CORPORATE ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) PERFORMANCE DISCLOSURE AND COMPANY'S CAPITAL COST, IDIOSYNCRATIC RISK AND MARKET VALUE

A Thesis submitted by

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ABSTRACT

Purpose: This study investigates the impact of corporate environmental, social and governance (ESG) performance disclosure on the company's capital costs, idiosyncratic risk and market value. Further, this study investigates the economic implications of corporate greenhouse gas emissions (GHG) on the company's idiosyncratic risk and capital costs. The Investigation for these relationships has been conducted through undertaking three individual studies. The findings are reported in three articles, which form the basis of chapters 3, 4, and 5 of this PhD by publication.

Design/Methodology: Employing an extensive Australian sample for the 2007–2017 period from the Bloomberg database, this study conducts a panel (data) regression analysis longitudinally to examine the above associations. The results of this study are consistent after performing sensitivity and robustness checks, including alternative assumptions and model specifications. Following previous literature, this study uses the simultaneous equation model to test the robustness of findings. This model provides an appropriate alternative for the corporate ESG performance disclosure to evaluate the associations. This study also controls the potential endogeneity issue of the primary model. This study follows prior literature and utilises an instrumental variable (IV) approach to re-examine the main estimation models to address the potential endogeneity issues. This study rigorously addresses the methodological, sample selection, endogeneity, and causality issues of corporate ESG performance disclosure and provides unbiased results with clear implications and future research directions.

Findings: The first study provides evidence of a favourable association between a higher corporate ESG performance disclosure and a cheaper cost of capital (COC). Additionally, the evidence supports the mitigating impact of corporate ESG performance disclosure on the company's idiosyncratic risk as a strong complement for access to a cheaper source of funds. The second study's findings show a tangible improvement in Australian corporate ESG performance disclosure, which is associated favourably with their financial performance (measured by market value). The second study also shows that while the corporate ESG performance disclosure improvements are linked to higher financial performance, this relationship is heterogeneous across industries. Lastly, the third study provides evidence of a positive association between the corporate carbon emissions performance disclosure and the company's idiosyncratic risk and COC, indicating that the capital market is pricing corporate carbon emissions and penalising polluting companies.

Implications: The findings of this thesis extend the current body of knowledge addressing these associations. While pressure by stakeholders to address ESG concerns is substantial, the improvement in corporate ESG performance disclosure should enhance the company's financial performance. The results encourage companies to strategically manage their carbon emissions performance level or consider an emissions reduction plan for risk management purposes and the associated costs. Corporate exposure to carbon emissions differs depending on managing the associated risks, which eventually impact the capital cost. The findings show that the capital market applies higher interest rates due to future uncertainty related to carbon emissions and their implication for companies. This study's findings propose a robust argument for the appropriateness of mandatory and standard disclosure of corporate carbon emissions performance, which could improve market efficiency and better resource allocation in the economy.

Originality/ value: An extensive literature review suggests that this study is the first that simultaneously evaluates the impact of corporate ESG performance disclosure on a company's COC and idiosyncratic risk. Additionally, it appears that no published research has holistically examined the improvement in the company's ESG performance disclosure and potential variations in the relationship between corporate ESG performance disclosure and financial performance across industries.

Keywords: environmental, social and governance (ESG), cost of capital (WACC), idiosyncratic risk, Corporate carbon emissions performance disclosure, Emissions intensity.

CERTIFICATION OF THESIS

This thesis is the work of Amir Gholami except where otherwise acknowledged, with the majority of the authorship of the papers presented as a Thesis by Publication undertaken by Amir Gholami. The work is original and has not previously been submitted for any other award, except where acknowledged.

Principal Supervisor: Professor John Sands

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Student and supervisory signatures of endorsement are held at the University.

STATEMENT OF CONTRIBUTION

The following details are the agreed share of contributions for the candidate and co-authors in the presented publication in this thesis:

1. GHOLAMI, A., SANDS, J. & SHAMS, S. 2020. Corporates' sustainability disclosures impact on cost of capital and idiosyncratic risk. *Meditari Accountancy Research*. ***(Published)***

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The overall contribution of Amir Gholami is 85% to the theoretical development, analysis and revising of the final submission. Professor John Sands and Dr Syed Shams contribute to the remaining 15% of the study's theoretical development, structure, analysis, editing and providing substantial feedback by 10% and 5%, respectively.

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"*We only see clearly with heart, and the most important things are invisible to the eyes*".

Matt Brett, La Torbe university

We measure, calculate and count what we can see, often to the neglect of some invisible essential points. Higher education and universities recommend the promise of civilising humankind by following the truth. Nurturing this critical idea of the university is fundamentally essential.

Throughout completing my PhD thesis, I have received a great deal of support and assistance.

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ABBREVIATIONS

ESG	Environmental, Social and Governance
CSR	Corporate Social Responsibility
GHG	Greenhouse Gas Emissions
PRI	Principles for Responsible Investment
ASX	Australian Securities Exchange
ASIC	Australian Securities and Investments Commission
CGC	Corporate Governance Council
NGER	National Greenhouse and Energy Reporting
NPI	National Pollutant Inventory
MSCI	Morgan Stanley Capital International
UNEPFI	United Nation Environment Program Finance Initiative
SSE	Sustainable Stock Exchanges
GFC	Global Financial Crisis
IR	Integrated Reporting
UN	United Nations
COC	Cost of Capital
COE	Cost of Equity
COD	Cost of Debt
WACC	Weighted Average Cost of Capital
LNTA	The Natural Logarithm of Total Assets
PPE	Property, Plant and Equipment
CAPEX	Capital expenditure
EVA	Economic Value Added

1. CHAPTER ONE: INTRODUCTION

1.1. Research Motivations and Significance

"Sustainable development involves the simultaneous pursuit of economic prosperity, environmental quality, and social equity. Companies aiming for sustainability need to perform not against a single financial bottom line, but against the triple bottom line" (Elkington, 2002).

Over the past decade, sustainability in business has attracted an increasing focus, resulting in a considerable debate regarding corporate environmental, social and governance (ESG)[1] performance and corporate social responsibility (CSR)[2] disclosure by Australian companies. Through the United Nations (UN) Sustainable Stock Exchanges (SSE)[3] initiative (SUSTAINABLE STOCK EXCHANGES (SSE), 2015), corporations are expected to work with stock exchanges so that, by 2030, they will be able to disclose their impact on ESG practices.

The recent rise of corporate ESG performance has motivated researchers to investigate whether corporate ESG performance disclosure leads to value creation. The extant research has investigated the association between corporate ESG performance and operational, financial and equity market performance but reports inconclusive answers (Margolis et al., 2009, Jiao, 2010). Additionally, only a few research investigate the capital market perception of corporate ESG performance disclosure (Sharfman and Fernando, 2008, El Ghoul et al., 2011, de Klerk and de Villiers, 2012, de Klerk et al., 2015). The inconsistencies in findings and the paucity of research that directly examines how corporate ESG performance disclosure impact a company's cost of capital (COC) motivate investigating this association. Therefore, this study seeks to answer whether the debt and equity markets consider the corporate ESG performance disclosure. This study seeks to extend the understanding of the economic implications of corporate ESG

[1] Environmental, social and governance (ESG) information is the non-financial information that needs to be taken into consideration for investment decision making (MSCI, 2018)

[2] Corporate social responsibility (CSR) disclosure mainly includes non-financial information regarding a firm's social, environmental and corporate governance impacts (de Klerk et al., 2015).

[3] The Sustainable Stock Exchanges (SSE) initiative was launched by the UN Secretary General in 2009 in New York. It is a platform for investigating how markets, in cooperation with companies, investors and regulators, could improve corporate transparency and performance on environmental, social and corporate governance (ESG) concerns and promote sustainability. The SSE is structured by the UN Global Compact, the UN Conference on Trade and Development (UNCTAD), the UN Environment Programme Finance Initiative (UNEP FI), and the Principles for Responsible Investment (PRI).

performance disclosure and responds to the call for further investigation in prior literature (Kempf and Osthoff, 2007, Sharfman and Fernando, 2008). This study refers to the corporate disclosure strategies and the markets imperfection concept that may impact a company's COC and idiosyncratic risk. This study reviews prior research and articulates that a better corporate ESG performance disclosure has a range of outcomes. First, it results in mutual trust and a more efficient social contracting with stakeholders (Jones, 1995). If corporate ESG performance disclosure impacts the perceived riskiness of a company, then better ESG performance disclosure should result in lower COC. Second, companies with better ESG performance provide more disclosure, showing better transparency and compliance with regulations (Dhaliwal et al., 2011). This reduces the information asymmetry issues (Botosan, 1997, Hail and Leuz, 2006), leading to a lower COC (Hubbard, 1998, El Ghoul et al., 2011, Cheng et al., 2014). Third, the COC represents the rate of return required by the equity or debt market and thus is an essential input in a company's long term decision making. Investigating the impact of corporate ESG performance disclosure on the company's financing cost should help the company's directors in strategic planning. Indeed, the COC can be a tool that both equity and debt markets encourage companies to be more socially responsible (Heinkel et al., 2001, El Ghoul et al., 2011). A review study by Renneboog et al. (2008) revealed that the recent literature is yet to address whether the capital market price is associated with corporate ESG performance. This is in addition to the previous requests for studies to evaluate the impact of corporate ESG performance disclosure on the cost of capital (COC)[4], which has yet to be investigated (Sharfman and Fernando, 2008, Kempf and Osthoff, 2007).

The cost of capital (COC) is one of the main factors in a company's long-term investment decision making. Therefore, investigating the relationship between corporate ESG performance disclosure and the COC helps decision-makers to understand the economic implications of corporate ESG performance disclosure and a company's long-term decision

[4] Since most publicly listed companies usually finance themselves with a combination of debt capital and equity capital, the compsny's overall cost of financing is a more reliable figures of the cost of capital (COC). This means an average rate that combine the cost of capital (COE) and cost of debt capital (COD) which named weighed average cost of capital (WACC). This study will use WACC (which is named in this study COC) as a measure of the company's financial or debt risk. WACC will be applied in this study to address both cost of equity capital (COE) and cost of debt capital (COD) as the combine financial risk of a company. The COE is the required rate of return after considering a company's associated risks by the market. In other words, it is the discounted rate used by market for measuring a company's present market value according to the company's future cash flows. The cost of debt (COD) could be incurred by the financing through public resources such as the debt market, it could be also funded through private institutions such as financial institutes or banks. No matter which way the company choose its financing option, both sectors imply interest cost (Sharfman and Fernando, 2008).

making. Heinkel et al. (2001) recommended the COC as a signal through which the market could persuade corporations toward sustainability in business.

The extended focus of the current study is motivated by prior studies' findings that corporate ESG performance disclosure impacts a company's idiosyncratic risk through better social contracting with stakeholders (McGuire et al., 1988, Dhaliwal et al., 2014a, Becchetti et al., 2015a). Idiosyncratic risk accounts for most of the fluctuation in a company's valuation (Bansal and Clelland, 2004). Financial resource providers allocate a lower cost of financing for companies with lower risk (Merton, 1987). Chatterjee et al. (1999) state that corporate activities that lower idiosyncratic risk would enable companies to access cheaper financial resources. Previous studies mainly focused on the operating performance results of corporate ESG performance disclosure. Little studies exist on whether corporate engagement in ESG activities can reduce idiosyncratic risk (Sharfman and Fernando, 2008, Luo and Bhattacharya, 2009, Jo and Na, 2012). This study argues that a good corporate strategy, including ESG disclosure, can contribute to a solid relationship with stakeholders improve information asymmetry, thus lowering idiosyncratic risk. Nowadays, the increased corporate ESG performance disclosure level is also the result of increasing demands from ethical stakeholders and investors (Chow et al., 2014). Jackson and Apostolakou (2010) explain that corporate ESG performance disclosure is considered a strategic accountability response to stakeholders' demands. Disclosing more information to stakeholders will reduce financial risks for companies. According to the financial risks measurement from portfolio theory, the link between corporate ESG performance disclosure and financial risks is affected by systematic and idiosyncratic risks. Systematic risk is related to market movement or common risk factors, while the idiosyncratic risk is affiliated with company-individual strategies, including ESG performance. The idiosyncratic risk impedes market efficiency by intimidating arbitrage activity (Duan et al., 2010). Previous studies do not provide clear evidence of an association between corporate ESG performance disclosure and idiosyncratic risk. While some studies show that corporate ESG performance decreases idiosyncratic risk (Hsu and Chen, 2015, Bouslah et al., 2013, Mishra and Modi, 2013, Lee and Faff, 2009, Jo and Na, 2012), other studies evidenced no positive relationship (Kim, 2010, Humphrey et al., 2012). Therefore, this study also proposes to examine the impact of corporate ESG performance disclosure engagement on idiosyncratic risk for all Australian listed companies.

Based on the theoretical argument of Friedman (2007), due to the costs associated with ESG related activities, there would be a negative impact on the corporate financial

performance. On the other hand, based on the stakeholder theory (Freeman, 1984), the relationship between corporate ESG performance disclosure and financial performance must be positive and beneficial to companies due to the better relationship with stakeholders, increased opportunities in the markets and reduced transaction costs (Fombrun et al., 2000, Jones, 1995). The extensive empirical studies on the association yield unclear results. It is not clear whether there is a positive, negative or no association between corporate ESG performance disclosure and financial performance (Brooks and Oikonomou, 2018). While some studies documented a positive association (Margolis et al., 2009, Harjoto and Jo, 2015, Kumar and Firoz, 2022), others reveal a non or negative relationship (Hassel et al., 2005, Clacher and Hagendorff, 2012). This has led to a recent call for further studies to consider confounding elements that can potentially present causality and yield inconclusive findings (Aouadi and Marsat, 2018). This study does not aim to declare a winner position for this longstanding debate. Instead, this study argues that eighter positive or negative association could be correct due to the industrial characteristics. The stakeholders in different industries can impact the relationship. Therefore, there could be positive, negative or no associations. This study argues that the relationship requires more focus by corporate managers. They can choose to capitalise on ESG performance to increase financial benefit for their companies after considering their industrial characteristics and their stakeholder expectations (Barnett, 2007). Companies with lower stakeholder concerns on ESG related disclosure may not create positive economic benefits. The industrial characteristics in which the company is mainly involved can significantly influence ESG and financial performance (Barnett, 2007, Amato and Amato, 2012).

While it is not controversial to link poor corporate ESG performance to poor financial performance, it is more difficult to extrapolate whether good corporate ESG performance leads to good financial performance and enhanced market value. Various studies have resulted in contrasting findings. Several studies have provided evidence that corporate ESG performance impacts market value (Eccles et al., 2011, de Villiers and Marques, 2016, Li et al., 2018, Harjoto and Jo, 2015, Clacher and Hagendorff, 2012, Hassel et al., 2005). In their study of the largest European companies, de Villiers and Marques (2016) witnessed a positive association between corporate ESG performance disclosure and stock price. A similar result was found in the United Kingdom (UK) stock market (Li et al., 2018) and the United States (US) stock market (Harjoto and Jo, 2015). In contrast to these results, another study of the UK market showed no positive reaction by the stock market to corporate ESG performance disclosure

(Clacher and Hagendorff, 2012, Murray et al., 2006). Using a sample of Swedish companies, Hassel et al. (2005) found evidence that a specific environmental performance disclosure negatively affects future earning power and stock market value. Since the start of the great financial crisis (GFC) (between 2008-2009), where the irresponsible behaviour of the financial sector caused the financial crisis (Eberle et al., 2013), the notion of corporate ESG performance and its impact on financial performance has increased globally (Aguinis and Glavas, 2012). Due to the strong fundamentals in the Australian economy and financial regulations,[5] Australia has shown a resilient performance compared to other developed countries. This has coincided with the introduction of the ASX Corporate Governance Principles and Recommendations in 2003[6] and further adjustment in the sustainability and risk guideline in 2007[7] that improved monitoring of the corporate governance. The period of this study (2007-2017) is important as the financial turmoil caused by the Global Financial Crisis (GFC) (2007-2008) has led to a significant organisational focus on corporate transparency and governance. Several corporate scandals after the GFC indicate the importance of monitoring corporate ESG performance as responsible actions toward diverse stakeholders. Hence, there is a substantial organisational focus on corporate ESG related activities globally during this study.

The above counterintuitive findings and the lack of research in the Australian market identify the need to research the relationship between corporate ESG performance disclosure and stock market values to understand the relationship better.

The inconclusive findings of prior literature on the relationship between corporate ESG and financial performance have left this line of study unresolved, prompting new research questions (Friede, Busch, and Bassen 2015; Brooks and Oikonomou 2018). Even though some studies have linked corporate ESG performance with market value, this link remains unexplored in the Australian market. The current study investigates this relationship by using comprehensive proxies for corporate ESG performance disclosure on a sample of all Australian listed companies.

Moreover, greenhouse gas (GHG) emissions, particularly corporate GHG emissions, are alarming, consequently attracting public attention to climate change. Climate change has emerged as an ecological concern and the cause of unpredictable economic harm (Labatt and

[5] https://www.finsia.com

[6] This was introduced in 2001 and gradually updated to the recent version (Corporate Governance Principles and Recommendations, 2019).

[7] Principle 7.4 of the Council's Corporate Governance Principles and Recommendations recommends the disclosure of material exposure to economic, environmental, and social sustainability risks and how to manage those risks.

White, 2011, Bebbington and Larrinaga-Gonzalez, 2008). Policymakers in some countries have started to react to these increasing issues by managing GHG emissions with the help of businesses.

Due to these alarming points, a company's carbon risk exposure has emerged as the main concern of various stakeholders (Labatt and White, 2011, FI), 2006, Hoffmann and Busch, 2008, Subramaniam et al., 2015). It is important to investigate how capital markets price the risks associated with corporate carbon emissions performance. Such evidence will allow companies to change their carbon management strategy to mitigate its implications on the market's idiosyncratic risk assessment, which will reduce their cost of capital (COC).

The first motivation of this study is derived from the previous literature argument on the moderating impact of corporate environmental performance disclosure on the company's idiosyncratic risk. Although this is supported in some literature (Liesen et al., 2017, Bui et al., 2020), this may not be the case for the direct impact of corporate carbon emissions performance as stated by Cooper et al. (2018). Second, prior studies provide mixed results on the risk efficacy of corporate carbon emissions performance. Some studies propose that companies with higher carbon emissions try to incorporate superior environmental strategies and reporting practices; therefore, they benefit from lower idiosyncratic risks (Hassan and Romilly, 2018, Weinhofer and Hoffmann, 2010). On the other hand, Dawkins and Fraas (2011) argue that companies with lower carbon emissions try to differentiate themselves by environmental disclosure; therefore, they are perceived to have lower idiosyncratic risk. It, therefore, is unclear whether the capital market fully utilises corporate carbon emissions performance for lending or investing decision-making or adjusts for companies exposed to carbon emissions-related risks (Benlemlih et al., 2018, Cooper et al., 2018, He et al., 2021). He et al. (2021) also points out that results in the current literature are disproportionate to evaluate the direct impact of corporate carbon performance on the company's risk management and reduction of carbon emissions. This study attempts to address the knowledge gap in the research about this association by responding to the call for further studies to evaluate the idiosyncratic risks associated with corporate carbon emissions performance (Jo and Na, 2012, He et al., 2021).

The implications of climate change risks and the imminent challenge of moving to the low carbon economy are expected to substantially redistribute the wealth from companies with poor carbon performance management to those with strategies that mitigate corporate exposure to carbon emissions (Matsumura et al., 2014b, Luo and Tang, 2021).

The extended focus of the study is on the economic implications of corporate carbon emissions performance, which is an active area of study within the research community (Benson et al., 2015, Linnenluecke et al., 2017, Borghei, 2021). Prior research has primarily focused on corporate environmental performance disclosure and related risks on a company's COC, with limited exploration of corporate carbon emissions performance (El Ghoul et al., 2011, Ng and Rezaee, 2015). This study builds on the sparse empirical findings linking corporate carbon emissions performance with COC (Sharfman and Fernando, 2008, Clarkson et al., 2013, Jung et al., 2018, Bui et al., 2020). Past studies have investigated the impact of corporate environmental performance on a company's COC by using the cost of equity (COE) (Bui et al., 2020, Clarkson et al., 2013) or cost of debt (COD) (Maaloul, 2018, Jung et al., 2018). Also motivated by increasing concerns over the climate change risks in prior literature, this study examines the impact of corporate carbon emissions performance on the company's idiosyncratic risk and COC.

The study's findings have several implications for the literature, corporate decision-makers, and market participants. This study also aims to extend the scope of the work of El Ghoul et al. (2011). Their study finds that companies with higher ESG performance received lower financing by estimating the relationship individually across the three dimensions of environmental, social and governance and calculating the aggregated ESG score. The current study also extends the research by Goss and Roberts (2011), which provided some advocacy on the viewpoint that corporate ESG performance disclosure is priced by revealing that this strongly matters for equity pricing.

This study also extends the literature on the association between corporate ESG performance disclosure and financial risk. The findings help to understand better whether improving corporate ESG performance benefits corporations by reducing idiosyncratic risk. In other words, the findings highlight whether the market price changes due to corporate ESG performance disclosure through reducing financial risk. The postulations of prior studies stimulate the current study's extended focus that corporate ESG performance impacts a company's value by reducing company risk (McGuire et al., 1988, Starks, 2009). The study also contributes to previous literature investigating corporate ESG performance and COC implications (Goss and Roberts, 2011, Sharfman and Fernando, 2008, Chava, 2010, El Ghoul and Karoui, 2017).

This study helps to understand whether corporate ESG performance disclosure improves its market value through higher transparency and accountability. The finding of this study

extends prior literature by providing evidence that corporate ESG performance disclosure by Australian companies is value relevant. This study's findings indicate market attitudes and potentially different relationships between corporate ESG performance disclosure and market value in the Australian context. This could also be the interest of corporate decision-makers for disclosure purposes, share market participants for investment decision making, analysts for corporate evaluation purposes and regulators for future regulations in the context of corporate ESG performance disclosure.

Finally, this study's findings contribute to previous research evaluating the impact of corporate GHG emissions on the cost of capital (COC). The study's investigation highlights the potential benefits to corporations of undertaking more responsible conduct toward GHG emissions (Hong and Kacperczyk, 2009). Furthermore, this study investigates the impact of corporate GHG emission on COC and highlight the potential benefit of adopting a carbon risk reduction plan for the corporation's risk improvement.

1.2. Research Objectives and Questions

The main objective of this study is to investigate whether improvement into corporate ESG performance disclosure leads to value creation for companies by decreasing capital costs or increasing market value. The corporate ESG performance disclosure improves the relationship with stakeholders and creates the mutual trust (Jones, 1995, Cathy and Edwin, 2003). Additionally, it will improve transparency and compliance with regulations (Dhaliwal et al., 2011). Consequently, corporate ESG performance information's availability leads to lower capital costs by reducing information asymmetry (Hubbard, 1998). Managers who become inspired by the share-based payments or bonuses linked to their performance, earnings or stock market price may exaggerate the voluntary corporate ESG performance disclosure, affecting the stock price (Cormier and Magnan, 2007). Shareholders need more information for monitoring corporate ESG strategies to forecast the company's profit and future cash flows (Cormier et al., 2005). Corporate disclosures such as ESG performance are a means of monitoring executive actions for stakeholders. From the stock market viewpoint, shareholders who do not have this information consider a worst-case scenario and lower a company's market value (Healy and Palepu, 2001, Cormier et al., 2005). To help comprehend a company's prospects, such as future cash flows and risks, stakeholders require corporate ESG performance information. Stakeholders rely on this information to evaluate organizational, social and environmental impacts. On the other hand, Prior studies on the relationship between corporate

ESG performance disclosure and a company's financial performance revealed counterintuitive findings (Margolis et al., 2009, Fatemi et al., 2017, Friede et al., 2015). It is argued that the confounding elements such as industry characteristics presumably present causality and lead to the contrasting findings in prior literature on the relationship between corporate ESG performance disclosure and financial performance (Galbreath and Shum, 2014, Aouadi and Marsat, 2018).

Terms such as "GHG emission risk", "carbon risk", "environmental risk" and "climate change risk" are often used interchangeably by scholars. Following Hoffmann and Busch (2008), the current study considers carbon risk as a subcategory of environmental risks arising from exposure to climate change. In the debt capital market, one of the main concerns for lenders is the ability of borrowers to repay the debt; consequently, they consider all the important elements that potentially impact this ability. This means a company's earning power, liquidity and market value are the main elements for evaluating the credit risks from the lender's viewpoint (Saunders and Allen 2002; Weber 2012). This study also discusses the implications of corporate GHG emissions, considering the impact on the credit risk and, in turn, on the COC and earning power and current and future cash flow. Companies with a higher level of GHG emissions are exposed to higher credit risk; thus, lenders and investors consider that this implies higher costs. This study examines the association between corporate GHG emissions and the cost of capital (COC). This study examines the association between corporate GHG emissions and COC.

This study investigates the following two main research questions given the above discussion.

RQ1. "What is the impact of corporate ESG performance disclosure on company's financial performance?"

- **RQ1.1.** "What is the impact of corporate ESG performance disclosure on company's cost of capital (COC)?"
- **RQ1.2.** "What is the impact of the corporate ESG performance disclosure on the company's idiosyncratic risk?"
- **RQ1.3.** "Do Australian companies demonstrate improvement in ESG performance disclosure and consequent improved financial performance over time?"
- **RQ1.4.** "What is the impact of the level of corporate ESG performance disclosure on a company's financial performance?"

RQ2. "What is the impact of corporate carbon emissions performance disclosure on company's financial performance?"

RQ2.1. "What is the impact of corporate carbon emissions performance disclosure on company's idiosyncratic risk?"

RQ2.2. "What is the impact of corporate carbon emissions performance disclosure on company's cost of capital (COC)?"

1.3. Research Hypotheses Overview

To answer the research questions and achieve the objective of this study, the below hypotheses are developed related to the corporate ESG performance disclosure and its impacts within the scope of this research project.

H1: There is an inverse association between the level of corporate ESG performance disclosure and a company's cost of capital (COC).

H2: There is an inverse association between the level of corporate ESG performance disclosure and a company's idiosyncratic risk.

H3: Australian companies have demonstrated an improvement in their ESG performance disclosure over time.

