discussions on the results of this study related to Stakeholder Theory which is the theoretical framework of this study. More importantly, this chapter also provides the practical and managerial implications of the results of this study and applies the research study results to actions in the real business world. Last but not the least, this chapter draws conclusions, makes recommendations, identifies research limitations of this study as well as future research opportunities.

8.2 Key Findings and Implications

Based on the results analyses and discussions in previous chapters, this section summarises the key findings for the research questions 1, 2 and 3 and the hypotheses 1A, 1B, 1C, 2 and 3 as stated in Section 1.6.

8.2.1 Research Question 1 and Hypotheses 1A, 1B and 1C

To answer the research question 1 and test the hypotheses 1A, 1B and 1C as stated in Section 1.6, some empirical studies and tests have been conducted in Chapter 7. Descriptive and inferential statistical results, discussions and analyses are summarised as follows.

<u>Descriptive statistical results and implications</u>

For the dependent variable of the S&P Global ESG Score for the years of 2020 and 2021, it has been found that there was an increasing trend over time reflecting that listed companies improved ESG performance over the period.

For the three independent variables of the board size, proportion of independent non-executive directors and separation of the roles of chairman and chief executive officer for the years of

2020 and 2021, it has been found that all three independent variables were very stable reflecting that there was no significant change in the board attributes over the period.

For the four control variables for the years of 2020 and 2021, it has been found that except for the profitability with significant changes reflecting fluctuations during the peak period of the COVID-19 pandemic, all other three control variables, namely the company size, leverage and age were very stable over the period.

Inferential statistical results and implications

For the hypotheses 1A as stated in Section 1.6, there is no evidence to infer that the board size is statistically significant and positively related to S&P Global ESG Score keeping the effects of other control variables to be constant. As such, the hypothesis 1A is rejected as discussed in Chapter 7.

As discussed in Chapter 3, some prior literature finds that the board size is positively related to the company and ESG performance (Goodstein, et al., 1994; Kiel & Nicholson, 2003; Birindelli, et al., 2018; Husted & de Sousa-Filho, 2019) whereas some other literature finds that the board size is negatively related to the company and ESG performance (Yermack, 1996; Eisenberg, et al., 1998; Kholeif, 2009). The mixed results have not found conclusive consensus among researchers regarding the board size and ESG performance. However, the results of this study in the context of listed companies in Hong Kong do not support the overseas extant research results and show that the board size is not positively related to ESG performance.

Stakeholder Theory as discussed in Chapter 3 argues that directors would build up a good image and reputation of a socially responsible company so as to improve relationships with different stakeholder groups. However, the results of this study do not support the arguments of Stakeholder Theory and show that an increase of the board size is not positively related to ESG performance which is expectedly to be improved from time to time by different stakeholders.

The practical and managerial implication of the findings of this study is the board size does not matter at all in respect of ESG performance given that the benefits of a large board size with more directors with diverse backgrounds, skills and knowledge and experience may be traded

off and offset by the costs of decreasing board effectiveness resulting from lacking of coordination, communications, cohesiveness and consents among different directors. As such, a company should not focus on the board size to increase board effectiveness for the purposes of improving ESG performance.

For the hypotheses 1B as stated in Section 1.6, there is no evidence to infer that the proportion of independent non-executive directors is statistically significant and positively related to the S&P Global ESG Score keeping the effects of other control variables to be constant. As such, the hypothesis 1B is rejected as discussed in Chapter 7.

As discussed in Chapter 3, some prior literature finds that the proportion of independent non-executive directors is positively related to the company performance (Raheja, 2005; Gordini, 2012; Husted & de Sousa-Filho, 2019; Arayssi, et al., 2020). On the other hand, some prior literature finds that there is no relationship between the proportion of independent non-executive directors and the company performance (Hermalin & Weisbach, 1991; Bhagat & Black, 2002; Bozec, 2005; Srivastav & Singh, 2012). The mixed results have not found conclusive consensus among researchers regarding the proportion of independent non-executive directors and ESG performance. The results of this study in the context of listed company in Hong Kong support some prior research results that the proportion of independent non-executive directors is not positively related to ESG performance.

Stakeholder Theory as discussed in Chapter 3 argues that directors would build up a good image and reputation of a socially responsible company so as to improve relationships with different stakeholder groups. However, the results of this study do not support the arguments of Stakeholder Theory and show that an increase in the proportion of independent non-executive directors is not positively related to ESG performance which is expectedly to be improved from time to time by different stakeholders.