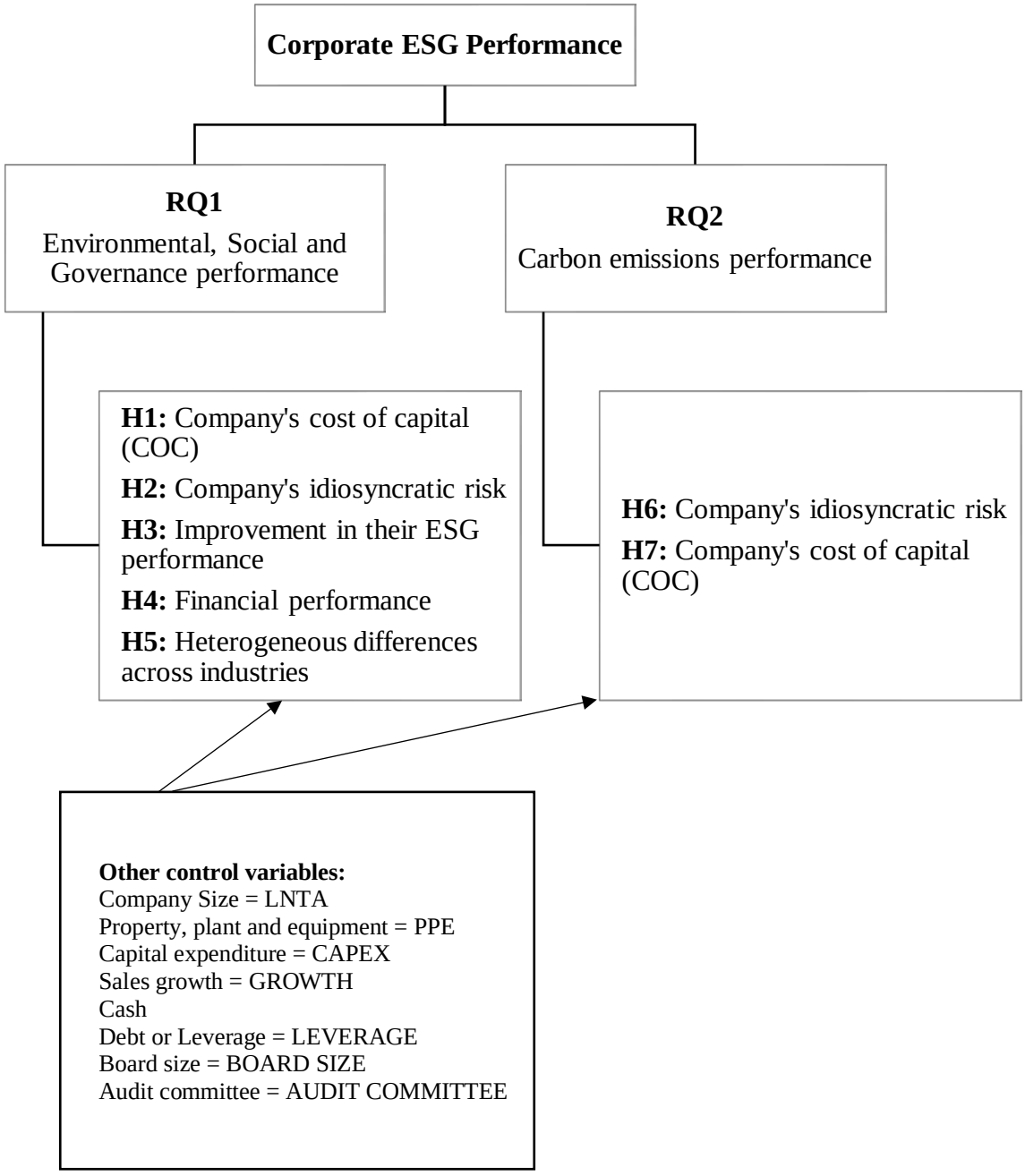
H4: There is a positive association between corporate ESG performance disclosure and a company's financial performance over time.

H5: There are heterogeneous differences across industries in the association between corporate ESG performance disclosure and the company's financial performance over time.

H6: There is a positive association between corporate carbon emissions performance disclosure and idiosyncratic risk.

H7: There is a positive association between corporate carbon emissions performance disclosure and the company's overall cost of capital (COC).

Figure 1-1: Research Design



1.4. Research Scope Overview

Whereas the disclosure of financial information is strongly regulated, corporate ESG performance disclosure is often voluntary. In the Australian Securities Exchange (ASX) market, corporate governance has improved ad hoc and iterative as an essential tool to elevate management accountability to stakeholders. In 2003, the ASX Corporate Governance Council (CGC) introduced a principles-based recommendation on corporate social responsibility. Principle 7 of the current *Corporate Governance Principles and Recommendations*

(AUSTRALIAN SECURITIES EXCHANGE (ASX) CORPORATE GOVERNANCE COUNCIL (CGC), 2019) recommends that listed companies disclose material exposure to economic, environmental and social sustainability risks and how they manage those risks.

1.5. Research Methodology Overview

To examine the association between the level of corporate ESG performance disclosure and market value, this study collected data from Bloomberg, which provides accounting and ESG performance disclosure data and integrated reports (Bloomberg, 2018).

Bloomberg provides and rates corporate ESG performance disclosure on three dimensions: environmental disclosure data, social disclosure data and governance disclosure data. Bloomberg's analysts rate the environmental, social and governance disclosure reports based on companies' transparency and accountability. Companies prefer to source their ESG performance information from official corporate disclosures, with Bloomberg providing this information.

As in previous studies, the focus of the current study is on all companies. The study focuses on all Australian listed companies from 2007–to 2017. Several databases have recently been developed for evaluating and scoring corporate ESG performance disclosure. Inconsistency with different performance disclosure scoring methods has been found among these data sets (Halbritter and Dorfleitner, 2015, Semenova and Hassel, 2015). The specific panel data of corporate ESG performance disclosure captured from Bloomberg for this study contains multiple environmental, social and governance score measures over 2007–2017. Bloomberg's criteria for scoring the corporate ESG performance disclosure level are the most consistent measures among the various databases (Halbritter and Dorfleitner, 2015). They are being calculated based on 120 indicators covering the three dimensions of environment, social and governance activities[8]. The range for disclosure starts from a minimum of 0.1 to a maximum of 100. Data from Bloomberg have been used in several academic studies, such as the works of Li et al. (2018) and Baldini et al. (2018).

Regarding financial risk and, specifically, idiosyncratic risk, the market risk measure provided by Bloomberg and the standard deviations of residuals from the Bloomberg financial risk model is considered as the company's idiosyncratic risk. The standard deviation of the residual from the financial risk measure provided by Bloomberg is calculated for every year. The calculated annualised standard deviation is used as a measure of idiosyncratic risk.

[8] This information comes from Bloomberg's (2015) Impact Report Update.

To examine the association between corporate ESG performance disclosure and the cost of capital (COC), the current study collects the data from Bloomberg, which provides the cost of equity capital (COE) and cost of debt capital (COD). The study follows the same approach to evaluate the association between the different dimensions of corporate ESG performance disclosure (environmental, social and governance) and the cost of capital (COC). Bloomberg also provides the data regarding corporate GHG emissions used in this study to evaluate the relationship between corporate GHG emissions and the cost of capital (COC).

1.6. Research Structure

This thesis is organised into six chapters, as shown in the following figure 1.2.

Figure 1-2: Research Structures

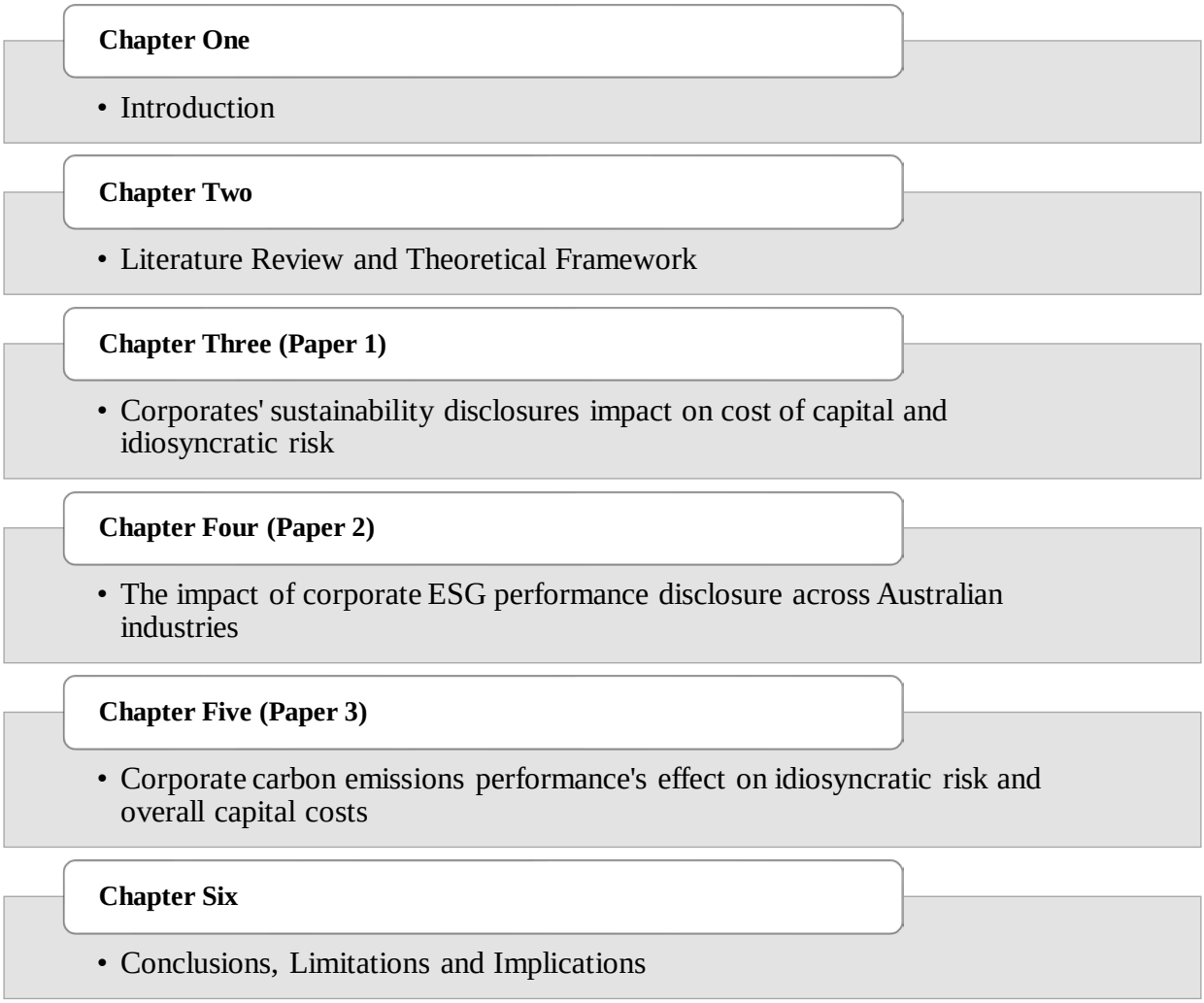


Figure 1-1 illustrates the structure of the thesis. **Chapter One** starts with the motivation and significance of the research. This is followed by the research questions and objectives that led to the development of the seven hypotheses. The scope of the study and an overview of the

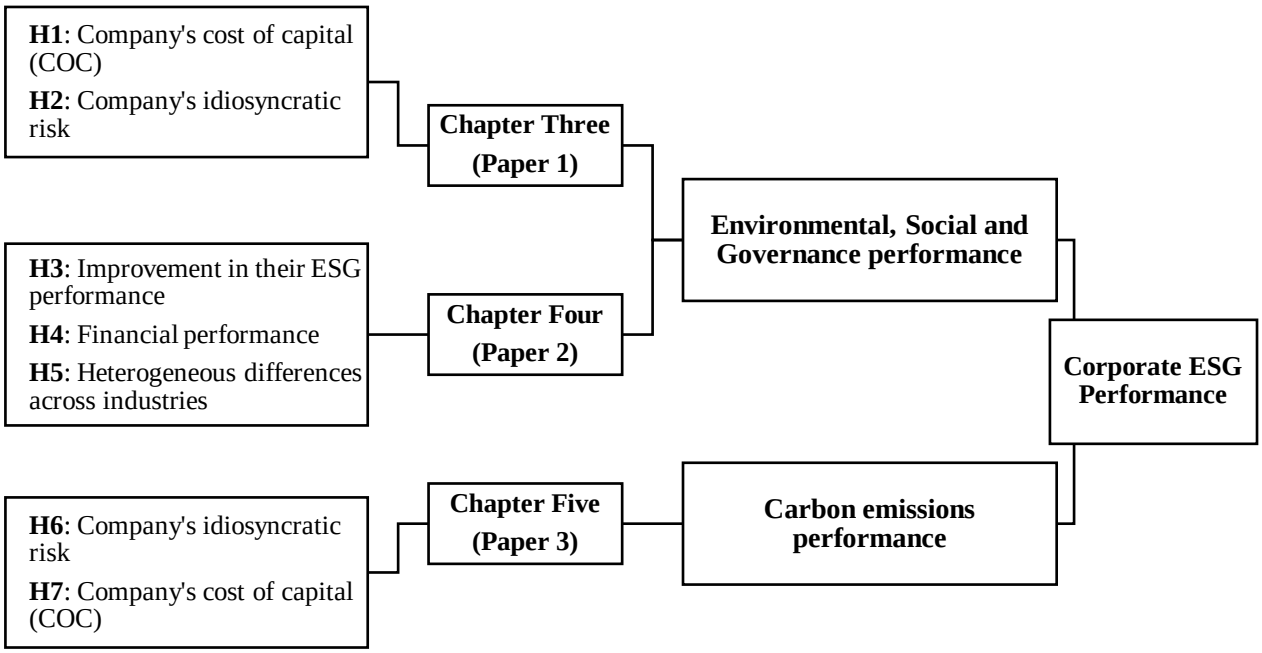
research methodology is also presented. **Chapter Two** discusses the conceptual framework and literature review. The chapter provides a summary of the Australian GHG regulations.

Chapter Three presents the first paper, "Corporates' sustainability disclosures impact on the cost of capital and idiosyncratic risk" which is under review for publication in a revise and resubmit revision round within a Q1 academic accounting journal's double-blind review process. This paper investigates the favourable impact of the corporate ESG performance disclosure on idiosyncratic risk as a strong complement to the diminishing impact on a company's ability to access a reasonably cheaper source of funds. The study also highlights the importance of the company's risk management strategy via sustainability disclosure.

Chapter Four presents the second paper, "The heterogeneous impact of ESG performance disclosure improvement on financial performance across industries". This paper provides an unbiased evaluation of corporate ESG performance improvement longitudinally and highlights its positive implications for companies. The paper also provides industrial benefit analysis across different industry sectors and is currently under review for publication within a Q1 academic accounting journal's double-blind review process.

Chapter Five presents the third paper, "Corporate carbon emissions performance disclosure, idiosyncratic risk, and overall capital costs". This paper investigates the effect of corporate greenhouse gas (GHG) emissions on idiosyncratic risk and its consequential impact on the overall capital cost. This paper will be submitted to a Q1 academic accounting journal's double-blind review process for publication purposes. Finally, **Chapter Six** presents a compilation of the results of the three studies in Chapters 3, 4 and 5, bringing this research project to a conclusion, discussing the limitations and presenting the implications of the findings.

Figure 1-3: Connections between the research empirical analysis chapters



1.7. Chapter Conclusion

This chapter provides an overview of the thesis and highlights the importance of corporate ESG performance disclosure in generating value for companies through a better relationship with stakeholders. Corporate ESG performance disclosure could help create a better relationship with a different group of company's stakeholders through better transparency and reducing information asymmetry. This chapter outlines the thesis's importance, motivations, objectives, research questions, and hypotheses. Additionally, this chapter summarises the research methodology and presents the thesis structure. Lastly, the chapter outlines the connection between the empirical analysis chapters and the hypotheses relevant to the thesis. The next chapter presents the literature review and theoretical framework of the thesis.

2. CHAPTER TWO: LITERATURE REVIEW AND THEORITICAL FRAMEWORK

2.1. Chapter Introduction

The previous chapter reviewed the research motivations, questions and hypotheses that concentrated on the three empirical research projects presented as individual publications in Chapters 3, 4 and 5.

The current chapter introduces the concept of corporate environmental, social and governance (ESG) performance disclosure in Section 2.2. This is followed in Section 2.3 by an overview of the Australian corporate disclosure legislation. Section 2.3 outlines the roles of the Australian Securities Exchange (ASX) Corporate Governance Council (CGC), the National Pollutant Inventory and the *National Greenhouse and Energy Reporting (NGER) Act 2007*. The section also discusses the literature and the theoretical framework that underpin the development of the study's main hypotheses and the three papers in the following chapters. The initial discussion concentrates on the value generated by companies through corporate ESG performance disclosure and its impact on the cost of capital (COC), idiosyncratic risk and companies' market value. In this section's further discussion of the theoretical framework, the impact of corporate carbon emissions performance on the cost of capital (COC) is investigated.

Sections 2.4 and 2.5 review the literature on the economic implications of corporate ESG performance disclosure for companies, with a specific focus on a company's cost of capital (COC) and idiosyncratic risk. Sections 2.6–2.8 provide a brief review of studies on Australian improvement in the corporate ESG performance disclosure and the consequent impact on a company's financial performance (measured by a company's market value) across all industry sectors and within individual industries. Sections 2.9 and 2.10 provide an overview of studies on the economic implications of the corporate carbon emissions performance by following its associated impact on a company's idiosyncratic risk.

2.2. Corporate ESG Performance Disclosure

Before recent decades, business entities (or corporations) were assumed to be responsible for their financial performance and their main stakeholders (i.e., their shareholders). This viewpoint prioritises the benefits of a particular group of stakeholders with a direct interest in the company (called either shareholders or investors in prior literature) over other stakeholders' interests. However, this has changed, and it has become widely accepted that a company has

responsibilities to a broader group of stakeholders, such as local communities, employees, customers, creditors, the government and the environment. These responsibilities include corporate social and environmental performance as well as financial performance (Deegan, 2020). This viewpoint is reflected in the statement made by the CEO of Shell UK (Shell UK, 1998):

> ***"The days when individual companies were judged solely in terms of economic performance and wealth creation have long disappeared. Today, companies have far wider responsibilities to the community, to the environment and to improving the quality of life for all."***

This viewpoint embraces a position that extends a company's accountability beyond a robust financial performance to providing a set of accounts apart from traditional financial accounts. Therefore, providing ESG information requires that a company goes beyond traditional financial reporting.

Companies face a limited mandatory requirement to disclose their ESG performance publicly. However, large corporations are increasingly providing these types of performance disclosure in a stand-alone report or combined with their annual financial reports. Limitations in the disclosure and reporting regulations lead to variances in the preparation and structure of these reports, with ESG disclosure predominantly voluntary. Therefore, a significant amount of research has investigated corporate ESG performance disclosure motivation.

In the recent academic literature, the attention on corporate ESG performance has significantly increased. In line with stakeholder theory, managing the satisfaction of a diverse group of stakeholders might be considered a tool to capture improved financial performance (Donaldson and Preston, 1995, Jones, 1995). Furthermore, from the investor viewpoint, ESG performance is an important measure of a company's risks and opportunities (Limkriangkrai et al., 2017), even if corporate ESG performance disclosure is voluntary by nature (Cucari et al., 2018). Companies are encouraged to disclose their ESG performance to stakeholders to receive more support and maintain accountability (Said et al., 2009), generating value in return (Dellaportas et al., 2012, Forcadell and Aracil, 2017). Corporate ESG performance is the primary indicator of non-financial performance (Galbreath, 2013).

Empirical studies on the different implications of corporate ESG performance disclosure are extensive in the accounting literature. However, considering the emergence of catastrophic environmental and social events that threaten humanity, accounting research must be extended

toward sustainability to maintain sustainable growth and control significant challenges (Badham, 2013).

Enhancing profitability and achieving economic benefits by promoting environmental and social responsibility has been under investigation for more than four decades (Brooks and Oikonomou, 2018). The financial incentives through responsible corporate behaviour reposition the contemporary debate from ethical and moral philosophy toward modern economics. The foundation of corporate ESG performance is rooted in the theory that it improves relationships with stakeholders (consumers, employees, environmental activists, local communities, etc.). It has been initiated through the generation and evolution of stakeholder theory (Freeman, 2010) and its instrumental aspects (Jones, 1995). However, not all scholars are agreed on the positive impact of improving corporate ESG performance on financial performance (Friedman, 2007). Friedman (2007) argues that corporate ESG performance could impose some undemocratic pressure on shareholders as its initial implementation cost could be higher than any benefits. The costs associated with the implementation of corporate ESG performance disclosure could result in misallocation and misappropriation of valuable corporate resources (Friedman, 2007). Following the above contrasting viewpoints, during the past four decades, scholars in the different fields of strategic management, economics, business ethics, the environment and finance have been undertaking significant investigations of different dimensions of corporate ESG performance disclosure. In recent decades, the emergence of socially responsible investment (SRI) has provided scholars with greater impetus to carry out in-depth investigations of the relationship between corporate ESG performance and financial performance. Apart from the volume of the literature, its latitude is also substantial. For instance, according to Griffin and Mahon (1997) and supported by Malik (2015), most findings in the literature are not comparable due to the diverse characteristics of the studies.

Previous studies on the relationship between corporate ESG performance and financial performance could be categorised based on:

- Different definitions of financial performance and corporate ESG performance,
- Use of counterintuitive theoretical frameworks,
- Use of databases with different emphases on corporate ESG performance components, and a focus on diverse country and industry factors, as well as
- Use of diverse econometric methodologies for scaling corporate ESG performance engagement.

The above factors make it harder to generalise a decisive view of the field academically. The current investigation is more significant, but without having a profound literature review that could effectively summarise the knowledge based on all the studies conducted in the field.

2.3. Overview of Australian Corporate Disclosure Legislation

In Australia, the *Corporations Act 2001*, section 299(1)(f), requires corporations to provide detailed disclosure of their environmental performance in the company's Director's Report if their operations are subject to any environmental law by the Commonwealth or state or territory. Under section 299A of the Corporations Act, listed companies must disclose any information in the company's Director's Report that shareholders would need for informed decision making. The Corporations Act (sections 1013A to 1013F) also enforces disclosure by providers of financial products (such as institutional investors) on how labour standards and environmental, social and ethical issues are considered within their investment decision making.

The Australian Securities and Investments Commission (ASIC) requires a company's directors to consider best practice guidance, such as the review of operations and financial conditions, in disclosing financial and non-financial information (sustainability measures), including corporate environmental and social performance indicators.

Specific corporations must also extend their disclosure beyond traditional corporate annual reports to organisations such as environmental protection agencies (presumably for licensing requirements). These disclosures are not required to be included in annual reports or ESG/CSR/sustainability reports.

2.3.1. Australian Securities Exchange (ASX) Corporate Governance Council (CGC)

All Australian publicly listed companies must provide a corporate governance statement in their annual reports or provide a link to where this statement is located on their website. This requires corporations to disclose whether they have followed the recommendations of the Australian Securities Exchange (ASX) Corporate Governance Council (CGC) in the financial period. The recommendations are included in the ASX CGC's (2019) *Corporate Governance Principles and Recommendations.* Suppose the corporation's board determines that the disclosure is not appropriate for its situation and that, therefore, the adoption of these recommendations is not required. In that case, the corporation must disclose its rationale for not adopting the recommendations. This is the 'If not, why not' approach for disclosure.

Recommendation 7.4 of the ASX CGC (2019) *Corporate Governance Principles and Recommendations* states that:

> ***"A listed entity should disclose whether it has any material exposure to environmental or social risks and, if it does, how it manages or intends to manage those risks."***

The purpose of detailed environmental and social disclosure is to help investors to evaluate the risk associated with their investment appropriately. In addition, it encourages corporations to disclose the mechanism they use to measure their performance and achievement. As with environmental performance, corporations are not generally required to disclose their social performance in their annual reports publicly. The external corporate disclosure requirement mainly concentrates on valuable information for those stakeholders with a financial stake in the corporation. This narrow approach (directed mainly to shareholders rather than stakeholders) is the 'shareholder primacy' viewpoint of corporate disclosure, which different interest groups are increasingly challenging. However, corporations, their industry and the market are left to the regulator to determine the extent of corporate ESG disclosure.

2.3.2. National Pollutant Inventory and National Greenhouse and Energy Reporting (NGER) Act 2007

The National Pollutant Inventory (NPI) mechanism requires companies to disclose details of corporate emissions of defined substances to air, water, and land if the emissions exceed a particular threshold. This applies to a limited number of corporations. The NPI does not require disclosure of greenhouse gas (GHG) emissions as this information is required by the National Greenhouse and Energy Reporting (NGER) Scheme. This publicly available information is intended for use by communities as they have a ‘right to know’ about hazards created by corporations. Through a combination of public pressure and corporate awareness, this mechanism also encourages corporations to implement changes. It is not easy to find if communities or the public are aware of the NPI or this information. Media coverage of the NPI is limited (Weng et al., 2012), and it appears to be ineffective in Australia compared to other countries with similar schemes.

The *National Greenhouse and Energy Reporting Act 2007* (Cwlth) (NGER Act) is the Australian framework for disclosing and presenting corporate GHG emissions, GHG projects, and energy consumption and production information. Corporations are required to register if they exceed the disclosure threshold for GHG or energy consumption and production in one

financial period. The disclosure includes the level of GHG emissions, energy production and consumption, and other information as defined by NGER regulations.

2.4. Corporate ESG Performance Disclosure and Cost of Capital (COC)

The concept of sustainability performance refers to the inclusion of a broader corporate focus beyond short-term profit maximisation through considering the impact of its operations on all stakeholders, including community, society and the environment (Freeman, 1984). The motivations that may explain the implications of corporate ESG performance disclosure can be related to the legitimacy theory. The increasing public attention to the corporate ESG performance has put significant pressure on companies to disclose information on their ESG performance to secure corporate legitimacy. Moreover, companies use corporate ESG performance disclosure as a strategic mechanism to establish and enhance legitimacy (Lindblom, 1994, Chen and Roberts, 2010). This creates a mutual trust representing a more efficient social contracting with stakeholders (Jones, 1995). In this context, Raji and Hassan (2021) argued that an unwritten social contract exists between businesses and communities that the businesses will consider the stakeholders' expectations to provide corporate resources.

Previous literature has used the legitimacy theory to link the perception of "legitimacy" to the notion of "social contract theory". These studies refer to the existence of a social contract between a corporation and society, where corporate activities are perceived as complying with social expectations (Mathews, 1995). Corporate legitimacy is an essential organisational resource for its survival and is conferred upon the organisation by society (Dowling and Pfeffer, 1975, O'Donovan, 2002). This resource can be managed or impacted by various corporate disclosure strategies (Woodward et al., 1996). Corporate ESG performance disclosure provides the required information to show business commitment to stakeholders' expectations (de Villiers and Lubbe, 2019, Deegan, 2020). The provision of a higher corporate ESG performance disclosure motivates financial resource providers to reciprocate positively and reward these corporations with cheaper sources of capital (Johnson, 2020). Conversely, corporations failing to comply with the social contract has costly consequences. For example, it can lead to various sanctions against the corporation, such as restricting its financial or capital resources (Deegan and Rankin, 1996). Corporate ESG performance disclosure can also help companies reduce the risk associated with the impact of new regulation or fiscal action (Freeman and Reed, 1983, Berman et al., 1999) and attract socially responsible investors (Kapstein, 2001). Further, many financial institutions have adopted strategies that provide

resources to companies with higher ESG performance (Equator Principles, 2013). These initiatives support the argument that companies with higher ESG performance disclosure might source their financial needs at a cheaper rate.

Referring to the legitimacy theory, this study argues that improvement in the corporate ESG performance disclosure leads to access to cheaper sources of capital. This is because of two important reasons. First, it improves corporate commitment to and relationships with stakeholders by creating a mutual trust (Jones, 1995). Second, previous studies find that corporations with better ESG performance are more likely to provide related disclosure as it represents transparency and more compliance with regulations (Freeman and Reed, 1983, Dhaliwal et al., 2011). This reduces the information asymmetry issues (Botosan, 1997, Hail and Leuz, 2006), leading to a lower COC (Hubbard, 1998, El Ghoul et al., 2011, Cheng et al., 2014).

Corporate ESG performance and disclosure is still considered a young discipline (Schaltegger et al., 2013, Dumay et al., 2017) and has emerged as a primary focus of many institutions, mutual funds, and scholarly publications (Bassen et al., 2006). This has contributed to substantial research investigating the link between corporate ESG performance disclosure and financial performance but yields contradictory results (Margolis et al., 2009, Jiao, 2010). For instance, a group of studies argues that corporate ESG performance imposes more costs on companies, leading to an extra financial burden (Aupperle et al., 1985, Jensen, 2002, Friedman, 2007). Investors perceive corporate ESG performance as additional indirect costs that erode a company's financial resources (Becchetti et al., 2012).

In contrast, a group of studies support the positive implications of corporate ESG performance disclosure by reducing capital costs (Clarkson et al., 2004, El Ghoul et al., 2011, Dhaliwal et al., 2011, Dhaliwal et al., 2014a, Ng and Rezaee, 2015). These studies concentrate on the role of the capital market as a middle mechanism through which corporate ESG performance disclosure led to a cheaper COC for companies. Clarkson et al. (2004) stated that the capital markets use corporate ESG performance disclosure to assess a company's unbooked ESG-related expenses and liabilities. Therefore, it impacts the investor’s required rate of return, hence the company’s COC. Dhaliwal et al. (2011) found that companies with historical records of higher COC tend to initiate ESG performance disclosure to achieve a lower COC. They also found that companies with superior ESG performance disclosure achieve a significantly lower COC than lower performers. In another international study on 31 countries, referring to transparency regarding corporate ESG concerns, Dhaliwal et al. (2014a) found that the negative

association between corporate ESG performance disclosure and COC is more pronounced in countries or companies with higher levels of financial opaqueness. Focusing on the US-listed companies, El Ghoul et al. (2011) and Ng and Rezaee (2015) argue that corporate disclosure on the ESG-related investment reduces the company's COC owing to a higher investor attraction and lower perceived risk. The inconsistent results of prior studies leave a gap in the body of knowledge that needs further investigation (Margolis and Walsh, 2003, Mohammad and Wasiuzzaman, 2021). The inclusion of the cost of equity and debt capital should provide a comprehensive platform to investigate the impact of corporate ESG performance disclosure on capital costs.

The first paper in this thesis (Chapter 3) argues that higher levels of corporate ESG performance disclosure result in access to a cheaper source of capital. The two reasons are that ESG performance disclosure impacts the corporate commitment of stakeholders and improves the relationship between stakeholders and the company through generating mutual trust (Jones, 1995, Cathy and Edwin, 2003). Corporate agreement and mutual trust with stakeholders reduce agency costs, monitoring costs, bonding costs, warranty costs and residual losses (Jones, 1995). Secondly, previous studies find that companies with higher levels of ESG performance are more likely to provide more disclosure in their sustainability reports (Dhaliwal et al., 2011) and are more likely to use assurance services to increase their disclosure's credibility (Simnett et al., 2009). Therefore, corporate ESG performance disclosure improves transparency and impacts on the company's internal control system and its corporate compliance with regulations. The availability of corporate ESG performance information thus leads to lower capital costs through reducing information asymmetry (Hubbard, 1998).

This study proposes that a higher level of corporate ESG performance disclosure results in a lower COC due to reduced information asymmetry via a better relationship with stakeholders. Furthermore, the study uses the exclusive elements of corporate ESG performance disclosure, namely, environmental (*ENV*), social (*SOC*) and governance (*GOV*), to investigate the above association. Therefore, the first paper (Chapter 3) of this thesis examines the inverse association between the level of corporate ESG performance disclosure and a company's cost of capital (COC). The second hypothesis for paper 1 relates to a higher level of corporate ESG performance disclosure resulting in reduced information asymmetry, which is discussed in the next section.

2.5. Corporate ESG Disclosure and Idiosyncratic Risk

According to the legitimacy theory, corporate ESG performance disclosure led to a long-term value generation for companies by satisfying a company's social responsibilities, meeting social norms and commitment and improving corporate reputation (Deegan and Rankin, 1996), thus lowering company-specific or idiosyncratic risks (Freeman, 2010, Deegan, 2014). This is through multiple theoretical mechanisms. First, it represents more corporate transparency, lowering information asymmetry among investors and between the company and capital markets. Therefore, it attracts financial resource providers due to a lower risk assessment (Amihud and Mendelson, 1986). With this respect, de Klerk and de Villiers (2012) and Harjoto and Jo (2015) argue that corporate ESG performance disclosure reduces a company's idiosyncratic risk due to the lower information asymmetry between the companies and shareholders. Second, Barry and Brown (1985) and Lambert et al. (2007) stated that better corporate disclosure could help reduce company-specific risk and parameter uncertainty in company pricing models used in capital markets. Third, a higher level of transparency reduces the monitoring costs improve equity market recognition, leading to improved company-specific risk-sharing (Merton, 1987). Godfrey (2005) stated that corporate ESG performance disclosure provides insurance-like protection to stakeholders' wealth and serves as public protection for a company's performance (Godfrey, 2005, Godfrey et al., 2009. Conversely, irresponsible companies with lower ESG performance may encounter more allegations of corporate wrongdoing (Waddock and Graves, 1997), thus facing a higher level of idiosyncratic risk (Frederick, 1995, Starks, 2009).

Prior studies show that higher corporate ESG performance disclosure can favourably reduce the company's idiosyncratic risk (Sharfman and Fernando, 2008, Luo and Bhattacharya, 2009, Jo and Na, 2012). Improving corporate ESG performance reduces any potential crisis rooted in ESG elements that can negatively impact the company's operation, consequently reducing idiosyncratic risk (Sharfman and Fernando, 2008). Insisting on the importance of managing relationships with stakeholders, Luo and Bhattacharya (2009) argue that corporate ESG performance disclosure empowers companies with efficient investors relationship, consequently lowering the company's idiosyncratic risk. Jo and Na (2012) found an inverse association between corporate ESG performance disclosure and the company's idiosyncratic risk, which is more significant for controversial industries such as tobacco, alcohol, gambling.

Failing to maintain stakeholders' expectations or being involved in negative ESG activities can result in severe operational consequences ranging from customer boycotts (Klein et al., 2004),

supply chain disruptions (Carter, 2000) and employees strike (Greening and Turban, 2000), that increase the company's idiosyncratic risk.

The first paper of this thesis follows the latter insights recommended by legitimacy theory (Lindblom, 1994, Chen and Roberts, 2010), which support value generation for companies through corporate ESG performance disclosure and its favourable impact on the company's idiosyncratic risk. The paper postulates that corporate ESG performance disclosure impacts on key stakeholders and, therefore, on the company's idiosyncratic risk. An examination of the inverse association between the level of corporate ESG performance disclosure and a company's idiosyncratic risk is provided in the first paper (Chapter 3).

2.6. Australian Corporate ESG Performance Disclosure

This study uses institutional theory to explore the first research question. This theory focuses on the impact of social or cultural environment on organisations (DiMaggio and Powell, 1983). There are presumptions, beliefs and expectations in the society that determine the organisational behaviour of corporations (Scott et al., 1994). These organisational behaviours are not adopted based on efficiency or best practice; instead, they comply with the institutional expectations. Corporate legitimacy is awarded to organisations as a reward by the institutional environment (Scott et al., 1994). As Scott (2001) states, there are three types of institutions within the institutional environment: regulative, normative, and cognitive. The official rules and incentives established by the state are regulative impacts. The normative impacts are the informal rules which involve values and moral commitments. The rules related to the cognitive distinctions and taken for granted concepts are cognitive impacts. These three institutional pillars are interrelated, as Scott (2001) states. For instance, the introduction of a carbon taxes acts is likely to generate a common understanding among businesses on climate change (cognitive), same as a set of values associated with sustainable development (normative).

Australian regulation enforcement shapes the organisational environment in which corporations are expected to respond ESG related concerns. The introduction of the ASX Corporate Governance Principles and Recommendations in 2003 is one of the most official and institutional mechanisms. Referring to the corporate scandals during the last two decades, Australian regulators seem to take robust actions to ensure a healthy corporate governance structure on their publicly listed companies. The ASX Principles are structured to improve corporations' governance, accountability, and transparency, although compliance is not compulsory. However, governance is only one aspect of regulative institutional focus, and

other aspects can be found. For instance, section 299 (1)(f) of the Australian corporation Act of 2001 requires a corporate disclosure concerning any particular and significant environmental regulation. Other examples are the United Nations Global Compact (UNGI), the Global Reporting Initiative (GRI), or the Carbon Disclosure Project (CDP), which Australian companies increasingly practice. Many of these companies are publicly listed companies investigated in this study.

Moreover, there seems to be a combination of normative and cognitive institutions related to corporate ESG performance in Australia. A study by Black et al. (2011) on corporate ESG performance in Australia shows that Australian companies have structured robust abilities in ethical behaviour that, in return, serve as a basis for other abilities that are essential to address social concerns. Ethical behaviour is considered a normative institution and includes informal rules related to values and moral commitments (Scott, 2001). Australian companies have the ethical capabilities to help address social behaviour, which is a necessary element for success and licence to operate (Klettner et al., 2010). Many corporate governance structures and principles in Australia gain shared comprehension and become homogenised in businesses (Klettner, 2016).

Given the above discussion of regulative, normative and cognitive institutional impacts, improvement in corporate ESG performance over time is likely as they seek to conform to institutional expectations. Therefore, the second paper (chapter four) assesses the improvement of Australian corporate ESG performance disclosure over time.

2.7. ESG Performance Disclosure and Financial Performance

Higher corporate ESG performance disclosure can confer higher competitive advantages for corporations and better reputation (Hart, 1995, Scott, 2001). With increasing social and regulation pressure, the equity market participants are becoming more interested in corporate ESG performance disclosure (Cormier and Magnan, 2007). It is reasonable to expect that companies with higher ESG performance disclosure are likely to view potential investors in the capital markets as more favourable.

The theoretical debates among scholars on the socio-political and legitimacy theory argue that corporate ESG performance disclosures are rooted in public pressure, thus aiming to maintain the license to operate by the diverse groups of stakeholders (Patten, 1991). However, consistent with the resource-based view (RVB) theory (Hart, 1995, Russo and Fouts, 1997), companies with higher corporate ESG performance disclosure have the incentive and resources to

financially benefits from these disclosures and achieve higher market value in the equity market. Consistent with the prediction of the RBV (Hart, 1995, Russo and Fouts, 1997), this study argues that companies with higher corporate ESG performance disclosure benefit from higher market value.

Research on the UK stock market by de Klerk et al. (2015) and Li et al. (2018) shows that a higher corporate ESG performance disclosure level positively correlates with higher market value. Companies initiating corporate ESG performance disclosure have higher market valuations on the Chinese stock market than other companies (Wang and Li, 2016). On the Johannesburg Stock Exchange (JSE), the new regulatory requirement to utilise integrated reporting (IR) standards by combining corporate ESG performance disclosure information with traditional financial reports has eventuated in a substantial increase in earning power evaluation analysis (Marcia et al., 2016). Based on KPMG (2017) survey results, integrating corporate ESG performance disclosure with annual financial reports has significantly increased among US companies. Comparing the corporate ESG performance disclosure of a sample of European, Canadian and US companies revealed that ESG disclosure reduced information risks and, consequently, enhanced the company's market values (Aerts et al., 2008).

In contrast, a study of the UK stock market finds no positive market reaction to ESG activities (Clacher and Hagendorff, 2012). Furthermore, Richardson and Welker (2001) find a negative relationship between corporate ESG performance disclosure and stock market value among Canadian-listed companies. Although the disclosure of ESG-related expenditure in European markets leads to higher market value, this type of disclosure is found to be neutral in its effect on investors in the US, Japanese and Australian markets (Bird et al., 2012).

Lys et al. (2015) provide evidence that the positive correlation between ESG expenditure and stock return is likely to be due to ESG-related expenses ‘signalling’ possible future outcomes rather than operational returns. Companies undertake ESG expenditure as they are predicting superior future financial performance. Therefore, participation in global ESG initiatives and voluntary principles-based programs could embed competitive advantages (Arevalo and Aravind, 2017). Companies that adopt ESG policies and procedures outperform their competitors' market values (Shrivastava and Addas, 2014). The increasing customer focus on corporate ESG performance assists companies to differentiate themselves from their competitors, with this positively correlated with the company's operational performance (Kiessling et al., 2016).

Evidence shows that corporate ESG performance disclosure is essential for investors and financial institutions as institutional investors require this information for investment decision-making (de Villiers and Van Staden, 2010). Investors reacted positively when the first Newsweek Green Ranking (NGR) report (a multi-dimensional rating of corporate ESG performance disclosure) was published on the US stock market in 2009. According to Cordeiro and Tewari (2015), the NGR reports provide valuable information to investors and are understood by environmentally conscious stakeholders as providing more substantial future cash flows. Green innovation, followed by green product innovation, helps to enhance environmental performance and boost organisational performance (Huang and Li, 2017). Investors will pay a premium to hold 'saint firms' (companies with greater engagement in ESG initiatives).

Conversely, investors expect some discount for investing in 'sin firms' (companies in the alcohol, smoking, tobacco and gaming industries) (Koh et al., 2015). As a specific component of corporate ESG performance disclosure, environmental strength creates greater market value for a company in the long run (Cai et al., 2016). Without corporate ESG performance disclosure, the market fails to incorporate the value of intangible assets from ecological strength into stock prices. On the other hand, from an investor's viewpoint, greenhouse gas (GHG) emissions are considered negative equity valuation elements. This valuation does not differ between voluntary or involuntary disclosure (Griffin et al., 2017). Barnea et al. (2013) argue that even companies without an excellent corporate ESG performance disclosure reputation could affect altruistic investors through spending on corporate ESG performance.

The other main hypotheses of the current study presented in the second paper (Chapter 4) address the relationship between corporate ESG performance and financial performance over time, with this motivated by the inconsistent findings of previous literature that leave this line of study unresolved. However, as there are different disclosure requirements for different industries, a further investigation of whether there is a difference in the impact of corporate ESG disclosure and financial performance across different industry sectors, and the following section will discuss the motivation of this additional hypothesised relationship.

2.8. ESG Performance Disclosure and Financial Performance Across Industries

According to the stakeholder theory, establishing and maintaining relationships with diverse stakeholders is highly important for corporate success (Clarkson, 1995). Stakeholder theory also links the industry sectors as the influential variable to ESG disclosure (Melville, 1990,

Waddock and Graves, 1997). Corporate ESG performance disclosure is a strategic tool to recognise stakeholders' expectations, understand ESG related risks and opportunities, and respond to them publicly. Managing the satisfaction of a diverse group of stakeholders contributes to financial performance (Donaldson and Preston, 1995, Jones, 1995). Corporate managers need to maintain and balance the ESG related standards and strategies to be responsive to the diverse group of stakeholders and their expectations (Filatotchev et al., 2019). Companies are encouraged to disclose ESG engagements to stakeholders to enhance their reputation and maintain accountability (Said et al., 2009) which, in return, results in generating value for the company (Forcadell and Aracil, 2017). The diversity of stakeholder needs and expectations is alluded to in RQ2. Due to the differences in stakeholder composition and their expectations, this study argues that the impacts of corporate ESG performance disclosure on the company's financial performance are likely to be different across different industry sectors.

Scholars have investigated the impacts of industrial characteristics on the relationship between corporate ESG engagement and financial performance from different perspectives. Hoepner and Yu (2010) witnessed a positive association between corporate social performance and financial performance only for limited industry sectors, including consumer discretionary and health care. Hoepner and Yu (2010) argue that the evaluation must be considered in the industry's context. Baron et al. (2011) evidence a positive association between corporate social performance and financial performance in the consumer industry sector and a negative association in the industrial sector. Incorporating the moderating impact of industrial differentiation into the relationship, Hull and Rothenberg (2008) recommend a complex but financially beneficial association. Their argument corroborates Barney (1991) that sustainable competitive benefits depend on several intertwined competencies, including differentiation through better corporate ESG performance disclosure.

The literature on corporate ESG and financial performance and further comparison across diverse industries is limited. This study investigates the differences between corporate ESG performance and financial performance across industries. This study argues that the mixed and counterintuitive findings of the previous studies on the relationship might be the outcome of different stakeholder groups and expectations among companies that operate in diverse industry sectors with particular conditions and strategies. The second paper (Chapter 4) investigates the heterogeneous relationship between ESG engagement and companies' financial performance.

2.9. Corporate Carbon Emissions Performance Disclosure and Idiosyncratic Risk

Creating value for all stakeholders by concentrating on common interests is a core element of stakeholder theory. The stakeholder pressure for carbon emissions performance disclosure is linked to the value creation concept and must be aligned with corporate strategic decision making (Freeman et al., 2010). Therefore, managers must set corporate strategies that respond to stakeholders and match corporate needs with resources (Deegan, 2014). On the other hand, companies use disclosure to elaborate on their environmental performance. Therefore, they will be rewarded with more investment from the equity market, higher consumer trust, higher employee productivity, and stakeholders' support (Richardson et al., 1999).

The emergence of carbon or carbon-related emissions regulations makes carbon risk management a dominant business strategy (Clarkson et al., 2015). Due to the uncertainty of future carbon emissions regulations and related risks, a company's exposure to carbon emissions increases the uncertainty of its future cash flow, earnings and brand damage (Labatt and White, 2011b, Sharfman and Fernando, 2008, Schneider, 2011, Chen and Gao, 2012). Some literature provides evidence of a positive association between corporate carbon performance and a company's total and idiosyncratic risk (Bouslah et al., 2013). Providing carbon performance disclosure or developing a corporate environmental reporting mechanism is costly and could be interpreted as an additional operational risk (Peters and Romi, 2014, Cormier and Magnan, 2015). Furthermore, in light of corporate environmental performance, the practice of voluntary disclosure does not necessarily equate to good performance (Al-Tuwaijri et al., 2004). Managers may over-disclose information symbolically or use the disclosure mechanism to appear environmentally sensitive. This implies that environmental disclosure may be substantially inefficient. Regulations on environmental performance disclosure could further impact company-specific risks. Corporate carbon emissions performance disclosure could reduce the idiosyncratic risk if the performance is perceived as outstanding; otherwise, it is a concern for stakeholders and increases the idiosyncratic risk (Brown and Deegan, 1998, Lee et al., 2015).

Investigating the impact of corporate carbon emissions performance on the different aspects of company risk is an important yet under-researched area in the accounting and finance literature (Tzouvanas et al., 2020). Some studies in the literature predict that corporate environmental performance disclosure would improve information asymmetries and reduce idiosyncratic risks (Dhaliwal et al., 2011, Qiu et al., 2016, Benlemlih and Girerd-Potin, 2018). Gaspar and Massa (2006) argue that companies that include environmental responsibility in

their operating strategy can construct a solid relationship with stakeholders, thereby lowering idiosyncratic risk. Poddi and Vergalli (2009) use systematic risk (beta) from the capital asset pricing model (CAPM) as a proxy for company risk and investigate the impact of corporate environmental performance disclosure on a company's systematic risk. They find that corporate environmental performance disclosure can effectively minimise systematic risk. Salama et al. (2011) and Oikonomou et al. (2012) find a moderate negative association between the level of environmental performance disclosure and idiosyncratic risk. This is consistent with Jo and Na (2012), who argue that companies use environmental disclosure for risk management purposes. Jiang et al. (2009) argue that a corporate carbon emissions performance disclosure improves idiosyncratic risk and commits a company to its carbon emissions reduction plan. However, such a mechanism could be detrimental as it exposes companies to potential criticism and costs related to pollution abatement (Lee et al., 2015). Corporate carbon emissions performance disclosure can negatively impact investors concerned about the 'green' future and related investment strategies (Cormier and Magnan, 2015). In contrast to the extant literature investigating the impact of corporate environmental performance on financial performance or systematic risk, studies concentrating on the direct impact of corporate carbon emissions performance disclosure on idiosyncratic risk are limited (Jo and Na, 2012, Cooper et al., 2018, Benlemlih and Girerd-Potin, 2018).

The current study argues that, although mitigating the risks and financial impacts of corporate carbon emissions performance disclosure is difficult, the associated impacts must be clearly understood. Another main hypothesis of this study posits that companies with higher carbon emissions have a higher idiosyncratic risk, as discussed in the fourth paper (Chapter 5).

2.10. Carbon Emissions Performance Disclosure and Cost of Capital (COC)

A company's intensive carbon emissions performance and related risks are likely to encounter a higher default risk from the capital market perspective. Higher carbon emissions result in more compliance costs, impaired profitability and cash flows (Weber, 2012, Subramaniam et al., 2015). Environmentally irresponsible companies are more exposed to brand damage, potential operational disruption, market competition loss, and damaging future cash flows (Labatt and White, 2011b). Corporate carbon emissions performance should be an essential element of a company's risk assessment for investment decision-making (Matsumura et al., 2014a). Financial institutions may encounter additional regulation and reputational risks associated with carbon-related projects (Wegener et al., 2013, Li et al., 2014). Therefore, corporate carbon emissions can potentially damage a lender's ability to capture more customers

and eventually more revenue streams (Thompson, 1998, Weber, 2012, Subramaniam et al., 2015). Kim et al. (2015) argue that financial institutions apply a higher premium risk for carbon polluting companies with higher carbon emissions. Credit rating agencies downgrade companies with higher carbon emissions (Matsumura et al., 2014a, Li et al., 2014). The evidence indicates that capital markets have incorporated related risks into financing operations regarding the increasing public concerns and regulations on corporate carbon emissions performance. This is through using policies that enable them to manage their exposures to carbon emissions risks.

Prior research studies largely concentrate on corporate environmental performance and the impacts of related risks on a company's cost of capital, with little focus narrowly on corporate carbon emissions performance (Sharfman and Fernando, 2008, Clarkson et al., 2013, Maaloul, 2018, Jung et al., 2018, Bui et al., 2020). Sharfman and Fernando (2008) report a positive association between a particular environmental risk measure and COD across a sample of United States (US) companies. Clarkson et al. (2013) find no relationship between corporate environmental performance and COE but a positive and significant association between poor environmental performance and cost of equity (COE). In a study on Canadian-listed companies, Maaloul (2018) finds corporate carbon emissions increase COD by an average of 11–15%. Jung et al. (2018) find a positive relationship between a measure of corporate carbon risk awareness and cost of debt (COD). More recently, in a multinational study by Bui et al. (2020), corporate carbon emissions performance find to be positively associated with the cost of equity (COE). However, as it is argued by Aldamen and Duncan (2013), investigating the economic impact of corporate carbon emissions performance exclusively from either the equity or debt market cannot provide a complete resolution.

Prior studies on the relationship have created an extensive debate amongst academics and practitioners to investigate how corporate carbon emissions performance help to improve energy efficiency and minimise the cost to the economy. The emissions reduction legislation may lead to higher financial costs and related risks for companies that fail to improve their carbon emissions performance. This study argues that the significant impact of carbon emissions performance initiatives and regulations on businesses should be clearly understood, even though it is hard to mitigate their risks and financial impacts.

The carbon emissions reduction regulation may lead to higher financial costs and related risks for companies that fail to improve their carbon performance. The third study argues that the significant effect of carbon performance regulations on businesses should be clearly

understood. Businesses are required to tolerate significant carbon performance costs to be capable of operating 'green'. The third paper (Chapter 5) investigates whether corporate carbon emissions performance disclosure leads to a higher cost of capital (COC).

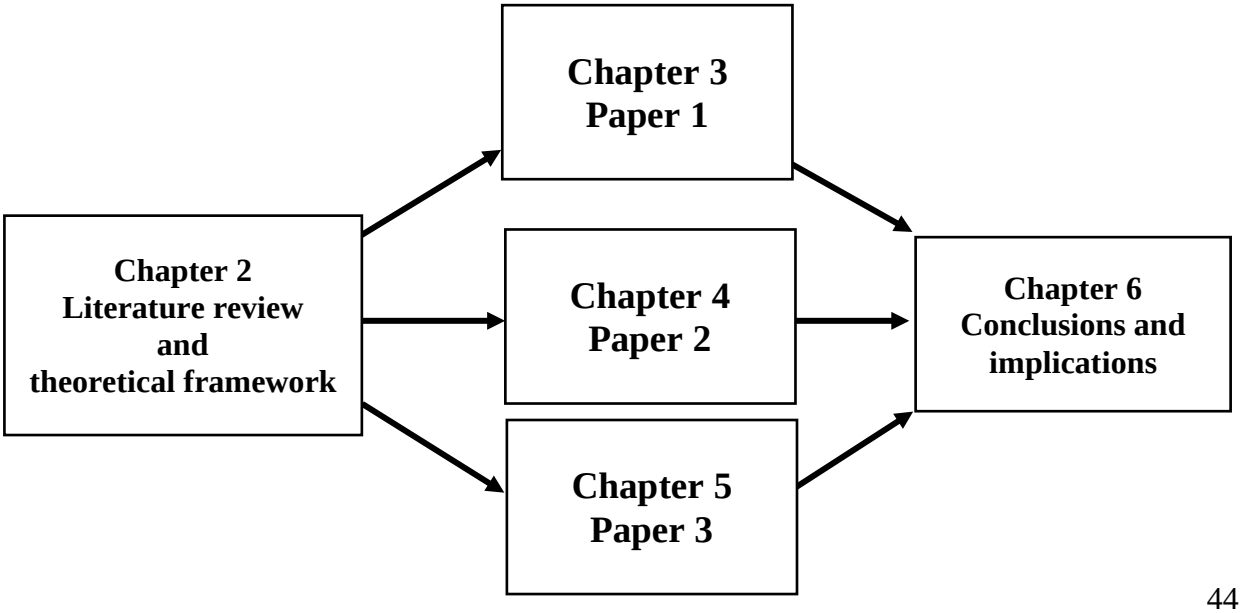
2.11. Chapter Summary

In the introduction section, this chapter firstly discusses corporate ESG performance disclosure and related regulations. This discussion mainly concentrates on Australia's *Corporations Act 2001* and its disclosure requirement, the ASX CGC, the National Pollutant Inventory and the *National Greenhouse and Energy Reporting (NGER) Act 2007*. Sections 2.4–2.10 then discuss the literature and theoretical framework on the economic implications of corporate ESG performance disclosure and corporate carbon emissions performance disclosure.

The next chapter (Chapter 3) presents the first paper of this thesis investigating the implications of corporate ESG performance disclosure on the company's COC and idiosyncratic risk. The second paper (Chapter 4) assesses the Australian corporate improvement in ESG performance disclosure over time. It also investigates the association between corporate ESG performance disclosure and a company's financial performance (measured by market value) and the diversity of this relationship across industries. The final paper (Chapter 5) explores the relationship between corporate carbon emissions performance disclosure and a company's idiosyncratic risk and cost of capital (COC).

Figure 2.1 displays how the thesis hypotheses are investigated in the following three chapters as well as how the study presents the conclusions of the findings.