The practical and managerial implication of the findings of this study is that an increase of the proportion of independent non-executive directors does not enhance ESG performance which may be due to their limited access to the ESG information as well as not familiar with the day-to-day operations of the company.

For the hypothesis 1C as stated in Section 1.6, there is evidence to infer that the separation of the roles of chairman and chief executive officer is statistically significant and positively related to the S&P Global ESG score keeping the effects of other control variables to be constant. As such, the hypothesis 1C is accepted as discussed in Chapter 7.

Some prior literature finds that the board independence in terms of the separation of chairman and chief executive officer enhances the effectiveness of the board's function of check and balance and avoiding conflicts of interest and ultimately improve the company performance (Brickley, et al., 1997; Lipton, et al., 2019; Mallin, 2019; Husted & de Sousa-Filho, 2019; Arayssi, et al., 2020). The results of this study in the context of listed companies in Hong Kong support such prior research results and show that the avoidance of duality of chairman and chief executive officer would enhance ESG performance because the separation of the two roles would enhance board independence and effectiveness. to meet the expectations of various stakeholders.

Stakeholder Theory as discussed in Chapter 3 argues that directors would build up a good image and reputation of a socially responsible company so as to improve relationships with different stakeholder groups. The results of this study support the arguments of Stakeholder Theory and show that the independence of chairman by avoiding the duality of chairman and chief executive officer is positively related to ESG performance which is expectedly to be improved from time to time by different stakeholders.

The practical and managerial implication of the findings of this study is that the separation of the roles of chairman and chief executive officer enhances ESG performance which may be due to better assess and monitor the ESG performance of management to ensure the strategies to have been formulated and implemented by chief executive officer achieving the long-term ESG visions and missions of the company. As such, it is so important for a company to separate the roles of chairman and chief executive officer.

For the four control variables, the results suggest that the company size and age are statistically significant and positively related to the Global ESG Score but the leverage is statistically significant negatively related to the S&P Global ESG Score. However, there is no evidence to infer that the profitability is statistically significant and related to the S&P Global ESG Score.

To address the research question 1 as stated in Section 1.6, because the hypothesis 1C is accepted, the results suggest that the board attribute in terms of the separation of the roles of chairman and chief executive officer affects ESG performance of listed companies in Hong Kong. However, as the hypotheses 1A and 1B are rejected, the results do not suggest that the board attributes in board size and proportion of independent non-executive directors affect ESG performance of listed companies in Hong Kong. In addition, the results also suggest that some company characteristics, namely the company size and age affect positively but the leverage affects negatively ESG performance of listed companies in Hong Kong.

8.2.2 Research Question 2 and Hypothesis 2

To answer the research question 2 and test the hypothesis 2 as stated in Section 1.6, some empirical studies and tests have been conducted as stated in Chapter 7. Descriptive and inferential statistical results, discussions and analyses are summarised as follows.

<u>Descriptive statistical results and implications</u>

For the dependent variable of the price-book value ratio for the years of 2020 and 2021, it has been found that the price-book value ratios with significant changes over the period reflecting that listed companies with fluctuations in the market price during the peak period of the COVID-19 pandemic.

For the independent variable of the S&P Global ESG Score for the years of 2020 and 2021, it has been found that there was an increasing trend over time reflecting that listed companies improved ESG performance over the period.

For the four control variables for the years of 2020 and 2021, it has been found that except for the profitability with significant changes reflecting fluctuations during the peak period of the COVID-19 pandemic, all other three control variables, namely the company size, leverage and age were very stable over the period.

Inferential statistical results and implications

For the hypothesis 2 as stated in Section 1.6, there is no evidence to infer that the S&P Global ESG Score is statistically significant and positively related to the price-book value ratio keeping the effects of other control variables to be constant. As such, the hypothesis 2 is rejected as discussed in Chapter 7.

As discussed in Chapter 3, some prior literature finds that ESG performance is positively related to the company value (Gregory & Whittaker, 2012; Reverte, 2012; Carnevale, et al., 2012; Velte, 2017; Yanagi & Michels-Kim, 2018; Fatemi, et al., 2018) whereas some other literature finds that ESG performance is negatively related to company value (Hassel, et al., 2005; Semenova, et al., 2009). The mixed results have not found conclusive consensus among researchers regarding ESG performance and the company value. However, the results of this study in the context of listed companies in Hong Kong do not support the prior research results and show that ESG performance is not positively related to the company value in terms of the price-book value ratio. The results are also contrary to our general belief that better ESG performance increases the company value.

The practical and managerial implication of the findings of this study is that ESG performance is not positively related to the company value. As such, it appears that it is not worthwhile for a company to use more resources to improve ESG performance for the purposes of increasing the company value. Nevertheless, it is important to note that the results are subject to two major limitations. Firstly, the company value in this study is measured in the price-book value ratio which is only one of the common financial ratios for measuring the company value. Secondly, ESG performance may increase the company in the long run but may not be reflected in the short run. Notwithstanding of the results of this study, a company should use more resources to improve ESG performance as reasonably expected by various stakeholders from time to time under Stakeholder Theory as discussed in Chapter 3.

For the four control variables, the results suggest that the leverage is statistically significant and positively related to the company value but the profitability is statistically significant and negatively related to the price-book value ratio. However, there is no evidence to infer that the company size and age is statistically significant and related to the price-book value ratio.

To address the research question 2 as stated in Section 1.6, because the hypothesis 2 is rejected, the results suggest that ESG performance does not affect the company value of listed companies in Hong Kong. However, the results suggest that some company characteristics, namely the leverage affects positively but the profitability affects negatively the company value of listed companies in Hong Kong.

8.2.3 Research Question 3 and Hypothesis 3

To answer the research question 3 and test the hypothesis 3 as stated in Section 1.6, some empirical studies and tests have been conducted as stated in Chapter 7. Descriptive and inferential statistical results, discussions and analyses are summarised as follows.

Descriptive statistical results and implications

For the dependent variable of the annual share price volatility for the years of 2020 and 2021, it has been found that it was very stable over time reflecting there was no significant change in the annual share price volatility over the period even though the share prices fluctuated with up and down a little bit over the period.

For the independent variable of the S&P Global ESG Score for the years of 2020 and 2021, it has been found that there was an increasing trend over time reflecting that listed companies improved ESG performance over the period.

For the four control variables for the years of 2020 and 2021, it has been found that except for the profitability with significant changes reflecting fluctuations during the peak period of the COVID-19 pandemic, all other three control variables, namely the company size, leverage and age were very stable over the period.

Inferential statistical results and implications

For the hypothesis 3 as stated in Section 1.6, there is evidence to infer that the S&P Global ESG Score is statistically significant and negatively related to the annual share price volatility keeping the effects of other control variables to be constant. As such, the hypothesis 3 is accepted as discussed in Chapter 7.

As discussed in Chapter 3, some prior literature finds that the level of non-financial information disclosures and the quality of reporting affects the investment risk negatively (Amir & Baruch, 1996; Trueman, et al., 2000; Rajgopal, et al., 2003; Lee & Shailer, 2008). The results of this study in the context of listed companies in Hong Kong support that ESG performance is negatively related to the investment risk in terms of annual share price volatility. Furthermore, the results also support Stakeholder Theory as stated in Chapter 3 arguing that management should provide information to meet the expectations of various stakeholders but not shareholders only. As such, better ESG performance meets the expectations of different stakeholders which is reflected as a lower investment risk from the financial perspective. The results support the stakeholder theory view that having good ESG performance would benefit the stakeholders of companies in terms of a lower investment risk which is measured in the annual share price volatility in this study.

The practical and managerial implication of the findings of this study is that ESG performance is negatively related to the investment risk. As such, it appears that it is worthwhile for a company to use more resources to improve ESG performance for the purposes of lowering the investment risk from the financial perspective. With a lower investment risk, a company can get the benefits of increasing borrowing capacity at a lower interest rate as well as a higher share price as more investors are willing to invest in the company in the long run.

For the four control variables, the results suggest that the company size and age are statistically significant and negatively related to the annual share price volatility. However, there is no evidence to infer that the leverage and profitability is statistically significant and related to the annual share price volatility.

To address the research question 3 as stated in Section 1.6, because the hypothesis 3 is accepted, the results suggest that ESG performance affects negatively the investment risk of listed companies in Hong Kong. In addition, the results also suggest that some company characteristics, namely the company size and age affect negatively the investment risk of listed companies in Hong Kong.

8.3 Conclusions

Given the importance of ESG reporting, this study has examined why the listed companies are willing to address ESG issues on a voluntary basis, evaluated the costs and benefits of ESG reporting as well as identified the contemporary challenges and issues in ESG reporting from the academic and professional points of view as discussed in Chapters 1 and 2.