Figure 2-1: Thesis Structure



3. CHAPTER THREE

Corporates' sustainability disclosures impact on cost of capital and idiosyncratic risk

3.1. Chapter Introduction

Chapter 2 provided the theoretical framework and literature review for this thesis. The extant literature supports the theoretical development for this thesis, which led to the development of the two main research questions with six subcategories. This chapter provides the first paper and is developed based on two hypotheses constructed from prior literature from the concepts within stakeholder theory. Hypothesis 1 was the basis for investigating the impact of corporate environmental, social and governance (ESG) disclosure on the company's costs of capital (COC). Hypothesis 2 enables the investigation of corporate environmental, social and governance (ESG) disclosure on the company's idiosyncratic risk. This chapter also investigates similar examination using individual elements of corporate ESG performance disclosure, including environmental (ENV), social (SOC) and governance (GOV). Therefore, it examines the impact of corporate ENV, SOC, and GOV performance disclosure on its COC and idiosyncratic risk. Section 3.2 present the first empirical study. Section 3.3 provide a summary of the contents of this chapter.

3.2. Empirical Study (Paper One)

Corporates' sustainability disclosures impact on cost of capital and idiosyncratic risk

Abstract

Purpose – This study investigates not only the association between corporate environmental, social and governance (ESG) performance and the cost of capital but also its impact on the company's idiosyncratic risk. Further, it highlights that companies could manage their risk through sustainability initiatives to achieve a cheaper cost of financing.

Design/methodology/approach – Employing an extensive Australian sample for the 2007–2017 period from the Bloomberg database, this study conducts a panel (data) regression analysis to examine the impact of the corporate ESG performance disclosure score on the cost of capital (COC) and idiosyncratic risk. The robustness of the findings is tested and confirmed in several ways, including a sensitivity test. Furthermore, the instrumental variable (IV) approach is utilised to address potential endogeneity issues.

Findings – A favourable association was found between a higher corporate ESG performance disclosure score and cheaper resources financing. The evidence also supports the mitigating impact of corporate ESG performance disclosure score on the company's idiosyncratic risk as a strong complement for access to a cheaper source of funds. The findings strongly support both hypotheses of this study.

Research limitations/implications – This study extends the current body of knowledge addressing these associations. Further studies should expand the investigation to non-listed or small and medium-sized companies. Additionally, future studies could contribute to the literature by including other moderating variables, such as a country's cultural environment and diverse economic situations.

Originality/value – An extensive literature review suggests that this study is the first that simultaneously evaluates the impact of corporate ESG performance disclosure on a company's COC and idiosyncratic risk.

Keywords – environmental, social and governance (ESG), cost of capital (WACC), idiosyncratic risk

Paper type – Research paper

Introduction

The pursuit of corporate environmental, social, and governance (ESG) criteria to improve a company's sustainable performance has become increasingly crucial in recent years (Bassen *et al.*, 2006). Publicly listed companies are progressively taking more responsibility toward ESG performance and its related risks. Additionally, investing in companies with higher ESG performance is increasingly preferred by institutional investors (Guenster *et al.*, 2011). An increasing number of multinational corporations have integrated their ESG performance into their strategies (Jo and Harjoto, 2011). The introduction of the Australian corporate ESG disclosure guideline in 2011 by the Australian Council of Superannuation Investors (ACSI, 2011), one of the country's largest institutional investors, is only an example of the importance of ESG performance.

The recent rise in corporate ESG performance or corporate social responsibility (CSR)[1] has motivated researchers to investigate whether corporate ESG performance disclosure leads to value creation. The extant research has investigated the association between corporate ESG performance and operational, financial and equity market performance but reports inconclusive answers (Margolis *et al.*, 2009, Jiao, 2010). Additionally, only a few research investigate the capital market perception of corporate ESG performance disclosure (Sharfman and Fernando, 2008, El Ghoul *et al.*, 2011, de Klerk and de Villiers, 2012, de Klerk *et al.*, 2015). The inconsistencies in findings and the paucity of research that directly examines how corporate ESG performance disclosure impact a company's cost of capital (COC) motivate investigating this association. Therefore, this study seeks to answer whether the debt and equity markets consider the corporate ESG performance disclosure. This study seeks to both extend the understanding of the economic implications of corporate ESG performance disclosure and respond to the prior literature's call for further investigation (Kempf and Osthoff, 2007, Sharfman and Fernando, 2008)[2].

This study refers to the corporate disclosure strategies and the market imperfection concept that may impact a company's COC and idiosyncratic risk. This study reviews prior research and articulates that a better corporate ESG performance disclosure has a range of outcomes. First, it results in mutual trust and a more efficient social contracting with stakeholders (Jones, 1995). If corporate ESG performance disclosure impacts the perceived riskiness of a company, then better ESG performance disclosure should result in lower COC. Second, companies with better ESG performance provide more disclosure, showing better transparency and compliance with regulations (Dhaliwal *et al.*, 2011). This reduces the information asymmetry issues

(Botosan, 1997, Hail and Leuz, 2006), leading to a lower COC (Hubbard, 1998, El Ghoul *et al.*, 2011, Cheng *et al.*, 2014). Third, the COC represents the rate of return required by the equity or debt market and thus is an important input in a company's long term decision making. Investigating the impact of corporate ESG performance disclosure on the company's financing cost should help the company's directors in strategic planning. Indeed, the COC can be a tool that both equity and debt markets encourage companies to be more socially responsible (Heinkel *et al.*, 2001, El Ghoul *et al.*, 2011).

The extended focus of the current study is motivated by prior studies' findings that corporate ESG performance disclosure impacts a company's idiosyncratic risk through better social contracting with stakeholders (McGuire *et al.*, 1988, Dhaliwal *et al.*, 2014, Becchetti *et al.*, 2015). Idiosyncratic risk accounts for most of the fluctuation in a company's valuation (Bansal and Clelland, 2004). Financial resource providers allocate a lower cost of financing for companies with lower risk (Merton, 1987). Chatterjee *et al.* (1999) state that corporate activities that lower idiosyncratic risk would enable companies to access cheaper financial resources. Previous studies mainly focused on the operating performance results of corporate ESG performance disclosure. Few studies exist on whether corporate engagement in ESG activities can reduce idiosyncratic risk (Sharfman and Fernando, 2008, Luo and Bhattacharya, 2009, Jo and Na, 2012). This study argues that a good corporate strategy, including ESG disclosure, can contribute to a solid relationship with stakeholders, improve information asymmetry, thus lowering idiosyncratic risk. This study aims to extend the research scope of Jo and Na (2012), which report corporate ESG performance inversely impacts a company's idiosyncratic risk.

This longitudinal study investigates Australian corporate ESG performance disclosure from 2007 to 2017. Australian stakeholders are increasingly concerned with corporate ESG performance and related risks such as environmental degradation or child labour (Hanson and Tranter, 2006). This has led to the introduction and further improvement in the Australian Securities Exchange (ASX) Corporate Governance Council (CGC) in 2003 and related risk guidelines in 2007 (ASX CGC, 2007). The ASX CGC has issued two further sets of Principles and Recommendations in 2014 and 2019. In the third issue, recommendation 7.4 states that "listed entity should disclose whether it has any material exposure to economic, environmental and social sustainability risks and, if it does, how it manages or intends to manage those risks" (ASX CGC, 2014)[3]. Furthermore, unlike previous studies concentrating on U.S. and U.K. companies, this study investigates a broad sample of Australian listed companies.

This study offers several contributions to the literature. First, an extensive literature review suggests that this study is the first which use a large panel of Australian companies between 2007 and 2017 to investigate the impact of corporate ESG performance disclosure on both COC and idiosyncratic risk simultaneously. Moreover, previous studies have investigated the association using the cost of equity (COE) or cost of debt (COD) individually. In contrast, this study utilises a combined measure of capital cost, including debt and equity market, therefore, provide a better resolution as requested in prior literature (Jung *et al.*, 2018). Second, this study improves previous literature by providing a better estimate of the impact of corporate ESG performance disclosure on a company's COC and idiosyncratic risk after controlling other financial characteristics of the companies in the long run, as stated by Cheng *et al.* (2014). Third, this study has a two-fold extension on the prior literature: value creation and risk mitigation. The initial extension adds to the value creation of a better corporate ESG performance disclosure consistent with prior studies (McGuire *et al.*, 1988, Starks, 2009, de Klerk *et al.*, 2015, Horn *et al.*, 2018). It investigates corporate ESG performance disclosure and its impact on the company's COC through improving social contracting with stakeholders and, thus, reducing information asymmetries. The second extension evaluates the impact of corporate ESG performance disclosure on the company's idiosyncratic risk through improved corporate transparency. Thus, this study provides empirical evidence to support the idea that the capital market is pricing corporate ESG performance disclosure, which is reflected in the company's COC and idiosyncratic risk.

The findings of this study are consistent after performing robustness checks, including alternative assumptions and model specifications. Following Gupta (2018) and Bui *et al.* (2020), this study uses the simultaneous equation model to test the robustness of findings. This model provides an appropriate alternative for the corporate ESG performance disclosure to evaluate its impact on a company's COC and idiosyncratic risk. The results are consistent after controlling the potential endogeneity issue of the primary model. The findings support the argument in the literature that ESG engagement reduces the company's COC and mitigates idiosyncratic risk. In order to address the endogeneity issues, this study utilises an instrumental variable (IV)[4] approach for re-examining the main estimation models, which follows previous literature (El Ghoul *et al.*, 2011, Attig *et al.*, 2013, Li *et al.*, 2018, Fatemi *et al.*, 2018).

The remainder of this paper is organised as follows. Section 2 explains the current study's theory, relevant literature, and hypotheses development. Section 3 describes the data and

methodology, and estimation model. Section 4 presents the empirical evidence and robustness check, and section 5 concludes the paper.

Theoretical framework and hypotheses development

The concept of sustainability performance refers to the inclusion of a broader corporate focus beyond short-term profit maximisation through considering the impact of its operations on all stakeholders, including community, society and the environment (Freeman, 1984). The motivations that may explain the implications of corporate ESG performance disclosure can be related to the legitimacy theory. The increasing public attention to the corporate ESG performance has put significant pressure on companies to disclose information on their ESG performance to secure corporate legitimacy. Moreover, companies use corporate ESG performance disclosure as a strategic mechanism to establish and enhance legitimacy (Lindblom, 1994, Chen and Roberts, 2010). This creates a mutual trust representing a more efficient social contracting with stakeholders (Jones, 1995). In this context, Raji and Hassan (2021) argued that an unwritten social contract exists between businesses and communities that the businesses will consider the stakeholders' expectations to provide corporate resources.

Previous literature has used the legitimacy theory to link the perception of "legitimacy" to the notion of "social contract theory". These studies refer to the existence of a social contract between a corporation and society, where corporate activities are perceived as complying with social expectations (Mathews, 1995). Corporate legitimacy is an essential organisational resource for its survival and is conferred upon the organisation by society (Dowling and Pfeffer, 1975, O'Donovan, 2002). This resource can be managed or impacted by various corporate disclosure strategies (Woodward *et al.*, 1996). Corporate ESG performance disclosure provides the required information to show business commitment to stakeholders' expectations (de Villiers and Lubbe, 2019, Deegan, 2020). The provision of a higher corporate ESG performance disclosure motivates financial resource providers to reciprocate positively and reward these corporations with cheaper sources of capital (Johnson, 2020). Conversely, corporations failing to comply with the social contract has costly consequences. For example, it can lead to various sanctions against the corporation, such as restricting its financial or capital resources (Deegan and Rankin, 1996). Corporate ESG performance disclosure can also help companies reduce the risk associated with the impact of new regulation or fiscal action (Freeman and Reed, 1983, Berman et al., 1999) and attract socially responsible investors (Kapstein, 2001). Further, many financial institutions have adopted strategies that provide resources to companies with higher ESG performance (Equator Principles, 2013). These

initiatives support the argument that companies with higher ESG performance disclosure might source their financial needs at a cheaper rate.

Referring to the legitimacy theory, this study argues that improvement in the corporate ESG performance disclosure leads to access to cheaper sources of capital. This is because of two important reasons. First, it improves corporate commitment to and relationships with stakeholders by creating mutual trust (Jones, 1995). Second, previous studies find that corporations with better ESG performance are more likely to provide related disclosure as it represents transparency and more compliance with regulations (Freeman and Reed, 1983, Dhaliwal *et al.*, 2011). This reduces the information asymmetry issues (Botosan, 1997, Hail and Leuz, 2006), leading to a lower COC (Hubbard, 1998, El Ghoul *et al.*, 2011, Cheng *et al.*, 2014).

Corporate ESG performance and disclosure is still considered a young discipline (Schaltegger *et al.*, 2013, Dumay *et al.*, 2017) and has emerged as a primary focus of many institutions, mutual funds, and scholarly publications (Bassen *et al.*, 2006). This has contributed to substantial research investigating the link between corporate ESG performance disclosure and financial performance but yields contradictory results (Margolis *et al.*, 2009, Jiao, 2010). For instance, a group of studies argues that corporate ESG performance imposes more costs on companies, leading to an extra financial burden (Aupperle *et al.*, 1985, Jensen, 2002, Friedman, 2007). Investors perceive corporate ESG performance as additional indirect costs that erode a company's financial resources (Becchetti *et al.*, 2012).

In contrast, a group of studies support the positive implications of corporate ESG performance disclosure by reducing capital costs (Clarkson et al., 2004, El Ghoul et al., 2011, Dhaliwal et al., 2011, Dhaliwal et al., 2014, Ng and Rezaee, 2015). These studies concentrate on the role of the capital market as a middle mechanism through which corporate ESG performance disclosure led to a cheaper COC for companies. Clarkson *et al.* (2004) stated that the capital markets use corporate ESG performance disclosure to assess a company's unbooked ESG-related expenses and liabilities. Therefore, it impacts the investor's required rate of return, hence the company's COC. Dhaliwal *et al.* (2011) found that companies with historical records of higher COC tend to initiate ESG performance disclosure to achieve a lower COC. They also found that companies with superior ESG performance disclosure achieve a significantly lower COC than lower performers. In another international study on 31 countries, referring to transparency regarding corporate ESG concerns, Dhaliwal *et al.* (2014) found that the negative association between corporate ESG performance disclosure and COC is more pronounced in

countries or companies with higher levels of financial opaqueness. Focusing on the US-listed companies, El Ghoul *et al.* (2011) and Ng and Rezaee (2015) argue that corporate disclosure on the ESG-related investment reduces the company's COC owing to a higher investor attraction and lower perceived risk. The inconsistent results of prior studies leave a gap in the body of knowledge that needs further investigation (Margolis and Walsh, 2003, Mohammad and Wasiuzzaman, 2021). The inclusion of the cost of equity and debt capital, concurrently, should provide a comprehensive platform to investigate the impact of corporate ESG performance disclosure on capital costs.

This study postulates that a higher corporate ESG performance disclosure leads to lower capital costs due to the reduced information asymmetry and better relationship with stakeholders through a higher corporate ESG performance disclosure.

According to the above discussion, this study proposes the following hypothesis:

H1: There is an inverse association between the level of ESG disclosure and a company's COC.

According to the legitimacy theory, corporate ESG performance disclosure led to a long-term value generation for companies by satisfying a company's social responsibilities, meeting social norms and commitment and improving corporate reputation (Deegan and Rankin, 1996), thus lowering company-specific or idiosyncratic risks (Freeman, 2010, Deegan, 2014). This is through multiple theoretical mechanisms. First, it represents more corporate transparency, lowering information asymmetry among investors and between the company and capital markets. Therefore, it attracts financial resource providers due to a lower risk assessment (Amihud and Mendelson, 1986). With this respect, de Klerk and de Villiers (2012) and Harjoto and Jo (2015) argue that corporate ESG performance disclosure reduces a company's idiosyncratic risk due to the lower information asymmetry between the companies and shareholders. Second, as stated by Barry and Brown (1985) and Lambert *et al.* (2007), better corporate disclosure can help reduce company-specific risk and parameter uncertainty in company pricing models used in capital markets. Third, a higher level of transparency reduces the monitoring costs, improve equity market recognition, leading to improved company-specific risk-sharing (Merton, 1987). Godfrey (2005) stated that corporate ESG performance disclosure provides insurance-like protection to stakeholders' wealth and serves as public protection for a company's performance (Godfrey, 2005, Godfrey et al., 2009. Conversely, irresponsible companies with lower ESG performance may encounter more allegations of

corporate wrongdoing (Waddock and Graves, 1997), thus facing a higher level of idiosyncratic risk (Frederick, 1995, Starks, 2009).

Prior studies show that higher corporate ESG performance disclosure can favourably reduce the company's idiosyncratic risk (Sharfman and Fernando, 2008, Luo and Bhattacharya, 2009, Jo and Na, 2012). Improving corporate ESG performance reduces any potential crisis rooted in ESG elements that can negatively impact the company's operation, consequently reducing idiosyncratic risk (Sharfman and Fernando, 2008). Insisting on the importance of managing relationships with stakeholders, Luo and Bhattacharya (2009) argue that corporate ESG performance disclosure empowers companies with efficient investors relationship, consequently lowering the company's idiosyncratic risk. Jo and Na (2012) found an inverse association between corporate ESG performance disclosure and the company's idiosyncratic risk, which is more significant for controversial industries such as tobacco, alcohol, gambling. Failing to maintain stakeholders' expectations or being involved in negative ESG activities can result in severe operational consequences ranging from customer boycotts (Klein *et al.*, 2004), supply chain disruptions (Carter, 2000) and employees strike (Greening and Turban, 2000), that increase the company's idiosyncratic risk.

This study postulate that corporate ESG performance disclosure represents better social contracting with stakeholders and reduce the company's idiosyncratic risk. The second hypothesis of this study is:

H2: There is an inverse association between the level of ESG disclosure and a company's idiosyncratic risk.

Research design

This study captures the ESG data for all Australian publicly listed companies from the Bloomberg database for the 2007-2017 period. This study period is chosen because companies mainly started to engage in ESG performance in 2007, possibly due to the Global Financial Crisis (GFC) between 2008-2009. Since the start of the GFC, where the main driver of the financial crisis was the irresponsible behaviour of companies toward their ESG performance, the pursuit of environmental, social and governance (ESG) has increased globally (Eberle *et al.*, 2013). The evidence shows that companies with higher ESG performance have performed better financially during the GFC period (Lins *et al.*, 2017). This period also coincided with introducing and further improving the ASX Corporate Governance Principles and Recommendations with its second edition in 2007. This study uses a Panel (data) regression analysis to examine the impact of the corporate ESG performance disclosure on COC and

idiosyncratic risk. The following five subsections discuss the measurements of the variables, explain the data collection process, and establish the estimation models.

Measures of ESG

To evaluate the association between corporate ESG performance disclosure, cost of capital and idiosyncratic risk, this study first captures the ESG data from the Bloomberg database as the primary independent variable. Despite highly regulated financial disclosure, corporate ESG performance disclosure is predominantly voluntary. Corporate ESG performance disclosure score in Bloomberg reflects the level of corporate nonfinancial disclosure.

Several different databases have been developed recently for assessing and rating the corporate ESG performance disclosure (such as Bloomberg, Asset 4 and RepRisk). There are numerous providers of corporate ESG databases these days indicating the significance and high demand for corporate ESG performance information by stakeholders. The ESG information and rating on the Bloomberg database has the highest consistency across all databases (Halbritter and Dorfleitner, 2015, Semenova and Hassel, 2015). Based on the impact report provided by Bloomberg (2018), this database covers more than 11,500 companies across 83 countries.

The rating system on Bloomberg is based on 120 indicators across three dimensions of the corporate environment, social and governance performance[5]. The indicators in the Bloomberg ESG data include carbon emissions, climate change impacts, waste disposal, renewable energy, supply chain, pollution, the depletion of resources, political contributions, discrimination, diversity, human rights, cumulative voting, community relations, executive compensation, shareholders' rights, and independent directors (Huber *et al.*, 2017). Bloomberg evaluates companies annually, capturing ESG information disclosed via ESG, CSR, sustainability and annual reports, or other official portals. The data are controlled and standardised. The ESG rating scores obtained from Bloomberg range from a minimum of 0.1 to a maximum of 100. Bloomberg data have been used in several academic studies (Baldini *et al.*, 2018, Li *et al.*, 2018). This study follows Di Giuli and Kostovetsky (2014) to normalise the ESG data to a notionally standard scale.

Cost of capital

Since most publicly listed companies usually finance themselves with a combination of debt and equity capital, its combined cost of financial resources is a more reliable figure for the cost of capital. This means the average rate, including the cost of debt and equity, forms the weighted average cost of capital (WACC). Following the previous research by Sharfman and

Fernando (2008), this study uses WACC (which is named COC in this study) calculated by the Bloomberg database to measure the company's financial or debt cost. WACC is applied in this study to address both the cost of equity (COE) and the cost of debt (COD) as a combined measure. COE is the required rate of return after considering a company's associated risks in the market. Investors use this rate to discount a company's future cash flow generation. The higher investor's required return, the higher the capital cost for the company to finance itself through the stock market. In other words, COE is the discounted rate used by the market for measuring a company's present market value according to the company's future cash flows. *Ceteris paribus*, it is expected that companies with a lower COE achieve higher market valuation, therefore attracting more investors. COD results from corporate financing through public resources such as the debt market, including private institutions, financial institutes, or banks. Regardless of how the company chooses its financing options, both sectors imply interest costs (Sharfman and Fernando, 2008).

Company's Idiosyncratic risk

Idiosyncratic risk is responsible for most of the volatility and uncertainty surrounding a particular asset over time. A company's investment strategies, management decisions, financial policies and procedures, geographic location, and even corporate culture could be considered elements of idiosyncratic risk. Some of the ESG elements could potentially impact the company's creditworthiness, such as the scarcity of resources, limiting monetary policies and increasing the cost of capital, which is highly important in different economic situations. Therefore, including ESG elements into long-term corporate strategies, such as investment or credit risk evaluation, is highly important (Richardson, 2009).

This study uses various measurements of financial risks, such as systematic and idiosyncratic risk, to examine the impact of corporate ESG performance disclosure on idiosyncratic risk. Following prior accounting literature (Mishra and Modi, 2013, Benlemlih, 2017), this study measures idiosyncratic risk by considering total risk. Theoretically, the total risk combines market risk (Beta or systematic risk) and idiosyncratic risk (company-specific risk). The total risk is traditionally calculated by the variance or the standard deviation of market return (Ross *et al.*, 2008). This study estimates systematic risk (the risk applying to all companies in the industry) by beta. The beta provided by the Bloomberg database is measured based on the CAPM beta associated with the market return. The CAPM beta calculates the company's systematic risk relative to the market risk in general (Oikonomou *et al.*, 2012, Sassen *et al.*,

2016). This study uses the beta provided by the Bloomberg database to calculate idiosyncratic risk for the years 2007-2017.

Idiosyncratic risk accounts for the remaining difference between total and systematic risk (Sassen *et al.*, 2016). This is consistent with Fama and French (2017) model for calculating the residuals, representing the idiosyncratic risk. This measurement model is relevant as it includes more influential elements that impact the entire company's return (Fama and French, 2017, Luo and Bhattacharya, 2009).

Sample and data

In addition to the corporate ESG information, this study collects other company characteristics' determinants, such as total assets (LNTA); total liabilities (LEVERAGE); total revenue (GROWTH); cash (CASH); capital expenditure (CAPEX); property, plant, and equipment (PPE); the size of the board (BOARD_SIZE) and the size of the audit committee (AUDIT COMMITTEE). The definitions of the variables are presented in the Appendix (Table AI).

The primary sample includes more than 127,000 observations of Australian listed companies between 2007-2017. After collecting data on other companies' characteristics, this study matches them with corporate ESG data. The variables of interest for this study and missing data lead to the finalised sample presented in panel A of Table I, which includes 30,735 observations for 3,422 publicly listed companies. Table I represents the sample selection and distribution from 2007 to 2017. Panels A, B and C of Table I shows the sample selection, year, and industry sector distributions, respectively.

According to Epstein *et al.* (2014), the sample selection bias can influence the association between corporate ESG performance disclosure and corporate performance. The dataset used in this study covers all Australian publicly listed companies; thus, the sample selection bias is significantly minimum in this study.

[INSERT Table I HERE]

[INSERT Table II HERE]

Estimation models

This section presents two estimation models: one for each hypothesis.

Estimation model for hypothesis 1

According to the conceptual framework proposed by de Villiers *et al.* (2017), the internal organisation elements (such as the size, profitability, revenue growth, leverage, ownership structure, corporate governance, and organisational culture), as well as external elements

(including the media, regulators, stakeholders, industry, institutional investors, geographic location, and cultural components), could influence each other and corporate ESG performance disclosure. Thus, consistent with prior literature (Aggarwal *et al.*, 2010, de Klerk and de Villiers, 2012, de Klerk *et al.*, 2015), this study includes other corporate determinants that are assumed to impact the association between corporate ESG performance disclosure and capital costs. In particular, the size of the company, measured by total assets (LNTA); property, plant and equipment (PPE) measured by the ratio of related assets total revenue; the capital expenditure ratio (CAPEX), as it measured by capital expenditure divided by total revenue; revenue growth (GROWTH), which is the revenue percentage change between periods; the cash ratio (CASH), as it measured by the item cash divided by total assets; and the debt ratio (LEVERAGE), as it measured by total liabilities divided by total assets. Prior research recommends a resource provision role for the company's board of directors (Hillman *et al.*, 2009), resulting in better corporate ESG performance (de Villiers *et al.*, 2011). Therefore, following the studies by de Villiers *et al.* (2011) and later by Khan *et al.* (2013), this study includes two other nonfinancial elements of the company, namely, the size of the board (BOARD_SIZE) and the size of the audit committee (AUDIT COMMITTEE).

This study proposes that corporate ESG performance disclosure is negatively related to the company's COC. The regression of COC on the corporate ESG performance disclosure helps examine the association.

$$COC_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 LNTA_{i,t} + \beta_3 PPE_{i,t} + \beta_4 CAPEX_{i,t} + \beta_5 GROWTH_{i,t} + \beta_6 CASH_{i,t} + \beta_7 LEVERAGE_{i,t} + \beta_8 BOARD\_SIZE_{i,t} + \beta_9 AUDIT\ COMMITTEE_{i,t} + IndustryFixedEffect_t + YearFixedEffect_t + \varepsilon_{it} \quad (1)$$

Estimation model for hypothesis 2

Companies with higher ESG performance disclosure face lower capital risks (Cheng *et al.*, 2014) and improve stakeholder engagement (Jo and Harjoto, 2011). This favourable association encourages managers to adopt a long-term corporate ESG performance disclosure strategy. After calculating the idiosyncratic risk, this study estimates the following equation:

$$IdiocyncrticRisk_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 LNTA_{i,t} + \beta_3 PPE_{i,t} + \beta_4 CAPEX_{i,t} + \beta_5 GROWTH_{i,t} + \beta_6 CASH_{i,t} + \beta_7 LEVERAGE_{i,t} + \beta_8 BOARD\_SIZE_{i,t} + \beta_9 AUDIT\ COMMITTEE_{i,t} + IndustryFixedEffect_t + YearFixedEffect_t + \varepsilon_{it} \quad (2)$$

Results

The descriptive and regression results are presented in the following three subsections.

Descriptive statistics and correlation matrix

Panel A and Panel B of Table II present the descriptive statistics and correlation matrix of the variables used in this study, respectively. Panel A of Table II shows the summary statistics, and panel B shows the correlation matrix of the variables. In order to control the impact of outliers, this study winsorises the variables at the 1% and 99% levels. According to the data provided in the descriptive statistics table, the average ESG score is 2.91, with the 25^{th} percentile score of 2.53 and 75^{th} percentile score of 3.18, which shows enough variation in the ESG disclosure score to test the first hypothesis of this study. Panel B of Table II represents the Pearson correlation coefficients between dependent and independent variables. The results show that the corporate ESG performance disclosure is associated with a lower cost of capital and the company's idiosyncratic risk. This table also shows the expected relations with the primary dependent variable for all other explanatory variables. The results in this table do not show a high correlation between the explanatory variables of the study. Therefore, multicollinearity between the variables is not a concern for the estimation models of this study.

Main regression results

As discussed in the introduction, despite the increased number of research on the economic implications of corporate ESG performance disclosure, the result of these studies is not conclusive. The purpose of this study is to address this gap by examining whether corporate ESG performance disclosure impacts a company's COC and idiosyncratic risk. This study argues that consistent with the theoretical prediction, corporate ESG performance disclosure reduces both company's COC and idiosyncratic risk, creating value in the long run for the stakeholders.

This study proceeds as follow. Section 4.2.1 this study performs a panel regression test that analyses the relationship between corporate ESG performance disclosure and the company's COC. This study continues performing the panel regression analysis in section 4.2.2 to test the association between corporate ESG performance disclosure and the company's idiosyncratic risk. Section 4.2.3 reports the results of sensitivity tests.

This study regresses the dependent variables on the corporate ESG performance disclosure and other control variables using a panel regressions analysis longitudinally. The dependent variables of this study are the company's COC and idiosyncratic risk after controlling the year and industry fixed effects.

Corporate ESG performance disclosure and COC

A panel regression analysis is performed to test the first hypothesis of this study, including other control variables and additional year fixed effects and company fixed effects. Table III shows the regression analysis results for the hypotheses of this study. The first column (Model 1) of Table III reports the association between the corporate ESG performance disclosure and COC. The estimated coefficient of ESG disclosure for the first model is negative at 1.9099 and statistically significant at the 1% level (t-statistics = 8.64 and standard error 0.2209). In other words, a one standard deviation increases in the corporate ESG performance disclosure results in a 0.89 basis points (1.9099*0.4711) decrease in the COC. Consistent with hypothesis 1, the result shows that companies with a higher level of ESG performance disclosure achieve a lower COC. Therefore, the first hypothesis of this study is supported.

The results are consistent with the findings by El Ghoul *et al.* (2011), Cheng *et al.* (2014), and El Ghoul *et al.* (2018), which provide evidence on the moderating impact of corporate ESG performance disclosure on COC. This is also in line with the extant literature, supporting the theoretical argument that companies that are perceived as more sustainable would achieve cheaper capital resources (Merton, 1987, Heinkel *et al.*, 2001, Dhaliwal *et al.*, 2011).

Referring to the legitimacy theory, the finding of this study shows that corporate ESG performance disclosure reduces the COC through the impact on the perception of the financial resource providers. Corporate ESG performance disclosure attracts capital market attention by providing extra information required for a company's financial assessment. This would reduce the information asymmetry between the financial resource providers and improves corporate transparency. Thus, the capital market applies a cheaper and better condition to the resource granted to these companies (Deegan and Rankin, 1996). The results imply that the capital market (including the debt and equity market) requests lower returns for the companies with higher ESG performance disclosure. Therefore, the capital market considers the companies' sustainability over the long run and the potential for higher returns in the short run.

Consistent with the existing literature, the results of other control variables show that the coefficients follow the same direction. In line with the findings by Aggarwal *et al.* (2010), property, plant and equipment (PPE) and the debt ratio (LEVERAGE) are negatively correlated with COC. On the other hand, total assets (LNTA), capital expenditure (CAPEX), revenue growth (GROWTH) and the liquidity ratio (CASH) are positively correlated with COC. Regarding other nonfinancial elements of the company, although BOARD_SIZE is positively

correlated with the COC, no significant association is found between the AUDIT COMMITTEE and COC.

Corporate ESG performance disclosure and company's idiosyncratic risk

The second column (Model 2) of Table III shows the results for the second hypothesis of this study. The results indicate that companies with higher ESG performance disclosure achieve lower idiosyncratic risk. In other words, a one standard deviation increases in the ESG disclosure score results in a 0.19 basis points (0.2178*0.8941) decrease in the company's idiosyncratic risk. Therefore, consistent with the second hypothesis, there is a significant and negative relationship between corporate ESG performance disclosure and idiosyncratic risk. The diminishing impact of the corporate ESG performance disclosure on a company's idiosyncratic risk is consistent with the findings of earlier studies, including Jo and Na (2012), Mishra and Modi (2013), Becchetti *et al.* (2015) and Harjoto and Laksmana (2018).

Among other control variables, the size of the company (LNTA), the property, plant, and equipment ratio (PPE), revenue growth (GROWTH) and liquidity (CASH) with a negative coefficient show the same strong result at the 1% level of statistical significance. At the same time, capital expenditure (CAPEX) is negatively associated with idiosyncratic risk at the 5% level of statistical significance. The results also report a positive association between the BOARD_SIZE and the idiosyncratic risk consistent with the result of the first estimation model.

The results support the prediction by the legitimacy theory discussed in the theoretical section of this study. Consistent with the theoretical discussion, corporate ESG performance disclosure improves a company's legitimacy and mitigates the idiosyncratic risks associated with ESG activities (Jo and Na, 2012, Becchetti *et al.*, 2015). The negative impact of higher corporate ESG performance disclosure on idiosyncratic risk complements the results for the first hypothesis and the diminishing impact of corporate ESG performance disclosure on the COC. This approach differentiates this study from prior literature investigating only the impact of corporate sustainability performance disclosure on capital costs. This study highlights the importance of promoting corporate ESG performance to access a reasonably cheaper source of funds and the risk mitigation function of corporate ESG performance disclosure.

[INSERT Table III HERE]

Sensitivity test

This study follows Gupta (2018) and constructs an alternative corporate ESG performance disclosure measure for a sensitivity test. The ESG performance disclosure for each company is benchmarked relative to the total sample of companies (Alt_ESG) and in their industry sector (Alt_ESG_In). The procedure for constructing the alternative measure involves standardising the ESG scores for each company (each industry) by subtracting the average ESG score for the total sample (each industry) and dividing it by the standard deviation of the total sample (each industry). This approach addresses the concern that corporate ESG performance may not be comparable in different industries. Corporate ESG performance varies between industries, and it is more pronounced in specific industries, such as the chemical or mining sectors. The approach to standardising the variables is as follows:

$$ESG\ adjusted\ scores = \frac{ESG\ score - mean\ ESG\ score}{SD}$$

The mean of corporate ESG score is the mean for either the total sample or the industry subsample. The SD is the standard deviation of the ESG score within the total sample or the industry subsample. The companies in an industry are classified according to the Bloomberg Industry Classification Standard (BICS). As per the BICS classification, a company can be categorised into one of 11 industry sectors.

Table IV reports the results of the sensitivity test. This study examines models 1 and 2 using alternative measures for ESG (sample and industry-adjusted measure for ESG) and presents the results in table IV. The results continue to mirror the main results, including those for all variables of interest.

The results document a robust negative association between the adjusted ESG scores and the cost of capital. The coefficients of alternative ESG are -0.8989 for sample-adjusted (Alt_ESG) scores and -0.8381 for industry-adjusted (Alt_ESG_In) scores. Additionally, for estimation model 2, the results indicate a significant negative impact of adjusted ESG scores on idiosyncratic risk. The coefficients of alternative measures are -0.1026 for sample-adjusted (Alt_ESG) scores and -0.0961 for industry-adjusted (Alt_ESG_In) scores. Overall, the results remain consistent across the battery of sensitivity models; therefore, the results reported in the primary evaluation models are supported.

Additionally, this study uses the exclusive elements of corporate ESG performance disclosure, including environmental (ENV), social (SOC) and governance (GOV), to investigate both hypotheses of this study. For the reason of brevity, the results are presented in the Appendix (Table AII). The results mirror the main findings and support both hypotheses of this study,

indicating a robust negative association between the exclusive element of corporate ESG performance disclosure and cost of capital and the company's idiosyncratic risk.

[INSERT Table IV HERE]

Robustness tests

This study runs several robustness tests to examine the authenticity of the main findings that the level of corporate ESG performance disclosure is negatively associated with the COC and idiosyncratic risk. The results of the robustness analysis are discussed in this section, and they are all consistent with the main hypotheses.

Propensity score matching (PSM)

Table V provides the additional results of a propensity score matching (PSM)[6] approach to resolve the potential inherent causality issues in regression modelling (Rosenbaum and Rubin, 1983). This study follows Ioannou and Serafeim (2017) in matching the company size (LNTA); property, plant and equipment (PPE); leverage (LEVERAGE); capital expenditure (CAPEX); revenue growth (GROWTH); cash (CASH); the size of the board (BOARD_SIZE); the size of the audit committee (AUDIT COMMITTEE) and the corporate ESG performance disclosure to construct a comparable control group. The matching strategy is particularly important for the model of this study concerning corporate ESG performance disclosure, which has significantly increased during the last decade (Ioannou and Serafeim, 2012). The results of the PSM model are strongly consistent with the main regression results reported in Table V.

[INSERT Table V HERE]

Endogeneity test

The issue of endogeneity between the main variables of the study also deserves attention. As it is highlighted by Garcia-Castro et al. (2010), it is essential to conduct endogeneity analysis to control the impact of reverse causality or unobserved company-specific variables. It might be the case that companies with better financial performance could promote higher ESG performance disclosure. Managers are willing to improve the appearance of ESG performance if it is worthwhile for the company's financial situation. On the other hand, there might be missing elements that significantly impact corporate ESG performance disclosure, COC and idiosyncratic risk. Although this study addresses this issue by considering company fixed effects, including time-invariant unobservable heterogeneity, an additional endogeneity test is used to negate the concerns. This study follows Cheng *et al.* (2014) and Gupta (2018) and use a simultaneous equation system to find an appropriate instrument. Following Cheng *et al.*

(2014), this study uses the yearly company mean of the ESG performance disclosure as an instrument.

The results presented in model 1 of Table VI indicate that the negative relationship between corporate ESG performance disclosure and COC remains significant, showing that endogeneity is not the driver of the results. The ESG performance coefficient is -1.8459 and is statistically significant at the 1% level.

Consistent with the main findings, the instrumental variable analysis results presented in model 2 of Table VI show that corporate ESG performance disclosure is significantly and negatively correlated with the company's idiosyncratic risk with a coefficient of -0.3008 at the 5% significance level. This indicates that endogeneity does not drive the main results of the study.

[INSERT Table VI HERE]

Conclusion

This study evaluates the impact of corporate ESG performance disclosure on the combined measure of the cost of capital, called the weighted average cost of capital, and evaluates the similar impact on the company's idiosyncratic risk, using all Australian listed companies. The results of this study remain consistent after performing robustness checks and are strongly confirmed using the IV approach.

Using a sample of 30,735 company-year observations from 2007 to 2017 and controlling for other company-specific elements as well as industry and year fixed effects, the results support the two hypotheses of the study. First, the results of evaluating the association between corporate ESG performance disclosure and COC (H1) show a strong and negative relationship, which is consistent with prior studies (El Ghoul *et al.*, 2011, Cheng *et al.*, 2014, El Ghoul *et al.*, 2018). Considering other financial and nonfinancial elements of the company, the findings of this study show that companies with higher ESG performance disclosure achieve lower COC.

Second, the results of evaluating the association between corporate ESG performance disclosure and idiosyncratic risk (H2) show a mitigating impact, which is also in line with prior literature (El Ghoul *et al.*, 2011, Mishra and Modi, 2013, Becchetti *et al.*, 2015, Jo and Na, 2012).

This study argues that the negative impact of corporate ESG performance disclosure on COC and idiosyncratic risk results from two mechanisms. First, better corporate ESG performance disclosure is associated with better stakeholder engagement (Choi and Wang, 2009, Jones, 1995). This will help improve mutual trust between the company and stakeholders, reducing

agency issues and related costs (Eccles *et al.*, 2014). Since the literature argues that market imperfections such as information asymmetries result in higher corporate capital costs, the result of this study shows that companies with better ESG performance disclosure can achieve a cheaper COC. Second, companies with better ESG performance tend more to disclose their ESG performances (Dhaliwal *et al.*, 2011), consequently appearing more transparent and accountable. This will reduce the information asymmetries between the company and capital market, including the debt and equity market, thus mitigating the company's idiosyncratic risk. The findings of this study contribute to the literature on whether promoting ESG performance by companies is value-enhancing, value-decreasing, or neutral. This study recommends that higher ESG performance disclosure contributes to corporate value generation by reducing capital costs. While prior studies focus on the impact of corporate ESG performance disclosure on value generation and access to financial resources, this study finds that ESG performance disclosure is essential as it also influences a company's idiosyncratic risk.

The results of this study have several implications. First, it contributes to the ESG literature that highlights the role of capital markets (such as banks, financial intermediaries, institutional investors, and equity market) in pricing corporate ESG strategies and performance (Lee and Faff, 2009, El Ghoul *et al.*, 2011, Goss and Roberts, 2011). Capital markets reward ESG-complying companies with a lower lending cost, as they perceive the company to have less uncertainty and risk exposure due to ESG performance disclosure. More than that, financial analysts and advisors need to accept investors' penchant for ESG investments and justify their investment suggestions accordingly. Second, considering the potential costs associated with operating outside the norm of the social contract, corporate managers would take disclosure strategies such as corporate ESG performance disclosure to ensure that the company's operations are perceived as legitimate (Dowling and Pfeffer, 1975). This study provides managers with evidence that the successful development of ESG strategies could lead to better performance. Corporate ESG performance disclosure should generate tangible financial performance benefits through access to cheaper financial resources. Such strategies benefit companies through favourable impact on capital costs and idiosyncratic risk. Managers of companies with lower ESG performance disclosure should consider incorporating ESG-related policies into their operational strategies. Third, as stated by Hurst (1971), one of the strategic purposes of corporate disclosure is to legitimate corporate activities. Using an active disclosure strategy to promote ESG performance publicly can project a positive image of a company. The ESG-responsible companies attract investors and consequently reduce their capital costs.

Managers and other company decision-makers should understand how their financial institutions and potential investors react to their ESG performance disclosure. Therefore, establishing an optimal level of ESG performance could help companies maximise the positive impact on operational performance and idiosyncratic risk.

This study is not without limitations, including acknowledging that corporate ESG performance operates in the broader context, consistent with this form of investigation. It is suggested that future studies may follow four lines of inquiry. First, while this study includes large Australian listed companies, future studies may either examine the impact of corporate ESG performance disclosure on COC and idiosyncratic risk among non-listed or small and medium-sized companies within an industry sector or across different industries, as discussed by Mohammad and Wasiuzzaman (2021). Second, investors' understanding of higher- or lower-ESG-performance companies may be impacted by a country's culture or diverse economic situations (Khlif *et al.*, 2015). Cross-country or cross-cultural investigations on the relationship between corporate ESG performance disclosure, COC and idiosyncratic risk would be interesting. Third, using a dynamic study approach, it is worth evaluating whether the relationship between ESG performance disclosure and COC impacts a company's behaviour. Finally, future studies would also be interesting to examine COC changes over time when lower-ESG-performance companies significantly enhance their investment in ESG performance improvement.

Notes

1. Corporate Social Responsibility (CSR) mainly includes non-financial information regarding a company's environmental, social, and governance (ESG) factors (de Klerk et al., 2015). This study uses the term ESG interchangeably with CSR, which are widely used in the academic literature and corporate practice.
2. Since most publicly listed companies finance themselves through a combination of debt capital and equity capital, the company's overall cost of financing is a more reliable figure for the cost of capital (COC). This means that an average rate combines the cost of capital (COE) and cost of debt capital (COD), which is called the weighted average cost of capital (WACC).
3. The fourth edition effective date is “an entity’s first full financial year on or after 1 January 2020” and entities with a 30 June balance date will be expected to comply with these

recommendations for the financial year ended 30 June 2021, which is outside of the current study period.

4. Estimating casual impacts between variables in the inferential studies is possible by using the IV approach. In an IV model, the extra variables, called instrumental variables, are used to determine the change that is exogenous to the treatment (Angrist et al., 1996). This technique helps to effectively estimate the casual association between the outcome and the predictor by using only the element of the variation in the independent variable that is not correlated with unobservable factors impacting the independent variable and eventual outcome. Technically, the instrumental variable is independent of all variables that impact the outcome variables and is not independent of the predictor, which means that the IV influences the outcome through its influence on the predictor.

5. This information is from the Bloomberg impact report (Bloomberg, 2018).

6. There might be other variables that significantly impact the association between an independent variable and the outcome variable. The PSM model solves this issue by estimating the impact of an intervention (Armstrong et al., 2010).

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TABLE I
Sample description

Panel A: Sample Selection

	Full Sample	Sample With Missing Data	Total Observation
2007	284	40	244
2008	294	27	267
2009	296	24	272
2010	303	20	283
2011	310	15	295
2012	318	14	304
2013	333	19	314
2014	352	12	340
2015	378	14	364
2016	379	9	370
2017	379	10	369
Total	3,626	204	3,422

Panel B: Year Distribution

	Full Sample		High ESG		Low ESG	
Year	N	%	N	%	N	%
2007	244	7.14	50	3.48	194	9.77
2008	267	7.81	60	4.18	207	10.43
2009	272	7.94	67	4.66	205	10.33
2010	283	8.27	82	5.71	201	10.13
2011	295	8.62	100	6.96	195	9.82
2012	304	8.88	125	8.70	179	9.02
2013	314	9.17	145	10.09	169	8.51
2014	340	9.93	169	11.76	171	8.61
2015	364	10.63	196	13.64	168	8.46
2016	370	10.81	208	14.47	162	8.16
2017	369	10.78	235	16.35	134	6.75
Total	3,422	100%	1,437	100%	1,985	100%

Panel C: Industry Distribution

	Full Sample		High ESG		Low ESG	
	N	%	N	%	N	%
Basic materials	754	22.03	318	22.13	436	21.96
Communications	201	5.87	58	4.04	143	7.20
Consumer, Cyclical	377	11.02	140	9.74	237	11.94
Consumer, non-cyclical	595	17.39	220	15.31	375	18.89
Diversified	18	0.53	4	0.28	14	0.71
Energy	386	11.28	131	9.12	255	12.85
Banking	575	16.80	283	19.69	292	14.71
Industrial	351	10.26	212	14.75	139	7.00
Technology	108	3.16	24	1.67	84	4.23
Utilities	57	1.67	47	3.27	10	0.50
Total	3,422	100%	1,437	100%	1,985	100%

This table presents the industry (according to the Bloomberg Industry Classification System (BICS)) and year distributions for the 30,735 firm-year observations comprising the sample between 2007 and 2017. High (low) ESG indicates whether a firm has an adjusted ESG score higher (lower) than the industry means.

TABLE II
Descriptive statistics

	N	Mean	Std Dev	Lower Quartile	Median	Upper Quartile
Panel A: Summary statistics						
ESG	3,422	2.919	0.471	2.531	2.864	3.184
WACC	3,422	9.409	3.872	6.841	8.633	11.196
IDIOSYNCRATIC RISK	3,422	3.455	0.894	3.095	3.526	4.002
LNTA	3,422	6.493	2.147	5.098	6.296	7.787
PPE	3,422	0.661	1.066	0.042	0.224	0.805
CAPEX	3,422	0.224	0.635	0.011	0.041	0.155
GROWTH	3,422	0.107	0.644	0.006	0.044	0.178
CASH	3,422	0.124	0.142	0.025	0.066	0.169
LEVERAGE	3,422	0.429	0.261	0.255	0.424	0.576
BOARD_SIZE	3,422	6.737	2.019	5	6	8
AUDIT COMMITTEE	3,422	3.382	0.938	3	3	4

Panel B: Correlation matrix

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	ESG	1.00										
(2)	WACC	-0.129***	1.00									
(3)	IDIOSYNCRATIC RISK	-0.286***	0.111***	1.00								
(4)	LNTA	0.509***	-0.138***	-0.386***	1.00							
(5)	PPE	-0.069***	0.033	0.076	-0.011	1.00						
(6)	CAPEX	-0.127***	0.106***	0.052***	-0.121***	0.398***	1.00					
(7)	GROWTH	-0.071***	0.022	-0.049***	-0.054	-0.103***	-0.096***	1.00				
(8)	CASH	-0.270***	0.196***	0.252***	-0.307***	-0.060***	0.063***	0.028	1.00			
(9)	LEVERAGE	0.258***	-0.319***	-0.287***	0.396***	-0.079***	-0.108***	0.001	-0.309***	1.00		
(10)	BOARD_SIZE	0.562***	-0.066***	-0.293***	0.497***	-0.057***	-0.131***	-0.029	-0.267***	0.322***	1.00	
(11)	AUDIT COMMITTEE	0.392*	-0.083**	-0.232***	0.457***	-0.022	-0.082***	-0.052***	-0.198***	0.252***	0.462***	1.00

This table presents the descriptive statistic and correlation coefficient of the variables, including 30,735 firm-year observations between 2007 and 2017. Panel A provides the number of observation, mean, Standard deviation, lower quartile, median, upper quartile. Panel B shows the Pearson correlation coefficients between dependent and independent variables.
Superscripts ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

TABLE III
Baseline regressions

	Model 1	Model 2
ESG	-1.9099***	-0.2178***
	(0.2209)	(0.046)
LNTA	0.4284***	-0.1296***
	(0.0669)	(0.0141)
PPE	-0.8159***	-0.1398***
	(0.1162)	(0.0245)
LEVERAGE	-4.5511***	-0.1038
	(0.3309)	(0.0699)
CAPEX	1.3084***	-0.0990**
	(0.1942)	(0.041)
GROWTH	0.0911	-0.1285***
	(0.1154)	(0.0244)
CASH	1.2722**	-0.1282***
	(0.6072)	(0.077)
BOARD_SIZE	0.8720***	0.2287***
	(0.328)	(0.0692)
AUDIT COMMITTEE	0.3474	-0.053
	(0.3302)	(0.0697)
Constant	11.9475***	4.6599***
	(0.6191)	(0.1307)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	3,422	3,422
Adjusted r-squared	0.2279	0.2969

This table shows the main panel regression result of company's COC and idiosyncratic risk on their ESG score. First Columns (Model 1) report result of the panel regression of the company's COC on their ESG and the second columns (Model 2) report result of the panel regression of the company's idiosyncratic risk on their ESG. Appendix A provides definitions of all variables. Superscripts ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

TABLE IV
Sensitivity test

	Model 1		Model 2	
	(1)	(2)	(3)	(4)
Alt_ESG	-0.8998***		-0.1026***	
	(0.1041)		(0.0220)	
Alt_ESG_In		-0.8381***		-0.0961***
		(0.0986)		0.0208)
LNTA	0.4284***	0.4005***	-0.1296***	-0.1326***
	(0.0669)	(0.0654)	(0.0141)	(0.0138)
PPE	-0.8159***	-0.8099***	-0.1398***	-0.1391***
	(0.1162)	(0.1163)	(0.0245)	(0.0245)
LEVERAGE	-4.5511***	-4.5103***	-0.1038	-0.0994
	(0.3309)	(0.3305)	(0.0699)	(0.0697)
CAPEX	1.3084***	1.3127***	-0.0990**	-0.0994**
	(0.1942)	(0.1943)	(0.0410)	(0.0410)
GROWTH	0.0911	0.0942	-0.1285***	-0.1281***
	(0.1154)	(0.1155)	(0.0244)	(0.0244)
CASH	1.2722**	1.2484**	0.0026	0.0016
	(0.6072)	(0.6075)	(0.1282)	(0.1282)
BOARD_SIZE	0.8720***	0.8939***	0.2287***	0.2313***
	(0.3280)	(0.3283)	(0.0692)	(0.0693)
AUDIT COMMITTEE	0.3474	0.3246	-0.0530	-0.0554
	(0.3302)	(0.3301)	(0.0697)	(0.0696)
Constant	6.3721***	6.5098***	4.0242***	4.0384***
	(0.6049)	(0.5996)	(0.1277)	(0.1265)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Observations	3,422	3,422	3,422	3,422
Adjusted r-squared	0.2272	0.2261	0.2959	0.2967

This table shows the result of the sensitivity test using an alternative measure of ESG disclosure score for the relationship between ESG score and COC and idiosyncratic risk. Columns (1) and (2) report the panel regression results of the company's COC on their alternative ESG score which are proxies for each company benchmarked relative to the total sample of companies (Alt_ESG) and inside their industry sector (Alt_ESG_In). Columns (3) and (4) report the panel regression results of the company's idiosyncratic risk on their alternative ESG score, respectively. Appendix A provides definitions of all variables. Superscripts ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

TABLE V
Propensity Score Matching (PSM)

	Model 1	Model 2
LNTA	0.7250***	-0.0264
	(0.2098)	(0.0435)
PPE	-0.9015***	-0.2912***
	(0.1553)	(0.0345)
LEVERAGE	-0.4998***	-0.2583***
	(0.1494)	(0.0323)
CAPEX	0.8607***	-0.3062***
	(0.1449)	(0.0382)
GROWTH	0.6105***	-0.2171***
	(0.1590)	(0.0360)
CASH	0.7713***	-0.3249***
	(0.1471)	(0.0329)
BOARD SIZE	0.7715***	0.2351***
	(0.1554)	0.0327
AUDIT COMMITTEE	0.7107	-0.3189
	(0.1510)	(0.0333)
Mean	9.4187	3.4553
SD	3.8495	0.8940

This table shows the result of Propensity Score Matching (PSM) model on the COC and Idiosyncratic Risk utilising the control variables.