Based on the new legal ESG regulatory framework in Hong Kong with effect from 1 July 2020 adopting a mandatory basis, a "comply or explain" basis and a voluntary basis, the study has reviewed four theories of ESG reporting providing different theoretical perspectives, discussions and arguments on why listed companies are willing to disclose ESG practices and information from time to time especially on a voluntary basis in addition to the legal requirements. The results of this study support the arguments and views of Stakeholder Theory for ESG reporting. Moreover, this study has also reviewed three theories of regulation of ESG reporting arguing that regulation is necessary and needed. The legal regulatory framework in Hong Kong adopting a mandatory basis and a "comply or explain" basis supports the arguments and views of those three theories of regulation of ESG reporting as discussed in Chapter 3.

This study has also conducted literature review of board attributes affecting ESG performance as the relationships between ESG performance and the company value and investment risk. Many academic investigations were conducted overseas. The study has identified the research gaps in these areas particularly in the context of listed companies in Hong Kong as discussed in Chapter 3.

This study has adopted quantitative research approach to investigate the effects of board attributes on ESG performance. In particular, this study has conducted academic research on the board effectiveness by developing some quantifiable measures based on three board attributes, namely the board size, proportion of independent non-executive directors and separation of the roles of chairman and chief executive officer. This study has explored the effects of board attributes on ESG performance by filling the research gap in literature in these areas in the context of listed companies in Hong Kong as discussed in Chapters 4, 5 6, 7 and 8.

This study has also adopted quantitative research approach. Some advances in the characterization of the emerging stakeholder approach to ESG reporting have been discussed.

This is achieved by analysing ESG performance by investigating the relationship between the quality of ESG reporting in terms of ESG performance and the company value as well as the relationship between the quality of ESG reporting in terms of ESG performance and the investment risk by filling the research gap in literature in these areas in the context of listed companies in Hong Kong as discussed in Chapters 4, 5, 6, 7 and 8.

Based on the above review of literature, results analyses and discussions of findings, it can be concluded that this study has achieved the two research aims as stated in Section 1.5 by investigating how the board effectiveness affects ESG reporting and what is the value of ESG reporting of listed companies in Hong Kong. Moreover, it can be concluded that this study has achieved the three research objectives as stated in Section 1.5 by investigating the effects of board attributes on the quality of ESG reporting in terms of ESG performance, the relationship between the quality of ESG reporting in terms of ESG performance and the company value aw well as the relationship between the quality of ESG reporting in terms of ESG performance and the investment risk of listed companies in Hong Kong.

In summary, the results analyses and discussions of findings of this study enhance the existing body of knowledge and understanding on the stakeholder approach to contemporary ESG issues particularly in the context of listed companies in Hong Kong. Such investigations are expected to provide constructive information for policy makers and regulatory bodies of Hong Kong to make improvements and changes to the existing ESG regulatory and reporting regime as well as practical insights for management of listed companies in Hong Kong.

8.4 Recommendations

A common challenge faced by listed companies is the lack of uniform ESG reporting framework and standards resulting in different listed companies have used different international standards, guidelines and metrics in their ESG reporting. As such, it is recommended that the regulatory bodies in Hong Kong should consider adopting the internationally well-accepted ESG reporting standards, such as IFRS S1 *General Requirements for Disclosure of Sustainability-related Financial Information* and IFRS 2 *Climate-related Disclosures* issued by ISSB, to become the ESG reporting standards in Hong Kong. Such recommended adoption is similar to the process of the adoption of International Financial Reporting Standards to become Hong Kong Financial Reporting Standards.

Presently, ESG reporting of listed companies is not subject to mandatory independent audit or assurance before releasing ESG information to the public at large in Hong Kong. It is argued that ESG reporting may not be meaningful for decision making in a sceptical marketplace without any kind of audit or assurance (Ravlic, 2022). As such, it is recommended that the regulatory bodies in Hong Kong should consider amending the relevant regulation to require independent audit or assurance to be mandatory for ESG reporting similar to the requirements of financial reports to be audited by auditors.

This study has found that ESG performance is positively related to the separation of the roles of chairman and chief executive officer. Listed companies should consider to separate the two roles. As such, it is recommended that Code Provision C.2.1 of Appendix 14 to the Listing Rules should be amended to require the separation of the roles of chairman and chief executive officer to be mandatory instead of on an existing "comply or explain" basis.