TABLE VI
Instrumental variables

	Model 1	Model 2
ESG	-1.8459***	-0.3008**
	(0.1506)	(0.1624)
LNTA	0.3496***	-0.1146***
	(0.0291)	(0.0314)
PPE	-0.0661***	-0.1383***
	(0.0229)	(0.0247)
LEVERAGE	-0.9315***	-0.1230
	(0.0729)	(0.0786)
CAPEX	0.0024***	0.0926**
	(0.0396)	(0.0427)
GROWTH	-0.0358	-0.1312***
	(0.0231)	(0.0249)
CASH	0.2846**	0.0135
	(0.1205)	(0.1299)
BOARD_SIZE	0.2400***	0.2356***
	(0.0653)	(0.0705)
AUDIT COMMITTEE	0.3221***	-0.0397
	(0.0687)	(0.0741)
Constant	4.8818***	0.0741***
	(0.2506)	0.2703
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	3,422	3,422
Adjusted R-squared	0.5872	0.2615

This table shows the result of the regression of COC and idiosyncratic risk on the ESG disclosure score (ESG) using an instrumental variable approach examining the robustness of our main inference in Model (1) and (2). First Columns (Model 1) report result of the panel regression of the company's COC on their ESG and the second columns (Model 2) report result of the panel regression of the company's idiosyncratic risk on their ESG. Superscripts ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Appendix I

ESG rating systems

Provider	Background	Rating Scale	Methodology	History & Usage
Bloomberg ESG Data	Collects ESG Data for over 11,500 companies in 83 countries Integrated into Bloomberg Equities and Intelligence Services	Out of 100 Provides scores from third-party rating agencies	Looks at 120 ESG indicators	In 2018, Bloomberg had over 18,000 ESG Customers
Corporate Knights Global 100	Publishes an annual index of the Global 100 most sustainable corporations in the world	Out of 100 Ranked against other companies in their industry group	14 key performance indicators Companies only scored on relevant performance indicators for specific industry	Out of the top 10 corporations listed on the 2017 "Global 100", 4 out of 10 companies had published a press release regarding this listing
DJSI	First global index to track sustainability-driven companies based on RobecoSAM's ESG analysis Broken down into: DJSI World, DJSI Regions and DJSI Country International scope	Out of 100 Ranked against other companies in their industry	Industry-specific questionnaire, covering relevant economic, environmental and social factors 80-120 questions Updated annually	Partnered with RobecoSAM Out of 10 Industry Group Leaders listed on the 2016 DJSI, all 10 companies published a press release regarding this listing
ISS	Acquired Ethix SRI and partnered with RepRisk to provide ESG and SRI research ISS's solutions also include climate change data and analytics from its recent acquisition of Climate Neutral Investments ISS QualityScore provides corporate governance reports on over 5,600 public companies ISS-Ethix partnered in July 2017 with CDP to launch the world's first climate impact rating for investment funds, called Climetrics, which tool can empower investors to make climate-friendly investments International Scope	ISS QualityScore: 1-10 Climetrics Score: 1 to 5 green leaves	ISS QualityScore: Covers board structure, compensation/remu-neration, shareholder rights, and audit & risk oversight Updated on an ongoing basis ISS-Ethix: Provides research, screening and analysis on SRI topics.	A leading provider
MSCI ESG	Provides ratings for over 6,000 companies and 350,000 equity and fixed income securities International scope	AAA to CCC	Looks at 37 Key ESG Issues Data collected from publicly available sources Companies monitored on an ongoing basis Annual in-depth review	iShares MSCI EAFE ESG Select ETF and MSCI EM ESG Select ETF Institutional investors, including Legal and General Investment Management, Morgan Stanley, Northern Trust Asset Management, and PIMCO
RepRisk	Founded in 1998 Provides ESG reports for more than 84,000 private and public companies across 34 sectors International scope	AAA to D	Looks at 28 ESG issues, which map onto the Ten Principles of the UN Global Compact Also looks into "Hot Topics" (currently a list of 45)	Partnered with the United Nations-supported Principles of Sustainable Investment Institutional investors, including Amundi and APG

			Updated daily	Partnered with Institutional Shareholder Services Inc. (ISS)
Sustainalytics	2008 consolidation of DSR, Scoris and AIS Covers over 6,500 companies across 42 sectors International scope	Out of 100 Sector/industry-based comparison	Looks at industry specific ESG indicators, covers at least 70 indicators in each industry Also looks at systems to manage ESG risks and disclosure of ESG issues and performance	Strategic relationships with BNY Mellon, City of London Investment Management (CLIM), Columbia Threadneedle, Norwegian Government Pension Fund, and Prudential Fixed Income
Thomson Reuters ESG Research Data	Thomson Reuters acquired Asset4 in 2009 Provides ESG data on over 6,000 companies International scope	Percentile rank scores (available on both percentages and letter grades from D- to A+)	Covers 400 different ESG metrics, electing 178 of the most relevant data points Categories are weighted Updated every 2 weeks	Comprehensive database ESG Scores are available on Thomson Reuters Eikon platform

Source: Huber *et al.* (2017)

Appendix II

Variable definitions, measurement and sources

Category	Measure	Definition/Measurement
Environment, social and governance disclosures	ESG	As measured based on a total of 120 indicators, covering three aspects: environment, social activities, and governance. The aggregated ESG score ranges from 0.1 for the minimum ESG data disclose to 100 maximums for those that disclose all data point
	ENV	Environmental score includes energy, water, biodiversity, emissions, products and services, compliance
	SOC	Social score includes labour practices and decent work, human rights, society, product responsibility
	GOV	Governance score includes over boarding, executive compensation
Idiosyncratic risk	Risk	Idiosyncratic risk is considered as an investment risk, potential issues and uncertainties which are endemic to a specific asset or a group of assets.
Weighted average cost of capital	WACC	A measure of the firm's financial or debt risk. WACC will be applied in this study to address both cost of equity capital (COE) and cost of debt capital (COD) as the combine financial risk of a firm.
Firm characteristics:		
Firm Size	LNTA	The natural logarithm of total assets
Property, plant and equipment	PPE	The ratio of property, plant, and equipment to total sales
Capital expenditure	CAPEX	The capital expenditure divided by total sales
Sales growth	GROWTH	The percentage change in sales over the prior year
Cash	CASH	The cash divided by total assets
Debt or Leverage	LEVERAGE	Leverage or total debt ratio measured as total debts divided by total assets
Board size	BOARD SIZE	Number of full-time directors on the company's board, as reported by the company (not including the deputy members of the Board).
Audit committee	AUDIT COMMITTEE	Number of full-time directors on the company's audit committee (not including the deputy members of the committee).

Source: Bloomberg Dataset

3.3. Chapter Summary

This chapter has presented the impact of corporate environmental, social and governance (ESG) performance disclosure on both company's costs of capital (COC) and idiosyncratic risk. This chapter has also presented the result of a similar examination using the exclusive elements of corporate ESG performance disclosure, including environmental (ENV), social (SOC) and governance (GOV). The results support the two hypotheses of this chapter. The summary and conclusion of the findings are included in chapter 6. The next chapter provides information on the second paper for this study. Built on stakeholder theory, the second paper investigates the association between corporate ESG performance disclosure and the company's market performance.

4. CHAPTER FOUR

The impact of corporate ESG performance disclosure across Australian industries

4.1. Chapter Introduction

Chapter three (paper one) provides the examination of the impact of corporate ESG performance disclosure on the company's cost of capital (COC) and idiosyncratic risk. This chapter provides the second paper based on three hypotheses constructed from prior studies from the concept of stakeholder theory. Hypothesis 1 is the basis for assessment of the improvement into Australian corporate ESG performance disclosure. Hypothesis 2 enables the investigation of economic implications of corporate ESG performance disclosure on the company's financial performance (measured by market value). Finally, hypothesis 3 investigates the heterogeneous economic implications of corporate ESG performance disclosure across different industry sectors.

Section 4.2 presents the empirical study on the second paper, following the summary of the content in section 4.3.

4.2. Empirical Study (Paper Two)

The impact of corporate ESG performance disclosure across Australian industries

Abstract

The aims of this study are threefold. Firstly, it examines the long-term improvement in the corporate environmental, social and governance (ESG) performance. Secondly, it highlights the favourable financial implications of the higher corporate ESG performance disclosure. The third aim is to provide insight into the industrial impact on the relationship between corporate ESG performance disclosure and financial performance. This study uses a sample of all Australian publicly listed companies between 2007 and 2017 and conduct a panel regression analysis. It also performs several robustness checks to address the methodological, sample selection, endogeneity issues concerning corporate ESG performance disclosure. The findings show a tangible improvement in Australian companies' corporate ESG performance disclosure, favourably associated with financial performance. However, while the corporate ESG performance disclosure appears to be linked to higher financial performance, this is not the case across different industries. The industrial impact on the association between corporate ESG performance disclosure and financial performance has several implications. Firstly, it appears that the stakeholders' pressure on companies to address ESG related concerns is substantial, enhancing corporate financial performance. Secondly, the findings indicate that corporate ESG performance disclosure does not equally benefit corporations in different industry sectors. It, therefore, requires more focus and interpretation by corporate decision-makers. Thirdly, by promoting ESG related disclosure, managers should consider diverse stakeholders in different industries that weigh business objectives differently. The results of this study provide insights for corporate managers regarding prioritising resource allocations to ESG related activities that could impact financial performance differently in different industry sectors. The results of this study contribute to the growing literature on the financial implications of corporate ESG performance disclosures, notably different industrial characteristics.

Keywords Environmental, Social, Governance, Corporate performance, Industrial sectors

JEL classification G30, G32, L25, M41, Q51

Introduction

The increasing concerns over a company's sustainable behaviour have led to substantial corporate disclosure on environmental, social and governance (ESG) performance during the last decade. The evidence shows that the capital markets are also interested in the corporate ESG performance disclosure (Li *et al.*, 2018). This causes significant academic studies examining the economic implications of these disclosures.

Based on the theoretical argument of Friedman (2007), due to the costs associated with ESG related activities, there would be a negative impact on the corporate financial performance. On the other hand, based on the stakeholder theory (Freeman, 1984), the relationship between corporate ESG performance disclosure and financial performance must be positive and beneficial to companies due to the better relationship with stakeholders, increased opportunities in the markets and reduced transaction costs (Fombrun *et al.*, 2000, Jones, 1995). The extensive empirical studies on the association yield unclear results. It is not clear whether there is a positive, negative or no association between corporate ESG performance disclosure and financial performance (Brooks and Oikonomou, 2018). While some studies documented a positive association (Margolis *et al.*, 2009, Harjoto and Jo, 2015, Kumar and Firoz, 2022), others reveal a non or negative relationship (Hassel *et al.*, 2005, Clacher and Hagendorff, 2012). This has led to a recent call for further studies to consider confounding elements that can potentially present causality and yield inconclusive findings (Aouadi and Marsat, 2018). This study does not aim to declare a winner position for this longstanding debate. Instead, this study argues that eighter positive or negative association could be correct due to the industrial characteristics. The stakeholders in different industries can impact the relationship. Therefore, there could be positive, negative or no associations. This study argues that the relationship requires more focus by corporate managers. They can choose to capitalise on ESG performance to increase financial benefit for their companies after considering their industrial characteristics and their stakeholder expectations (Barnett, 2007). Companies with lower stakeholder concerns on ESG related disclosure may not create positive economic benefits. The industrial characteristics in which the company is mainly involved can significantly influence ESG and financial performance (Barnett, 2007, Amato and Amato, 2012).

The primary motivation of this study is the contrasting findings of prior literature with limited industrial comparison analysis that leave this line of research unresolved, therefore guiding new research questions (Aouadi and Marsat, 2018, Brooks and Oikonomou, 2018).

The contingencies, corporate strategies and industrial components that could alter the relationship are still an area of potential investigation (Brooks and Oikonomou, 2018). Therefore, this study proposes the following research questions.

Research question 1 (RQ1): Do Australian companies demonstrate improvement in ESG performance and consequent improved financial performance over time?

Research question 2 (RQ2): Do the different groups of stakeholders with diverse expectations across industries have a different impact on the relationship between ESG and financial performance?

This study investigates the above research questions in the context of the Australian corporate ESG performance disclosure from 2007 to 2017 for several reasons provided in the preceding paragraphs.

Since the start of the great financial crisis (GFC) (between 2008-2009), where the irresponsible behaviour of the financial sector caused the financial crisis (Eberle *et al.*, 2013), the notion of corporate ESG performance and its impact on financial performance has increased globally (Aguinis and Glavas, 2012). Due to the strong fundamentals in the Australian economy and financial regulations,[9] Australia has shown a resilient performance compared to other developed countries. This has coincided with the introduction of the ASX Corporate Governance Principles and Recommendations in 2003[10] and further adjustment in the sustainability and risk guideline in 2007[11] that improved monitoring of the corporate governance. The period of this study (2007-2017) is important as the financial turmoil caused by the Global Financial Crisis (GFC) (2007-2008) has led to a significant organisational focus on corporate transparency and governance. More than that, several corporate scandals after the GFC indicate the importance of monitoring corporate ESG performance as responsible actions toward diverse stakeholders. Hence, during the period of this study, there is a substantial organisational focus on the corporate ESG related activities globally. Thus, this study investigates the corporate ESG performance across the panel data of all Australian publicly listed companies between 2007-2017.

[9] https://www.finsia.com.

[10] This was introduced in 2001 and gradually updated to the recent version (AUSTRALIAN SECURITIES EXCHANGE (ASX) CORPORATE GOVERNANCE COUNCIL (CGC), 2019).

[11] Principle 7.4 of the Council's Corporate Governance Principles and Recommendations recommends the disclosure of material exposure to economic, environmental, and social sustainability risks and how to manage those risks.

This study recommends several contributions. First, few studies investigate the improvement in corporate ESG performance over time. This study explores time-based changes in corporate ESG improvement. Second, this study extends existing studies on corporate ESG performance improvement and its economic implications across industries holistically. Third, previous studies primarily concentrate on corporate ESG disclosure and financial performance with limited attention to the industry variances. Therefore, the important question of which industry sector achieves positive, insignificant, or negative financial impacts for ESG performance remains unexplored. Recent literature states that further research with a more robust analysis considering different industries is required (Omar and Zallom, 2016, Garcia *et al.*, 2017, Kumar and Firoz, 2022).

The remainder of this paper is structured as follows. The second section presents the theoretical frameworks. The third section discusses the study design and the main estimation models. The fourth section provides the empirical results, sensitivity and robustness check analysis, and section 5 presents the conclusions.

Theoretical Framework, Literature Review and Hypotheses Development

This study uses institutional theory to explore the first research question. This theory focuses on the impact of social or cultural environment on organisations (DiMaggio and Powell, 1983). There are presumptions, beliefs and expectations in the society that determine the organisational behaviour of corporations (Scott *et al.*, 1994). These organisational behaviours are not adopted based on efficiency or best practice; instead, they comply with the institutional expectations. Corporate legitimacy is awarded to organisations as a reward by the institutional environment (Scott *et al.*, 1994). As Scott (2001) states, there are three types of institutions within the institutional environment: regulative, normative, and cognitive. The official rules and incentives established by the state are regulative impacts. The normative impacts are the informal rules which involve values and moral commitments. The rules related to the cognitive distinctions and taken for granted concepts are cognitive impacts. These three institutional pillars are interrelated, as Scott (2001) states. For instance, the introduction of a carbon taxes acts is likely to generate a common understanding among businesses on climate change (cognitive), same as a set of values associated with sustainable development (normative).

Australian regulation enforcement shapes the organisational environment that corporations are expected to respond ESG related concerns. The introduction of the ASX Corporate Governance Principles and Recommendations in 2003 is one of the most official and institutional mechanisms. Referring to the corporate scandals during the last two decades,

Australian regulators seem to take robust actions to ensure a healthy corporate governance structure on their publicly listed companies. The ASX Principles are structured to improve corporations' governance, accountability, and transparency, although compliance is not compulsory. However, governance is only one aspect of regulative institutional focus, and other aspects can be found. For instance, section 299 (1)(f) of the Australian corporation Act of 2001 requires a corporate disclosure concerning any particular and significant environmental regulation. Other examples are the United Nations Global Compact (UNGI), the Global Reporting Initiative (GRI), or the Carbon Disclosure Project (CDP), which Australian companies increasingly practice. Many of these companies are publicly listed companies investigated in this study.

Moreover, there seems to be a combination of normative and cognitive institutions related to corporate ESG performance in Australia. A study by Black *et al.* (2011) on corporate ESG performance in Australia shows that Australian companies have structured robust abilities in ethical behaviour that, in return, serve as a basis for other abilities that are essential to address social concerns. Ethical behaviour is considered a normative institution and includes informal rules related to values and moral commitments (Scott, 2001). Australian companies have the ethical capabilities to help address social behaviour, which is a necessary element for success and licence to operate (Klettner *et al.*, 2010). Many corporate governance structures and principles in Australia gain shared comprehension and become homogenised in businesses (Klettner, 2016).

Given the above discussion of regulative, normative and cognitive institutional impacts, improvement in corporate ESG performance over time is likely as they seek to conform to institutional expectations. Therefore, the first hypothesis of this study is:

H1 Australian companies have demonstrated an improvement in their ESG performance over time

As argued above, higher corporate ESG performance disclosure can confer higher competitive advantages for corporations and better reputation (Hart, 1995, Scott, 2001). With increasing social and regulation pressure, the equity market participants are becoming more interested in corporate ESG performance disclosure (Cormier and Magnan, 2007). It is reasonable to expect that companies with higher ESG performance disclosure are likely to view potential investors in the capital markets as more favourable.

The theoretical debates among scholars on the socio-political and legitimacy theory argue that corporate ESG performance disclosures are rooted in public pressure, thus aiming to

maintain the license to operate by the diverse groups of stakeholders (Patten, 1991). However, consistent with the resource-based view (RVB) theory (Hart, 1995, Russo and Fouts, 1997), companies with higher corporate ESG performance disclosure have the incentive and resources to financially benefits from these disclosures and achieve higher market value in the equity market. Consistent with the prediction of the RBV (Hart, 1995, Russo and Fouts, 1997), this study argues that companies with higher corporate ESG performance disclosure benefit from higher market value.

ESG performance and its implications on corporate financial performance have been discussed extensively in academic literature throughout the last four decades (Margolis *et al.*, 2009, Fatemi *et al.*, 2017, Friede *et al.*, 2015). Previous studies on the association achieved counterintuitive results. While Clacher and Hagendorff (2012) study found a negative association, a review by Margolis and Walsh (2003) revealed mixed results. In contrast, the positive association between ESG engagement and financial performance is consistent with several studies (Margolis *et al.*, 2009, Friede *et al.*, 2015, Harjoto and Jo, 2015, Kumar and Firoz, 2022). The second component of RQ1 for this study that addresses the relationship between corporate ESG and financial performance over time is motivated by the inconsistent results of the previous studies leaving this line of investigation unresolved.

Further to the above discussion, the second hypothesis of this study is:

H2 There is a positive association between corporate ESG and financial performance over time

According to the stakeholder theory, establishing and maintaining relationships with diverse stakeholders is highly important for corporate success (Clarkson, 1995). Stakeholder theory also links the industry sectors as the influential variable to ESG disclosure (Melville, 1990, Waddock and Graves, 1997). Corporate ESG performance disclosure is a strategic tool to recognise stakeholders' expectations, understand ESG related risks and opportunities, and respond to them publicly. Managing the satisfaction of a diverse group of stakeholders contributes to financial performance (Donaldson and Preston, 1995, Jones, 1995). Corporate managers need to maintain and balance the ESG related standards and strategies with the importance of being responsive to the diverse group of stakeholders and their expectations (Filatotchev *et al.*, 2019, Mollah *et al.*, 2021). Companies are encouraged to disclose ESG engagements to stakeholders to enhance their reputation and maintain accountability (Said *et al.*, 2009) which, in return, results in generating value for the company (Forcadell and Aracil, 2017). The diversity of stakeholder needs and expectations is alluded to in RQ2. Due to the

differences in stakeholder composition and their expectations, this study argues that the impacts of corporate ESG performance disclosure on the company's financial performance are likely to be different across different industry sectors.

Scholars have investigated the impacts of industrial characteristics on the relationship between corporate ESG engagement and financial performance from different perspectives. Hoepner and Yu (2010) witnessed a positive association between corporate social performance and financial performance only for limited industry sectors, including consumer discretionary and health care. Hoepner and Yu (2010) argue that the evaluation must be considered in the industry's context. Baron *et al.* (2011) evidence a positive association between corporate social performance and financial performance in the consumer industry sector and a negative association in the industrial sector. Incorporating the moderating impact of industrial differentiation into the relationship, Hull and Rothenberg (2008) recommend a complex but financially beneficial association. Their argument corroborates Barney (1991) that sustainable competitive benefits depend on several intertwined competencies, including differentiation through better corporate ESG performance disclosure.

The existing literature on corporate ESG and financial performance and further comparison across diverse industries is limited. This study investigates the differences between corporate ESG performance and financial performance across industries. This study argues that the mixed and counterintuitive findings of the previous studies on the relationship might be the outcome of different stakeholder groups and expectations among companies that operate in diverse industry sectors with particular conditions and strategies.

Therefore, the third hypothesis of this study is:

H3 There are heterogeneous differences across industries in the association between ESG and the company's financial performance

Research Design

This study uses a sample of 30,730 company-year observations between 2007 and 2017 from all Australian publicly listed companies and examines the improvement in ESG performance and, further, the relationship between ESG and a company's financial performance across ten industry categories provided by the Bloomberg Industry Classification System (BICS) to evaluate the industrial impact on the relationship between corporate ESG and financial performance.

Measures of ESG

ESG has emerged as the key indicator of strategic management competency and non-financial performance (Boerner, 2010) and is linked to socially responsible investment (Richardson, 2009). Strategic ESG competency involves promoting innovations that eventually benefit the corporation and society (Becker-Olsen *et al.*, 2006). ESG also simultaneously improve economic and social reputation by generating "shared value" in the communities (Porter and Kramer, 2011). ESG includes a broad list of environmental (e.g., energy, carbon emission, water usage, climate change), social (e.g., human rights, gender equality, product safety, health and safety, fair trade) and governance (e.g., corruption, bribery, reporting and disclosure, board independence, shareholder protection) issues.

Sample and data

This study retrieved the data from the Bloomberg database utilising the financial, environmental, social and governance functions for all companies listed in the Australian stock exchange. This study further standardises the ESG disclosure scores in the estimation model to have a notionally standard scale. The potential impact of outliers in the dataset is considered and follows the previous literature in trimming the extreme data and replacing them with the mean of that variable (Guenster *et al.*, 2011). The disclosure score calculated by Bloomberg is based on 120 indicators, including three elements of environmental, social and governance engagement[12]. The ESG score collected by Bloomberg ranges from a minimum of 0.1 to a maximum of 100.

Following prior studies, this study uses Tobin's Q initially recommended by Tobin (1969) as a primary proxy for a company's valuation (Jo and Harjoto, 2011, Luo and Bhattacharya, 2018, Servaes and Tamayo, 2013).

Consistent with prior literature, this study includes other companies' characteristics to account for their confounding effects that are assumed to impact the company's financial performance, such as the company's size or the ratio for property, plant, and equipment to total revenue (Aggarwal *et al.*, 2010). A detail of variables is provided in Appendix A.

After retrieving all the variables from the Bloomberg database and excluding the missing data in the ESG variable and Tobin's Q, this study obtains a final sample of 3,425 company year observations for Australian publicly listed companies from 2007 to 2017. Table I presents the number of observations used in the regression analysis.

[12] The information is extracted from the Bloomberg (2018) impact report.

Table I
Sample size

Items	No. of observations	Sample percentage
Initial number of observations	3624	100
Missing observations	199	5.4
Number of observations used in regression	3,425	94.5

Note*:* This table presents the sample selection process for all listed companies.

Table II represents the sample composition of the companies for the 2007-2017 period. Panel A of Table II represents the sample composition by year, and Panel B represents the sample composition by industry specification. According to Table II, the top five representative industries are basic materials (754 companies, 22 per cent), consumer non-cyclical (595 companies, 17 per cent), financial (575 companies, 17 per cent), energy (386 companies, 11 per cent), and consumer cyclical (377 companies, 11 per cent). Three industry sectors, comprising basic material, financial and consumer non-cyclical, represent more than 50% of the total sample's composition by industry sector.

Table II
Sample composition

Panel A: Sample composition by year	
Year	N
2007	244
2008	267
2009	272
2010	283
2011	295
2012	304
2013	314
2014	343
2015	364
2016	370
2017	369
Total	3,425

Panel B: Sample composition by industry		
Year	Observation	%
Basic materials	754	22%
Communications	201	6%
Consumer cyclical	377	11%
Consumer non-cyclical	595	17%
Diversified	18	1%
Energy	386	11%
Financial	575	17%
Industrial	354	10%
Technology	108	3%
Utilities	57	2%
Total	3,425	100%

Note*:* This table represents the sample company's composition by year and industry specification. The industry classification is based on Bloomberg Industry Classification Systems (BICS).

Estimation model

In order to evaluate the corporate ESG performance improvement, the measure of mean is used

for each year for the ESG disclosure score. It is argued that the sample selection bias may influence the relationship between ESG and financial performance (Epstein *et al.*, 2014). However, the sample selection bias is significantly minimum for this study as the dataset used for this study covers all Australian publicly listed companies. This study estimates the following main model (1) for evaluating the impact of ESG disclosure score overall and for different industry sectors.

$$Tobin'sQ = \beta_0 + \beta_1 ESG_{i,t} + \beta_3 LNTA_{i,t} + \beta_2 PPE_{i,t} + \beta_4 CAPEX_{i,t} + \beta_6 GROWTH_{i,t} + \beta_7 CASH_{i,t} + \beta_5 LEVERAGE_{i,t} + IndustryFixedEffect_t + YearFixedEffect_t + \varepsilon_{it} \quad (1)$$

Empirical results

Descriptive statistics

Table III shows the descriptive statistics for the independent and dependent variables for all companies and industries. This study winsorises the variables at 1% and 99% levels. Based on the data provided in the descriptive statistic table, the mean values of Tobin's Q are 1.9355, respectively. The average ESG score is 2.91, with the 25th of 2.53 and 75th of 3.18, which shows sufficient variation in the ESG disclosure score for testing the hypotheses of this study.

Table III
Descriptive statistics

	Obs	Mean	St.Dev	p25	Median	p75
Tobin Q	3,425	1.9355	1.8458	0.9999	1.3356	2.1399
EVA	3,425	4.1068	1.8434	2.9943	3.9967	5.2099
ESG	3,425	2.9193	0.4711	2.5313	2.8639	3.1839
LNTA	3,425	6.4935	2.147	5.0982	6.2964	7.7873
PPE	3,425	0.6598	1.0661	0.0419	0.2241	0.8047
Capex	3,425	0.224	0.6353	0.0101	0.0396	0.1545
Growth	3,425	0.1074	0.6438	-0.005	0.0443	0.1779
Cash	3,425	0.124	0.1424	0.0249	0.0658	0.1686
Leverage	3,425	0.4286	0.2613	0.2553	0.4237	0.5757

Note*:* This table shows the descriptive statistics for the variables included in the estimation model for all the companies in all industries.

Main result

The following analyses have been conducted to test all three hypotheses of this study.

ESG performance analyses

Table IV represents the detailed statistical comparison of the corporate ESG performance for all industries from 2007 to 2017. This study compares the average ESG performance score and benchmarks the performance in 2017 against 2007. To examine whether Australian companies

have demonstrated improvement in ESG performance over time, this study performs a t-test analysis by comparing the years 2017 and 2007. The mean difference is significant for the ESG performance score ($t = 8.213$, $p = 0.000$). The ESG performance trend is upward and shows improvement over time. Therefore, the first hypothesis of this study is supported. This is consistent with the results of previous studies by Galbreath (2013) and Klettner *et al.* (2010), which show that Australian companies demonstrate significant improvement in ESG performance over time.

Table IV
ESG Longitudinal performance

Statistics	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Rate of change (%)
Minimum	2.0297	2.1327	2.0825	2.1327	2.0297	2.2262	2.2262	2.1855	2.1806	2.2262	2.3116	+13.89
Maximum	3.9558	3.9113	4.1095	4.0758	4.0758	4.0578	4.1027	4.0465	4.082	4.078	4.0607	+2.65
Mean	2.6923	2.7184	2.7569	2.8123	2.8533	2.9127	2.9623	2.9951	3.0339	3.0571	3.117	+15.77
SD	0.4268	0.4399	0.478	0.4915	0.4871	0.4705	0.4697	0.445	0.4347	0.4232	0.4108	

Note: This table shows the longitudinal analysis of the ESG performance of all companies for the period 2007-2017. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table V
Panel regression analysis- industrial impact

Variables	All sectors	Basic materials	Communications	Consumer cyclical	Consumer non-cyclical	Diversified	Energy	Financial	Industrial	Technology	Utilities
Panel A: Financial performance as measured by Tobin Q											
ESG	0.0040***	0.0068***	0.0165***	0.0342	0.0038**	0.1425	0.0048**	0.0103	0.0096***	0.0526	-0.0030
	(0.0008)	(0.0021)	(0.0044)	(0.0570)	(0.0021)	(0.2014)	(0.0024)	(0.0307)	(0.0019)	(0.1758)	(0.0018)
LNTA	-0.0476***	-0.0656***	-0.1159***	-0.0531***	-0.0184**	-0.1226***	-0.0304*	-0.0142	-0.0727***	0.0024	0.0095
	(0.0047)	(0.0129)	(0.0263)	(0.0175)	(0.0140)	(0.0166)	(0.0156)	(0.0091)	(0.0155)	(0.0354)	(0.0179)
PPE	-0.0916***	-0.0207*	-0.1698	-0.3224***	-0.2241***	0.1314	-0.0423**	-0.1123***	-0.2170***	-0.7881***	-0.0654*
	(0.0097)	(0.0219)	(0.1916)	(0.0927)	(0.0420)	(0.1047)	(0.0211)	(0.0159)	(0.0659)	(0.2051)	(0.0327)
Capex	0.1001***	0.0412*	0.0881	0.5337**	0.2390***	0.6675	0.0334	0.0344	-0.0627	0.8037***	0.1523
	(0.0165)	(0.0314)	(0.2402)	(0.2170)	(0.0658)	(0.5667)	(0.0335)	(0.0458)	(0.0938)	(0.2490)	(0.1266)
Growth	0.0423***	0.0193	0.0358	0.0719	0.0370	0.0300	0.0219	0.0276	0.0760***	0.2699***	0.2492***
	(0.0096)	(0.0176)	(0.0622)	(0.0516)	(0.0266)	(0.0239)	(0.0213)	(0.0248)	(0.0239)	(0.1003)	(0.0635)
Cash	1.0352***	1.0780***	0.9267***	0.4507**	1.2563***	0.2896	0.7604***	1.1809***	1.7289***	0.9405***	0.5474
	(0.0523)	(0.1146)	(0.2972)	(0.1850)	(0.1186)	(0.2681)	(0.1453)	(0.1382)	(0.1499)	(0.3292)	(0.4305)
Leverage	0.1520***	0.2928***	0.0578	-0.0666	0.2991***	0.6800	0.2092***	0.3536***	0.2363***	0.6456***	0.3673*
	(0.0273)	(0.0684)	(0.1861)	(0.1003)	(0.0875)	(0.4178)	(0.0487)	(0.0725)	(0.0705)	(0.2384)	(0.1427)
cons	1.0368***	0.9498***	1.4311***	1.2348***	0.8390***	0.9656***	0.8190***	1.1451***	0.8644***	1.2557***	0.9679***
	(0.0276)	(0.0634)	(0.1807)	(0.1271)	(0.0790)	(0.6238)	(0.0890)	(0.0832)	(0.0850)	(0.4619)	(0.1361)
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,425	754	201	377	595	18	386	575	354	108	57

Variables	All sectors	Basic materials	Communications	Consumer cyclical	Consumer non-cyclical	Diversified	Energy	Financial	Industrial	Technology	Utilities
R-squared	0.2480	0.2019	0.2613	0.1610	0.2735	0.8877	0.1921	0.4690	0.4634	0.5501	0.6007
Panel B: Financial performance as measured by EVA											
ESG	0.3633***	0.3701*	1.2700***	-0.0511	0.3821**	-1.5790	0.0188***	0.3043	0.2331***	0.0440	-0.2618
	(0.0590)	(0.2207)	(0.2792)	(0.1234)	(0.1565)	(2.6076)	(0.0093)	(0.0899)	(0.1559)	(0.3703)	(0.3163)
LNTA	-0.7738***	-0.9432***	-0.7064***	-0.2001***	-0.8206***	-0.2874***	-0.8835***	-0.7798	-0.9102***	-0.1256	0.1210
	(0.0159)	(0.0614)	(0.0685)	(0.0394)	(0.0435)	(0.2164)	(0.0829)	(0.0257)	(0.0533)	(0.0807)	(0.1097)
PPE	-0.0565	0.0872	0.3939	-0.0974	-0.8389***	0.6029	0.6604***	-0.0451***	0.3507	-2.6035***	-0.0019
	(0.0361)	(0.1205)	(0.7712)	(0.2038)	(0.1904)	(1.3594)	(0.1357)	(0.0472)	(0.2598)	(0.6758)	(0.1892)
Capex	0.0350	0.1231	3.7470**	-0.7333	0.5981	6.0981	0.5225**	-0.0682	1.1554***	2.1909**	-0.6686
	(0.0794)	(0.1815)	(1.8138)	(0.4796)	(0.3649)	(7.3409)	(0.2335)	(0.1308)	(0.9721)	(4.9531)	(0.7598)
Growth	0.1320***	0.3478***	0.0122	0.2523	0.0903	0.2692	0.2352	0.0120	0.0237	0.8833***	0.4400*
	(0.0424)	(0.0948)	(0.1751)	(0.1206)	(0.1029)	(0.3105)	(0.1564)	(0.0773)	(0.1572)	(0.4136)	(0.3327)
Cash	0.6306***	1.5379**	1.3610**	1.2234	0.9712**	3.7212	0.0502	1.2574***	2.0234***	0.7870	4.2286
	(0.1932)	(0.6155)	(0.6794)	(0.4081)	(0.4036)	(3.4709)	(0.9398)	(0.3837)	(0.1572)	(0.7536)	(2.4568)
Leverage	0.7321***	0.4742***	-0.5584	-0.3130	-0.1015	6.6510	0.9744*	1.6971***	0.3118***	-0.3078	1.5327
	(0.1125)	(0.3576)	(0.4910)	(0.2372)	(0.2810)	(5.4144)	(0.4992)	(0.2092)	(0.2601)	(0.5856)	(0.8330)
cons	2.0954***	4.0614***	4.0251***	3.6357***	2.6021***	5.0350	1.8455***	1.5698***	2.8084***	2.9927***	1.9092***
	(0.1403)	(0.4946)	(0.6187)	(0.2840)	(0.3244)	(8.0823)	(0.5430)	(0.2410)	(0.3639)	(0.9586)	(0.9855)
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,425	754	201	377	595	18	386	575	354	108	57
R-squared	0.7516	0.7664	0.8105	0.6097	0.7567	0.3235	0.7482	0.8545	0.7541	0.6450	0.8093

Note*:* This table provides results of the regression of a company's financial performance over ESG performance in overall and across different industries. Financial performance is measured as Tobin's q (Panel A) and EVA (Panel B). Coefficient estimates and standard error computed (in parentheses) using robust fix-effect regression analysis are reported in the table. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table VI

Endogeneity analysis

Variables	All sectors	Basic materials	Communications	Consumer cyclical	Consumer non-cyclical	Diversified	Energy	Financial	Industrial	Technology	Utilities
Panel A: Financial performance as measured by Tobin Q											
ESG_Adj	0.0789***	0.0069***	0.3575***	0.0134	0.1148***	0.1034	0.0706***	0.0102	0.2964***	0.1007	-0.1340
	(0.0195)	(0.0018)	(0.1106)	(0.0619)	(0.0543)	(0.2172)	(0.0217)	(0.0316)	(0.0502)	(0.1644)	(0.0538)
LNTA	-0.0442***	-0.0649***	-0.1071***	-0.0454***	-0.0234**	-0.1108***	-0.3537***	-0.0146	-0.0843***	-0.0109	0.0214
	(0.0048)	(0.0112)	(0.0263)	(0.0173)	(0.0145)	(0.0124)	(0.0996)	(0.0090)	(0.0157)	(0.0325)	(0.0177)

Variables	All sectors	Basic materials	Communications	Consumer cyclical	Consumer non-cyclical	Diversified	Energy	Financial	Industrial	Technology	Utilities
PPE	-0.0897***	-0.0187	-0.1236	-0.3152***	-0.2265***	0.1887	-0.0508***	-0.1111***	-0.2303***	-0.6944***	-0.0619**
	(0.0098)	(0.0226)	(0.1917)	(0.0914)	(0.0420)	(0.1503)	(0.0368)	(0.0157)	(0.0652)	(0.1931)	(0.0314)
Capex	0.0990***	0.0276	0.0300	0.4863**	0.2454***	0.5655	0.0838*	0.0122	-0.0711	0.8393***	0.1419
	(0.0165)	(0.0324)	(0.2402)	(0.2140)	(0.0658)	(0.4647)	(0.0588)	(0.0458)	(0.0926)	(0.2404)	(0.1213)
Growth	0.0421***	0.0078	0.0391	0.0373	0.0382	0.0238	0.0906**	0.0128	0.0791***	0.3998***	0.2476***
	(0.0096)	(0.0182)	(0.0628)	(0.0523)	(0.0266)	(0.0933)	(0.0428)	(0.0250)	(0.0237)	(0.0961)	(0.0609)
Cash	1.0519***	1.1289***	1.1114***	0.4325**	1.2439***	0.8999	0.7920***	1.1740***	1.7734***	1.0371***	0.5763
	(0.0522)	(0.1152)	(0.2893)	(0.1824)	(0.1187)	(1.0383)	(0.1456)	(0.1360)	(0.1476)	(0.3058)	(0.4112)
Leverage	0.1486***	0.2440***	0.1186	-0.0661	0.2944***	0.3902	0.1032***	0.3551***	0.2439***	0.3742***	0.4304***
	(0.0273)	(0.0683)	(0.1857)	(0.1034)	(0.0873)	(0.3833)	(0.0824)	(0.0716)	(0.0696)	(0.2231)	(0.1397)
cons	0.8620***	0.8539***	0.5998***	1.3285***	0.6141***	1.2378***	1.6303***	1.1542***	0.2431***	1.5730***	1.2526***
	(0.0460)	(0.0538)	(0.2503)	(0.1368)	(0.1157)	(0.6848)	(0.1958)	(0.0843)	(0.1162)	(0.4309)	(0.1592)
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,425	754	201	377	595	18	386	575	354	108	57
R-squared	0.2457	0.2131	0.2482	0.1611	0.2752	0.9967	0.3433	0.4691	0.4771	0.5488	0.6317
Panel B: Financial performance as measured by EVA											
ESG_Adj	0.0936***	0.0311*	0.0537***	0.2072	0.0740*	-3.6092	0.0211***	0.1044	0.0634***	0.6238	-0.0103
	(0.0151)	(0.0323)	(0.0106)	(0.1441)	(0.0267)	(3.2105)	(0.0435)	(0.0176)	(0.0766)	(0.7226)	(0.3241)
LNTA	-0.3932***	-1.2178	-0.6963***	-1.4975***	-0.5174**	-0.0406	-0.8683***	-0.3340***	-1.3493***	-1.6777	0.0024
	(0.0664)	(0.1895)	(0.0665)	(0.5613)	(0.1322)	(1.7274)	(0.2596)	(0.0671)	(0.4635)	(1.0108)	(0.1125)
PPE	-0.0611*	0.0497	0.0213	-0.0789	-0.9091***	0.7067	0.6630***	-0.0943	1.0630	2.6394***	-0.0262
	(0.0447)	(0.1230)	(0.7749)	(0.5014)	(0.2159)	(1.5629)	(0.1441)	(0.0717)	(0.5771)	(0.7637)	(0.1970)
Capex	0.1093	0.1133	2.9251	-0.1071	0.5532***	0.4057	0.5241***	0.1185	-2.6231***	-1.1998	-0.3126
	(0.1006)	(0.1873)	(1.7992)	(1.3096)	(0.4114)	(9.0041)	(0.2291)	(0.2150)	(0.7927)	(5.5266)	(0.8074)
Growth	0.1948***	0.3051***	0.0033***	0.5854**	0.0755*	0.0476	0.2419	0.1268**	-0.0856	0.8890***	0.5505
	(0.0549)	(0.1070)	(0.1719)	(0.5215)	(0.1174)	(0.3338)	(0.1959)	(0.1245)	(0.2523)	(0.0076)	(0.3679)
Cash	0.1227***	1.7725	0.6825	0.0731***	1.2081***	4.0416	-0.0501	0.5430**	0.9165***	0.0997	1.2160**
	(0.2988)	(0.7152)	(0.6975)	(1.1221)	(0.4029)	(3.4304)	(0.8342)	(0.6494)	(1.4087)	(0.2708)	(2.5269)
Leverage	0.4063***	0.4322	-0.6481	-0.5478**	0.0201	8.5896	-0.9657	-1.4927***	-0.1297	-0.2732	1.7053**
	(0.0981)	(0.3231)	(0.4851)	(0.2492)	(0.3253)	(7.6908)	(0.5834)	(0.1793)	(0.3881)	(1.9134)	(0.8586)
cons	0.6505***	3.8445***	1.1732***	2.0117***	0.9146***	9.2649	1.7912***	0.4250***	3.6382***	2.7362***	2.2704***
	(0.1819)	(0.5852)	(0.4461)	(0.9906)	(0.3428)	(8.1276)	(0.7247)	(0.2778)	(1.4524)	(1.1880)	(0.9492)
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,425	754	201	377	595	18	386	575	354	108	57
R-squared	0.6143	0.7521	0.7951	0.6852	0.6883	0.4292	0.7208	0.6693	0.6343	0.4058	0.7212

Note: This table provides results of the endogeneity analysis using instrumental regression of a company's financial performance over the instrument variable overall and across different industries. Financial performance is measured as Tobin's q (Panel A) and EVA (Panel B). Coefficient estimates and standard error computed (in parentheses) using robust fix-effect regression analysis are reported in the table. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

ESG impact analysis

The results presented in the second column of Table V (Panel A) show a positive and statistically significant association between the corporate ESG performance score and financial performance. This study conducts panel regression analysis considering year fixed effect with robust standard error. The estimated coefficient of ESG is 0.0040 and statistically significant at 1% level (t-statistics = 5.21 and standard error 0.0008).

The findings are consistent with prior literature. In line with the study result by Jo and Harjoto (2011), and Brooks and Oikonomou (2018), the overall relationship between corporate ESG and financial performance is positive and significant, including all companies in different industries sectors. Therefore, consistent with the second hypothesis, the results show that corporate ESG performance is positively associated with corporate financial performance.

Industrial impact analysis

Table V (Panel A) also represents the result of evaluating the industrial impact of corporate ESG performance on corporate profitability across ten BICS industry sectors. The results presented in Table V (Panel A) shows a positive and significant association for sectors, including basic materials, communications, consumer non-cyclical, energy and industrial. On the other hand, no significant association has been witnessed for other sectors. In other words, although the overall relationship is positive, but is not consistent across different sectors. This is in line with the results of the studies by Omar and Zallom (2016) and Gholami *et al.* (2022), in which they document inconsistent results between the ESG and financial performance across industries.

Companies operating in different industry sectors are often significantly regulated and subject to diverse challenges by their stakeholders. The growing demands of customers, communities and regulators need to be addressed while maintaining the operational costs. The energy, industrial and material companies specifically need to ensure the employees' safety requirements, environmental performance improvements such as the reduction in greenhouse gas emissions and other specific challenges while maintaining industry compliance (Spence, 2011, Gholami *et al.*, 2022). The results reported in Table V (Panel A) show that the association between corporate ESG performance and corporate financial performance varies between different sectors. Therefore, the third hypothesis of this study is supported.

Sensitivity analysis

Traditional performance measures have been criticised recently for inconsistency in corporate performance measurement due to the inability to include the full cost of capital (Kumar and Sharma, 2011, Sloof and van Praag, 2015). Therefore, this study conducts additional tests utilising alternative metrics of corporate financial performance as economic value added (EVA)[13] and presents the result in Panel B of Table V.

Compared to other measures, the significance of EVA is the inclusion of both economic capital and economic profit to measure the corporations' value generation after adjusting the accounting profits. EVA could be used for both small and large corporations, and it reflects the value creation of a corporation, including the economic situations (Kumar and Sharma, 2011).

The result of this study's sensitivity analysis continues to mirror the main findings, including all variables of interest. Consistent with the result of the main model in Panel A of Table V, a robust positive relationship between the ESG and alternative financial performance measures are documented. The findings show a similar different relationship between ESG and financial performance across different industry sectors. Therefore, the results reported in the primary evaluation models are supported.

Robustness check

This study runs several robustness tests to examine the authenticity of the main findings. The robustness test results are discussed in this section. This study follows previous literature in utilising an instrumental variable (IV) approach for re-examining the estimation models and reports the results in Table VI (Li *et al.*, 2018, El Ghoul *et al.*, 2011).

Considering that companies with better operational performance in the past may maintain a higher ESG disclosure score, the IV approach helps control any potential endogeneity bias initiating from the reverse causality. To find an appropriate instrument, this study refers to the extant literature, uses a simultaneous equation system, and uses yearly company-average of ESG score (ESG_Adj) as an instrument (Cheng *et al.*, 2014, Gupta and Krishnamurti, 2018). First, the ESG performance for each company is benchmarked against other companies. The ESG performance is then standardised by subtracting from the average ESG performance of the total sample and dividing by the standard deviation[14].

[13] Economic Value Added (EVA) is the economic profit after considering net operating profit (NOPAT) over the total cost of capital (COC). It is argued that EVA reflects the company's true value (Stern *et al.*, 1995).

[14] $ESG\ Adjusted\ performance = \frac{Company\ ESG - Average\ ESG}{SD}$

The results of the endogeneity test are presented in Table VI (Panels A and B). The findings highlight the positive implication of ESG on the company's financial performance and further indicate the different impacts of corporate ESG performance on financial performance across sectors. The results of the robustness analysis check are all consistent with the main finding of the study, showing that endogeneity is not the issue.

Conclusions

This study first examines the extent to which Australian companies demonstrate improvement in their ESG performance from 2007 to 2017. The findings of this study show a significant improvement in corporate ESG performance over the designated period; therefore, the first hypothesis is supported. The ESG performance improvement is meaningful and in line with the previous study by Galbreath (2013), in which a significant improvement in the ESG performance is documented from 2002 to 2009.

Secondly, this study echoes previous studies' results by supporting the positive implication of corporate ESG performance improvement on financial performance over time (Jo and Harjoto, 2011, Margolis *et al.*, 2009, Brooks and Oikonomou, 2018). The results indicate that ESG performance improvement increases corporate financial performance longitudinally and, further, ESG disclosure helps to communicate to investors the appropriateness of corporate ESG performance. Communication via disclosure helps to convince stakeholders that the company is making a credible commitment towards sustainable business.

Lastly, this study extends the investigations into ESG performance's implications by targeting diverse stakeholders in different industries with diverse expectations. This study's findings support the argument that ESG performance does not equally benefit companies across different industry sectors, therefore, supporting the third hypothesis of this study and previous literature (Fish and Wood, 2017, McWilliams and Siegel, 2011). While the results of this study did not show a negative association between corporate ESG and financial performance, the positive impact of ESG on financial performance is not uniform across industries. Therefore, there is evidence to support the existence of the different associations between corporate ESG and financial performance across different industry sectors.

The results of this study have several implications. Firstly, the findings demonstrate that stakeholder pressure is the main driver for corporate ESG performance improvement across Australian companies. While stakeholder pressure on corporations in Australia is intense, the strength and scale of ESG performance improvement are impacted by an industry's

characteristics. This is consistent with the study by Galbreath (2010), who argues that the type of corporation and industrial strategy impacts a corporation's ESG performance. There are implications for ESG performance when management aims to satisfy diverse stakeholders in different industries. Consistent with prior literature, this study recommends that managers are likely to improve corporate financial performance by improving corporate ESG performance (Albertini, 2013). However, it is important to consider corporate ESG performance in a way that is appropriate for each company's strategy in a particular industry. This study indicates that the ESG performance does not equally benefit corporations across different sectors, with different stakeholder groups providing support for prior studies (Omar and Zallom, 2016, Gholami *et al.*, 2022). This study recommends that managers consider their respective industry's characteristics and whether corporate ESG performance is essential to their financial performance. The industry sector differences result in selecting various organisational strategies that weigh business objectives differently (Ortas *et al.*, 2015). This study's findings guide managers by highlighting that investing in ESG performance generates different financial outcomes in different industry sectors. Managers should wisely prioritise resource and budget allocations to ESG activities that substantially impact financial performance in the different industry sectors.

This study is not without limitations. Firstly, using only Australian publicly listed companies, and not a broader sample of non-listed corporations and smaller companies, could yield results that may not represent all types and sizes of companies. Secondly, Although this study expands the literature, it only examines Australian companies. Hence, it is limited by generalizability. This study provides an important direction for future ESG research. Due to the different nature of the relationship between ESG and financial performance across industries, examining the same relationship between disaggregated ESG elements will be interesting. The result of studies examining different ESG elements and different industry sectors should provide meaningful implications for managers.

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Appendices

Appendix A.

Variable definitions, measurement, and sources

Category	Measure	Definition/Measurement
Environment, social and governance disclosures	ESG	As measured based on a total of 120 indicators, covering three aspects: environment, social activities, and governance. The aggregated ESG score ranges from 0.1 for the minimum ESG data disclose to 100 maximums for those that disclose all data point
Company characteristics:		
TobinQ		Market value/total assets
Economic Value Added	EVA	Also referred to as economic profit that compares net operating profit to total cost of capital The EVA is measured by: $EVA = NOPAT - (WACC \times Capital\ Invested)$ Where: $NOPAT = net\ operating\ profit\ after\ tax$ $WACC = weighted\ average\ cost\ of\ capital$ $Capital\ Invested$ $= total\ capital\ invested\ via\ equity\ or\ debt$
Company Size	LNTA	The natural logarithm of total assets
Property, plant and equipment	PPE	The ratio of property, plant, and equipment to total sales
Capital expenditure	CAPEX	The capital expenditure divided by total sales
Sales growth	GROWTH	The percentage change in sales over the prior year
Cash	CASH	The cash divided by total assets
Leverage	LEVERAGE	Leverage or total debt ratio measured as total debts divided by total assets

Source: Bloomberg Dataset

4.3. Chapter Summary

This chapter has presented the assessment of the improvement into Australian corporate ESG performance disclosure over time. It has also present the result of the examination on the impact of corporate ESG performance disclosure on the company's financial performance and further provides the results of similar examination across industry sectors. The results support all three hypotheses of this chapter. The summary and conclusion of the findings are included in the conclusion chapter (chapter 6). The next chapter provides information on the third paper for this thesis. The third paper (chapter 5) investigate the impact of corporate carbon performance disclosure on the company's cost of capital and idiosyncratic risk.

5. CHAPTER FIVE

Corporate carbon emissions performance's effect on idiosyncratic risk and overall capital costs

5.1. Chapter Introduction

Chapter four (paper two) evaluates the improvement into Australian corporate ESG performance disclosure and further evaluate the consequential economic impact on the company's financial performance overall and across different industries. This chapter provides the third paper based on two hypotheses constructed from previous literature based on stakeholder theory. Hypothesis 1 enables examining the impact of corporate carbon emissions performance disclosure on the company's idiosyncratic risk. Hypothesis 2 investigate the impact of corporate carbon emissions performance disclosure on the company's cost of capital (COC).

Section 5.2 presents the empirical study on the third paper, following the content summary in section 5.3.

5.2. Empirical Study (Paper Three)

Corporate carbon emissions performance's effect on idiosyncratic risk and overall capital costs

Abstract

This study investigates the effect of corporate carbon emissions on a company's idiosyncratic risk and its consequential impact on the overall capital cost. Additionally, this study provides an estimation of the average interest rate applied by the capital market for corporate carbon emissions performance. Based on 748 company-year observations within Australian-listed companies between 2007 and 2017, the evidence shows that corporate carbon emissions have a discernible impact on idiosyncratic risk and capital cost. The findings are economically meaningful: for every additional tonne of corporate GHG emissions, the capital costs increase on average by 20–22%. Therefore, the capital market is pricing corporate GHG emissions and penalising polluting companies. The findings of this study highlight the importance of risk awareness associated with corporate carbon emissions performance as a business strategy and its importance to capital resources providers exposed to corporate default and reputational risk. Corporate exposure to carbon emissions depends on managing corporate risks, which eventually impact the capital cost. This study provides insight to investors and managers on the combined effect of carbon emissions performance on a company's risk and capital cost.

Keywords: Corporate carbon emissions performance, Emissions intensity, Cost of capital (COC)

JEL classification: M41, M48, Q20, Q56, C12,

Introduction

Climate change risks, carbon emissions and related economic impacts have become the main concerns of financial institutions, institutional investors and other stakeholders (Benson et al., 2014; Eccles et al., 2011; Linnenluecke et al., 2017b). Although prior studies support the value-relevance of corporate carbon emissions performance information, research on the impacts of this type of information on a company's idiosyncratic risk is scarce. It is important to investigate how capital markets price the risks associated with corporate carbon emissions performance. Such evidence will allow companies to change their carbon management strategy to mitigate its implications on idiosyncratic risk assessment by the market, which will, in turn, reduce their cost of capital (COC).

The first motivation of this study is derived from the previous literature argument on the moderating impact of corporate environmental performance disclosure on the company's idiosyncratic risk. Although this is supported in some literature (Bui et al., 2020; Liesen et al., 2017) this may not be the case for the direct impact of corporate carbon emissions performance, as stated by Cooper et al. (2018). Second, prior studies provide mixed results on the risk efficacy of corporate carbon emissions performance. Some studies propose that companies with higher carbon emissions try to incorporate superior environmental strategies and reporting practices; therefore, they benefit from lower idiosyncratic risks (Hassan and Romilly, 2018; Weinhofer and Hoffmann, 2010). On the other hand, Dawkins and Fraas (2011) argue that companies with lower carbon emissions try to differentiate themselves by environmental disclosure; therefore, they are perceived to have lower idiosyncratic risk. It, therefore, is unclear whether the capital market fully utilises corporate carbon emissions performance for lending or investing decision-making or adjusts for companies exposed to carbon emissions-related risks (Benlemlih et al., 2018; Cooper et al., 2018; He et al., 2021). He et al. (2021) also points out that results in the current literature are disproportionate to evaluate the direct impact of corporate carbon performance on the company's risk management and reduction of carbon emissions. This study attempts to address the knowledge gap in the research about this association by responding to the call for further studies to evaluate the idiosyncratic risks associated with corporate carbon emissions performance (He et al., 2021; Jo and Na, 2012).

The implications of climate change risks and the imminent challenge of moving to the low carbon economy are expected to substantially redistribute the wealth from companies with poor carbon performance management to those with strategies that mitigate corporate exposure to carbon emissions (Luo and Tang, 2021; Matsumura et al., 2014b).