This study has found that the board independence influences the board effectiveness which may ultimately affect ESG performance. In order to increase the board independence, listed companies should consider increasing the number and proportion of independent non-executive directors. As such, it is recommended that Listing Rule 3.10 should be amended to require a listed company in Hong Kong to increase the existing minimum number of three independent non-executive directors to five. In addition, it is also recommended that Listing Rule 3.10A should be amended to require a listed company in Hong Kong to appoint independent non-executive directors representing at least 50% instead of the existing one-third of the board.

Directors of listed companies play a pivotal role in ESG reporting. Given the complex and rapid changes in ESG issues and practices, it appears that directors must possess the knowledge, skills and experience in relation to ESG reporting. Directors should take some continuing professional development courses in ESG reporting on a regular basis. As such, it is recommended that the Listing Rules should be amended to require directors of listed companies to take a minimum number of 20 hours of continuing professional development courses every financial year in order to build up and increase their knowledge and skills as well as to keep them updated on ESG issues. Moreover, directors have also to ensure that the listed company has employed sufficient professional staff with the requisite knowledge, skills and experience to handle ESG reporting effectively and efficiently.

8.5 Research Limitations

This research is an exploratory study using a quantitative approach and subject to the following limitations.

(1) Owing to the scope of this study, the results have been based on the sample size of 211 listed companies for each of the financial years ended 2020 and 2021 under the HSCI which are basically large listed companies with different capital base, risk profiles, history, business activities and management and personnel arrangements. This study has not considered small to medium sized listed companies.

(2) This study has included three board attributes, namely the board size, proportion of independent non-executive directors and separation of the roles of chairman and chief executive officer to be the determinants of the board effectiveness for analysis. However, some other board structure and composition attributes such as the education level, skills and experience of directors may also affect board effectiveness which may ultimately affect ESG performance.

(3) This study has investigated the relationship between the quality of ESG reporting in terms of ESG performance and company value. The company value can be measured in many different accounting variables. Owing to the scope of this study, the company value is measured in terms of the price-book value ratio.

(4) This study has investigated the relationship between the quality of ESG reporting in terms of ESG performance and investment risk. The investment risk can be measured in many different financial measures. Owing to the scope of this study, the investment risk is measured in terms of the annual share price volatility.

8.6 Future Research

The sample listed companies chosen from the HSCI in this study were large listed companies based on different industry sectors in Hong Kong. Listed companies with different sizes may have different considerations on ESG reporting as well as its relationships with the company value and investment risk. There is a scope for further research by choosing small to medium

sized listed companies from Hang Seng Composite Size Indexes such as SmallCap Index, MidCap and SmallCap Index, and MidCap Index in the future.

This study has investigated the effects of board attributes on ESG performance using the quantitative research approach to analyse the publicly available information. However, the question as to how directors deal with ESG reporting is behavioural in nature and hence it may also be appropriately investigated the issues using the qualitative research approach in addition to the quantitative research approach. Therefore, there is a scope of further research by enquiring directors how to deal with ESG reporting coping with the expectations of various stakeholders from time to time and the reasons and rationale behind for using resources to do so especially for those ESG practices and reporting on a "comply or explain" basis or a voluntary basis.

In this study, it has been found that ESG performance does not affect the company value. However, the price-book value ratio is one of the accounting measures of the company value. The company value can be measured in many different accounting variables such as the price/earnings ratio. As such, further research can be conducted to investigate whether ESG performance affects the company value of listed companies in Hong Kong if the company value is defined in other company value measurement.

In this study, it has been found that ESG performance affects the investment risk. In fact, the investment risk consists of many different of risks including but not limited to systematic and unsystematic risks as well as market and political risks. The annual share price volatility is only one of the common measurements for the investment risk. As such, further research can be conducted to investigate whether ESG performance affects the investment risk of listed companies in Hong Kong if the investment risk is defined in other investment risk measurement.

8.7 Chapter Summary

This chapter has discussed the key findings and implications of this study related and compared to the findings in prior extant research results and also provided in-depth discussions on the results of this study related to Stakeholder Theory. In addition, this chapter has provided the practical and managerial implications of the results of this study and applied the research study

results to actions in the real business world. Finally, this chapter has drawn conclusions, made recommendations, identified research limitations as well as future research opportunities.

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