The extended focus of the study is on the economic implications of corporate carbon emissions performance, which is an active area of study within the research community (Benson et al., 2015; Borghei, 2021; Linnenluecke et al., 2017a). Prior research has primarily focused on the impact of corporate environmental performance disclosure and related risks on a company's COC, with limited exploration of corporate carbon emissions performance (El Ghoul et al., 2011; Ng and Rezaee, 2015). This study builds on the sparse empirical findings linking corporate carbon emissions performance with COC (Bui et al., 2020; Clarkson et al., 2013; Jung et al., 2018; Sharfman and Fernando, 2008). Past studies have investigated the impact of corporate environmental performance on a company's COC by using the cost of equity (COE) (Bui et al., 2020; Clarkson et al., 2013) or cost of debt (COD) (Jung et al., 2018; Maaloul, 2018). Also motivated by increasing concerns over the climate change risks in prior literature, this study examines the impact of corporate carbon emissions performance on the company's idiosyncratic risk and COC. This study extends the prior literature by focusing on Australian companies, a sample set with limited studies regarding carbon emissions, idiosyncratic risk and financial costs compared to previous studies concentrating on U.S. and U.K. companies. Although corporate carbon emissions in Australia have no explicit costs, evidence on the extent to which the capital market is affected by corporate carbon emissions performance is important for corporate decision making. The findings should help Australian companies to consider the cost-benefit of appropriate resource allocation to carbon emissions reduction strategies.

Since most listed companies source their financial resources from a combination of debt and equity markets, their overall capital cost is the average interest rate of the debt and equity market as a more relevant COC. Therefore, investigating the economic impact of corporate carbon emissions performance exclusively from either the equity or debt market cannot provide a complete resolution (Aldamen and Duncan, 2013; Jung et al., 2018). In contrast to prior studies, this study uses a more comprehensive measure of a company's COC that should provide inclusive guidance on the economic implications of corporate carbon emissions performance for companies and managers. Consequently, this study extends the current literature and responds to the call for further investigation of the economic impact of corporate carbon emissions performance by using a comprehensive measure of COC, that is, the weighted average cost of capital (WACC) (Aldamen and Duncan, 2013; Jung et al., 2018). In addition, prior studies only focus on corporate environmental performance disclosure or only one environmental, social and governance (ESG) performance disclosure measure, or a composite

disclosure index rather than concentrating on corporate carbon emissions performance (Dhaliwal et al., 2014; Gupta and Krishnamurti, 2018). Hence, the differential impacts of corporate carbon emissions performance on the combined measure of a company's COC are not well understood. This study also examines the joint impact of corporate carbon performance and emissions intensity on the company's COC to negate any concerns on the comparability of corporate carbon emissions between industries. It, therefore, provides an estimation of the average interest rate imposed by the capital markets for corporate carbon emissions performance.

This study uses data over 11 years from 2007–2017, compared to previous studies which focused on a single year (Chapple et al., 2013; He et al., 2013). Furthermore, this study includes all industry sectors compared to other studies that focused on only a particular sector (Clarkson et al., 2008; Li et al., 2014). Also, several sensitivity tests are performed to address these issues and further consider the systematic differences in the level of idiosyncratic risks and COC that may result in spurious correlation.

This study should contribute to the body of knowledge investigating the impact of corporate environmental performance on the company's idiosyncratic risk and cost of capital (COC) (Dhaliwal et al., 2014; El Ghoul et al., 2011; Kim et al., 2015; Sharfman and Fernando, 2008). This study contributes to the extant literature by documenting how corporate carbon emissions performance impacts idiosyncratic risk and its consequential impact on its COC, including debt and equity market.

There are several important implications for managers, regulators or literature derived from the study's results. The first implication for managers is the need for a practical and robust understanding of the risks associated with corporate carbon emissions performance, as Borghei (2021) stated. The findings also corroborate Jo and Na (2012) and Luo and Tang (2021) argument for managing corporate environmental performance to control the company's idiosyncratic risk and is the second important implication for managers. Therefore, the third important implication for managers is the need to develop strategies to identify the link between carbon emissions performance and company-specific risks, such as physical, operational, regulatory and stakeholder pressure.

For regulators, the findings of this study could help during the development, evaluation or updating of carbon emissions related legislation by highlighting the financial consequences of corporate carbon emissions performance. The inefficient evaluation of corporate carbon emissions performance leads to inefficient capital allocation that could impede overall

economic growth (Walras, 2003). The results should advocate the appropriateness of the standard reporting mechanism of corporate carbon emissions performance, which helps market efficiency and better resource allocation.

As Warwick and Ng (2012) and recently He et al. (2021) highlighted, financial accounting needs to build a mechanism to recognise corporate carbon emissions risks and allowance. The findings contribute to financial accounting schemes for corporate carbon emissions recognition and reporting, therefore adding implications to the literature for future studies.

The remainder of this paper is structured as follows. Section 2 discusses Australian carbon legislation. Section 3 presents the relevant theory and literature on corporate carbon emissions, with this followed by developing the study's two hypotheses. Section 4 discusses the study's data, sample selection and variables, and estimation models. The results are presented in Section 5, and the paper concludes with Section 6.

Australian carbon emissions legislation

Climate change and, specifically, carbon emissions can cause disturbance to the complex ecological systems and damage countries' economies and human health (Bebbington and Larrinaga-Gonzalez, 2008; Labatt and White, 2011). Governments in many countries have started to implement regulations and policies targeting carbon emissions reduction. There is an increasing debate that the capital market could play a critical role beyond maximising its profit by undertaking a socially responsible resource allocation approach (Gutiérrez-Nieto et al., 2016). Companies are increasingly challenged in their fiduciary responsibilities to balance profits with environmental risks (Linnenluecke et al., 2020).

The Australian regulations on carbon performance disclosure are defined under the *National Greenhouse and Energy Reporting Act 2007* (The NGER Act). The Clean Energy Regulator is responsible for the management and administration of the NGER Act. According to the NGER Act, all businesses emitting more than the defined thresholds of carbon dioxide, megawatt-hours of electricity or million litres of fuel in one financial year must be registered. These businesses must collect and keep records and report their carbon emissions, energy consumption and production to the Clean Energy Regulator every year, following the end of the financial year. The Clean Energy Regulator publishes the information publicly on Scopes 1 and 2 carbon or greenhouse gas (GHG) emissions and energy consumption for all registered businesses. Furthermore, in 2011, the Australian government introduced a Climate Change Plan named 'Securing a Clean Energy Future', which required significant social and economic

commitment from companies (Subramaniam et al., 2015). Following this plan, Australian companies are encouraged to manage their associated risks and opportunities by disclosing corporate carbon emissions. The emissions reduction plan is an essential economic and environmental reform that could profoundly change the business environment.

Theoretical framework and hypotheses development

Creating value for all stakeholders by concentrating on common interests is a core element of stakeholder theory. The stakeholder pressure for carbon emissions performance disclosure is linked to the value creation concept and must be aligned with corporate strategic decision making (Freeman et al., 2010). Therefore, managers must set corporate strategies that respond to stakeholders and match corporate needs with resources (Deegan, 2014). On the other hand, companies use disclosure to elaborate on their environmental performance. Therefore, they will be rewarded with more investment from the equity market, higher consumer trust, higher employee productivity, and stakeholders' support (Richardson et al., 1999).

The emergence of carbon or carbon-related emissions regulations makes carbon risk management a dominant business strategy (Clarkson et al., 2015). Due to the uncertainty of future carbon emissions regulations and related risks, a company's exposure to carbon emissions increases the uncertainty of its future cash flow, earnings and brand damage (Chen and Gao, 2012; Labatt and White, 2011; Schneider, 2011; Sharfman and Fernando, 2008). Some literature provides evidence of a positive association between corporate carbon performance and a company's total and idiosyncratic risk (Bouslah et al., 2013). Providing carbon performance disclosure or developing a corporate environmental reporting mechanism is costly and could be interpreted as an additional operational risk (Cormier and Magnan, 2015; Peters and Romi, 2014). Furthermore, in light of corporate environmental performance, the practice of voluntary disclosure does not necessarily equate to good performance (Al-Tuwaijri et al., 2004). Managers may over-disclose information symbolically or use the disclosure mechanism to appear environmentally sensitive. This implies that environmental disclosure may be substantially inefficient. Regulations on environmental performance disclosure could further impact company-specific risks. Corporate carbon emissions performance disclosure could reduce the idiosyncratic risk if the performance is perceived as outstanding; otherwise, it is a concern for stakeholders and increases the idiosyncratic risk (Brown and Deegan, 1998; Lee et al., 2015).

Investigating the impact of corporate carbon emissions performance on the different aspects of company risk is an important yet under-researched area in the accounting and finance

literature (Tzouvanas et al., 2020). Some studies in the literature predict that corporate environmental performance disclosure would improve information asymmetries and reduce idiosyncratic risks (Benlemlih and Girerd-Potin, 2018; Dhaliwal et al., 2011; Qiu et al., 2016). Gaspar and Massa (2006) argue that companies that include environmental responsibility in their operating strategy can construct a solid relationship with stakeholders, thereby lowering idiosyncratic risk. Poddi and Vergalli (2009) use systematic risk (beta) from the capital asset pricing model (CAPM) as a proxy for company risk and investigate the impact of corporate environmental performance disclosure on a company's systematic risk. They find that corporate environmental performance disclosure can effectively minimise systematic risk. Salama et al. (2011) and Oikonomou et al. (2012) find a moderate negative association between the level of environmental performance disclosure and idiosyncratic risk. This is consistent with Jo and Na (2012), who argue that companies use environmental disclosure for risk management purposes. Jiang et al. (2009) argue that a corporate carbon emissions performance disclosure improves idiosyncratic risk and commits a company to its carbon emissions reduction plan. However, such a mechanism could be detrimental as it exposes companies to potential criticism and costs related to pollution abatement (Lee et al., 2015). Corporate carbon emissions performance disclosure can negatively impact investors concerned about the 'green' future and related investment strategies (Cormier and Magnan, 2015). In contrast to the extant literature investigating the impact of corporate environmental performance on financial performance or systematic risk, studies concentrating on the direct impact of corporate carbon emissions performance disclosure on idiosyncratic risk are limited (Benlemlih and Girerd-Potin, 2018; Cooper et al., 2018; Jo and Na, 2012). The current study examines how corporate carbon emissions performance affects company risk, focusing on idiosyncratic risk. Therefore, the recommended first hypothesis of this study is as follows:

H1: There is a positive association between corporate carbon emissions performance and idiosyncratic risk.

A company's intensive carbon emissions performance and related risks are likely to encounter a higher default risk from the capital market perspective. Higher carbon emissions result in more compliance costs, impaired profitability and cash flows (Subramaniam et al., 2015; Weber, 2012). Environmentally irresponsible companies are more exposed to brand damage, potential operational disruption, market competition loss, and damaging future cash flows (Labatt and White, 2011). Corporate carbon emissions performance should be an essential element of a company's risk assessment for investment decision-making (Matsumura

et al., 2014a). Financial institutions may encounter additional regulation and reputational risks associated with carbon-related projects (Li et al., 2014; Wegener et al., 2013). Therefore, corporate carbon emissions can potentially damage a lender's ability to capture more customers and eventually more revenue streams (Subramaniam et al., 2015; Thompson, 1998; Weber, 2012). Kim et al. (2015) argue that financial institutions apply a higher premium risk for carbon polluting companies with higher carbon emissions. Credit rating agencies downgrade companies with higher carbon emissions (Li et al., 2014; Matsumura et al., 2014a). Referring to the increasing public concerns and regulations on corporate carbon emissions performance, the evidence indicates that capital markets have incorporated related risks into financing operations. This is through using policies that enable them to manage their exposures to carbon emissions risks.

Prior research studies largely concentrate on corporate environmental performance and the impacts of related risks on a company's cost of capital, with little focus narrowly on corporate carbon emissions performance (Bui et al., 2020; Clarkson et al., 2013; Jung et al., 2018; Maaloul, 2018; Sharfman and Fernando, 2008). Sharfman and Fernando (2008) report a positive association between a particular environmental risk measure and COD across a sample of United States (US) companies. Clarkson et al. (2013) find no relationship between corporate environmental performance and COE but a positive and significant association between poor environmental performance and cost of equity (COE). In a study on Canadian-listed companies, Maaloul (2018) finds corporate carbon emissions increase COD by an average of 11–15%. Jung et al. (2018) find a positive relationship between a measure of corporate carbon risk awareness and cost of debt (COD). More recently, in a multinational study by Bui et al. (2020), corporate carbon emissions performance find to be positively associated with cost of equity (COE). However, as it is argued by Aldamen and Duncan (2013), investigating the economic impact of corporate carbon emissions performance exclusively from either the equity or debt market cannot provide a complete resolution.

Prior studies on the relationship have created an extensive debate amongst academics and practitioners to investigate how corporate carbon emissions performance help to improve energy efficiency and minimise the cost to the economy. The emissions reduction legislation may lead to higher financial costs and related risks for companies that fail to improve their carbon emissions performance. This study argues that the significant impact of carbon emissions performance initiatives and regulations on businesses should be clearly understood, even though it is hard to mitigate their risks and financial impacts. This study posits that higher

corporate carbon emissions performance results in having higher COC in the capital markets, including debt and equity markets. Therefore, the second hypothesis of this study is:

H2: There is a positive association between corporate carbon emissions and the overall cost of capital (COC).

Research design

Empirical models

In this section, the empirical models to analyse the hypotheses of this study are provided. As with the studies by Mishra and Modi (2013) and Benlemlih (2017), this study calculates and uses various company's risk measures, including systematic and idiosyncratic risks, to examine the first hypothesis (H1). This study also follows prior literature (Benlemlih, 2017; Benlemlih et al., 2018; Goss and Roberts, 2011; Maaloul, 2018) and includes other financial determinants impacting a company's financial operation. To be specific, these measures include: the company's bankruptcy risk or default risk (*Z_Score*); systematic risk (*Beta*); company profitability (*ROA*); company market price to book value (*M/B*); company size measured by total assets (*LNTA*); debt ratio (*LEVERAGE*) measured by total liabilities divided by total assets; the ratio of property, plant and equipment to total revenue (*PPE*); capital expenditure ratio (*CAPEX*) measured by capital expenditure divided by total revenue; revenue growth (*GROWTH*) measured by the revenue percentage change between the periods; and cash ratio (*CASH*) measured by the item 'cash' divided by total assets.

This study proposes that corporate carbon emissions positively impact idiosyncratic risk. Therefore, the following equation is estimated:

$$Idiosyncratic\ Risk_{i,t} = \beta_0 + \beta_1 GHG_{i,t} + \beta_2 Z\_Score_{i,t} + \beta_3 Beta_{i,t} + \beta_4 ROA_{i,t} + \beta_5 M/B_{i,t} + \beta_6 LNTA_{i,t} + \beta_7 LEVERAGE_{i,t} + \beta_8 PPE_{i,t} + \beta_9 CAPEX_{i,t} + \beta_{10} GROWTH_{i,t} + \beta_{11} CASH_{i,t} + IndustryFixedEffect_t + YearFixedEffect_t + \varepsilon_{it} \quad (1)$$

The current study expects companies with higher carbon emissions to have higher credit- or investment-related risks and tolerate a higher interest rate. Consistent with these expectations, this study regresses corporate COC on carbon emissions to examine the second hypothesis (H2).

$$COC_{i,t} = \beta_0 + \beta_1 GHG_{i,t} + \beta_2 Z\_Score_{i,t} + \beta_3 Beta_{i,t} + \beta_4 ROA_{i,t} + \beta_5 M/B_{i,t} + \beta_6 LNTA_{i,t} + \beta_7 LEVERAGE_{i,t} + \beta_8 PPE_{i,t} + \beta_9 CAPEX_{i,t} + \beta_{10} GROWTH_{i,t} + \beta_{11} CASH_{i,t} + IndustryFixedEffect_t +$$

$YearFixedEffect_t + \varepsilon_{it}$ (2)

Data and sample selection

IThis study obtains the corporate carbon emissions (or GHG emissions) data and all accounting variables from the Bloomberg database. The initial sample includes all Australian-listed companies from 2007–2017 (801 company-year observations). The companies with missing data are excluded from this study's sample. This results in the final sample of 748 company-year observations, as presented in Table 1.

[INSERT Table 1 HERE]

The Australian regulations for carbon emissions performance reporting is defined under the NGER act in 2007. The study period starts from the inception of the NGER act in 2007 as a major economic and environmental reform that could change the business environment. The NGER Act and further climate change plan named 'Securing a Clean Energy Future' in 2011 target cut pollution by 5 per cent by 2020.

Table 2 presents the sample distribution by industry sector, in which the financial, basic materials and consumer non-cyclical sectors comprise the largest proportions (25%, 21% and 15%, respectively). The technology, communications and utility sectors comprise the smallest proportions (1%, 3% and 3%, respectively). Due to missing carbon information, the current study excludes the health care sector. The industry classifications are based on the Bloomberg Industry Classification System (BICS) presented in Appendix A.

[INSERT Table 2 HERE]

Measurement of variables

Corporate carbon emissions

This study uses Bloomberg's carbon emissions data frequently used in prior literature (Matsumura et al., 2014a; Sharfman and Fernando, 2008). Bloomberg reports total carbon emissions as the total of the company's direct emissions (Scope 1) and all indirect emissions (Scope 2).

This study further follows previous literature (Bui et al., 2020; Maaloul, 2018; Matsumura et al., 2014a) and measures carbon emissions in two ways: total carbon emissions and carbon emissions intensity. This negates any concerns about the comparability of carbon emissions between different industries. Total corporate carbon emissions are measured based on the total amount of scope one from all company sources and scope two from a company's electricity, heat or steam consumption. The carbon emissions intensity is a ratio of total

corporate carbon emissions scaled by total revenue. This ratio helps mitigate the impact of extreme variance across different sectors, so data becomes more comparable across different reporting periods (Kim et al., 2015; Luo and Tang, 2014; Wegener et al., 2013).

Idiosyncratic risk

Most of the uncertainty and volatility of a particular asset over time are caused by idiosyncratic risk. Idiosyncratic risks include diverse elements, such as a company's investment strategies, management decisions, financial policies and procedures, geographic location of its operation and even corporate culture. Richardson (2009) argues that some corporate environmental performance elements, such as carbon emissions, resource scarcity, actions limiting a company's monetary policy or increases in its cost of capital, are essential in different economic situations. Therefore, incorporating corporate environmental performance into credit risk assessment and investment evaluation is critical in a long-term corporate strategy setting (Richardson, 2009).

The current study considers various company risks, such as systematic and idiosyncratic risks, to examine the impact of corporate carbon emissions on idiosyncratic risk. The study follows Mishra and Modi (2013) and Benlemlih (2017) to calculate the company's idiosyncratic risk according to total risk. Total risk includes market risk (beta) and company-specific (idiosyncratic) risk. The total risk is traditionally measured by the market return variance, or typically standard deviation (Brealey et al., 2001). The market risk provided by the Bloomberg database is calculated based on beta in the capital asset pricing model (CAPM) associated with the market return. Beta represents the systematic risk of a company relative to the market risk in general. The current study calculates idiosyncratic risk based on the market beta provided by the Bloomberg database.

Cost of capital (COC)

Most publicly listed companies source their financial needs through debt and equity capital. In the equity market, the COE is the investors' required rate of return after including a company's particular risks. Investors use this to measure discounted future cash flow generation for companies. A higher required rate of return means higher financial costs for the company in sourcing its financial needs through the equity market. COD is the cost of borrowing financial resources from sources other than the equity market, which is the debt market. Resource providers in the debt market include banks, private institutions or institutional investors, and other financial institutions. These financing options may lead to interest costs

for companies (Sharfman and Fernando, 2008). Therefore, a company's overall COC should include the costs of both debt and equity market. The weighted average cost of capital (WACC) provides the average cost of financing, including the COD and COE. Following Sharfman and Fernando (2008), the WACC (named COC) is used in this study. This study obtained data from the Bloomberg database. Details of the WACC calculation by the Bloomberg database are presented in Appendix B.

Empirical results

Descriptive statistics

Table 3 presents descriptive statistics for the variables of this study. This study winsorises the variables at 1% and 99% levels to control the impact of outliers. The mean value of the WACC is 2.17, with values ranging from 1.05–3.22, which includes interest rates in both equity and debt markets. The mean value of idiosyncratic risk is 3.03, with values ranging from 1.25–4.71, representing the company-specific risk for companies in the study's sample. The mean of carbon emissions is 886,014 metric tons, significantly larger than the median at 197.05 metric tons. The mean of carbon emissions intensity (*GHG_INT*) is 439.156. This indicates that, on average, Australian companies emit 439 tons of carbon per million dollars of revenue, a result consistent with prior studies in the same geographic region (Li et al., 2014). The mean and median values of company size (*LNTA*) at 8.94 and 8.8, respectively, indicate that the sample includes some extremely large companies. The mean value of other control variables such as the default risk (*Z_Score*); systematic risk (*Beta*); profitability (*ROA*); market to book value (*M/B*); leverage (*LEVERAGE*); property, plant, and equipment (*PPE*); capital expenditure (*CAPEX*); revenue growth (*GROWTH*); and liquidity (*CASH*) are all comparable with prior studies (Goss and Roberts, 2011; Griffin et al., 2017).

[INSERT Table 3 HERE]

It is also crucial to evaluate the impact of industry membership as a valid control variable in this study, as recommended by prior literature (Gebhardt et al., 2001; Sharfman and Fernando, 2008). Companies in different industries have a systematically different level of environmental risks and COC, resulting in a spurious correlation between idiosyncratic risk and cost of capital (COC). This study follows Sharfman and Fernando (2008) and Maaloul (2018) to address this issue by treating the industry impact as an empirical one, thus determining whether this affects companies in the sample. This study performs the analysis of

variance (*ANOVA*) with COC as the dependent variable and corporate carbon emissions and emissions intensity as the independent variables.

Table 4 presents descriptive statistics by industry and ANOVA results across industry sectors. The results indicate a significant difference at 1% significance level between industry sectors concerning carbon emissions (ANOVA=39.89 and 63.36) and cost of capital (COC) (ANOVA=21.73). As shown in Table 4, the basic materials sector is ranked first in carbon emissions and COC, followed by utilities and energy sectors.

[INSERT Table 4 HERE]

Table 5 presents Pearson's correlation coefficients for the study's variables. The results show that the correlation between idiosyncratic risk and the two measures of carbon emissions (total carbon emissions and carbon emissions intensity) is positive and statistically significant at the 1% level (0.1176 and 0.2666). Furthermore, the results show a similar positive association between the WACC and corporate carbon emissions (0.1799 and 0.2673). These results support both hypotheses and suggest that the capital markets consider corporate carbon emissions in their investment and lending decisions. This also suggests that equity and debt markets consider corporate carbon emissions in their investment and lending decisions. Companies with higher carbon emissions face higher risk and higher COC.

As shown in Table 5, idiosyncratic risk and the WACC are negatively and significantly correlated with LNTA, LEVERAGE, Beta, ROA and M/B consistent with prior studies (Goss and Roberts, 2011; Li et al., 2014; Maaloul, 2018). Other variables, such as PPE, CAPEX, revenue growth (*GROWTH*) and liquidity (*CASH*), are positively and significantly correlated with idiosyncratic risk and the WACC, which is also consistent with the findings of prior studies (Bui et al., 2020; Li et al., 2014). Finally, as shown in Table 5, correlations between the variables are below the critical value of 0.7, indicating that multicollinearity is not an issue (Cohen et al., 2013; Hair et al., 2006).

[INSERT Table 5 HERE]

Main regression results

Corporate carbon emissions and idiosyncratic risk

Table 6 presents the panel regression analysis of the first estimation model of this study. Columns (1) and (2) in Table 6 show regression analysis results for the company's idiosyncratic risk on carbon emissions and emissions intensity, respectively. The coefficients of corporate carbon emissions are positive for both carbon emissions and emissions intensity (β=1.3008,

$p<0.01$; $\beta=1.4605$, $p<0.10$). This indicates that companies with higher carbon emissions have higher idiosyncratic risk, consistent with the findings in prior literature (Benlemlih et al., 2018; Cai et al., 2016).

Across all other control variables, systematic risk (*Beta*), return on assets (*ROA*), market to book value (*M/B*), and company size (*LNTA*) shows a negative association with idiosyncratic risk at a 1% statistical significance level. This is consistent with prior literature that finds that companies with larger assets diversify their operations; therefore, they have lower idiosyncratic risk (Benlemlih et al., 2018; Tzouvanas et al., 2020). Larger companies attract more stakeholder attention (Bansal, 2005). Therefore, they tend to manage their environmental performance better, resulting in less idiosyncratic risk (Gebhardt et al., 2001). Similarly, companies with higher capital expenditure (*CAPEX*) are likely to have lower idiosyncratic risk.

On the other hand, companies with higher leverage (*LEVERAGE*) are riskier as they are exposed to a higher risk of default. Similarly, the higher the default risk (*Z_scores*), the higher the idiosyncratic risk. Finally, other control variables, including property, plant and equipment (*PPE*), revenue growth (*GROWTH*) and liquidity (*CASH*), are positively associated with idiosyncratic risk; however, they are not robust in the model's specification. Taken together, the results from the control variables are consistent to a considerable extent with relevant studies, including Benlemlih et al. (2018) and Jo and Na (2012) and Cai et al. (2016).

These results indicate that companies with higher carbon emissions face a higher idiosyncratic risk. In other words, investors and creditors impose a higher risk premium on companies with high carbon emissions when making financial resource allocation decisions. Therefore, the first hypothesis (H1) of this study is supported.

[INSERT Table 6 HERE]

Corporate carbon emissions and cost of capital (COC)

Table 7 show the results of the panel regression analysis of COC on carbon emissions (first columns) and emissions intensity (second columns), including other control variables. The results show a positive association between corporate carbon emissions and COC after controlling for all other variables known to impact the COC. This indicates that higher corporate carbon emissions result in a higher COC. Therefore, investors and lenders impose a higher risk premium on companies with higher levels of carbon emissions, consequently implying a higher COC.

As shown in Table 7, the coefficients range from 0.20–0.22 for corporate carbon emissions and emissions intensity. This shows an average coefficient of 0.21, indicating an

average 20–22% increase in the COC for each additional metric ton of carbon emissions, which should be considered a financial penalty for the company.

The COC has a statistically significant and positive association with the following control variables, namely the default risk (*Z_Score*), systematic risk (*Beta*), return on assets (*ROA*), market to book value (*M/B*), debt ratio (*LEVERAGE*), and revenue growth rate (*GROWTH*). This indicates that companies with a higher risk of default, higher systematic risk, higher profitability, higher market value, higher debt ratio and revenue growth rate have to pay the higher capital costs to raise capital. This is consistent with prior literature by Sharfman and Fernando (2008) and Bui et al. (2020). Overall, the results from all control variables are in line with prior literature.

The findings support the study's second hypothesis (H2) that equity and debt markets include corporate carbon emissions in resource allocation evaluation. Companies with higher carbon emissions encounter a higher financial cost when sourcing their capital needs through the capital markets. The findings are consistent with prior studies by Jung et al. (2018); Sharfman and Fernando (2008), and Bui et al. (2020). The current study's findings align with the extant literature advocating that companies should meet environmental and ethical operational standards to become attractive to the capital market, providing them with cheaper financial support (Dhaliwal et al., 2011; Heinkel et al., 2001; Matsumura et al., 2014a; Merton, 1987).

[INSERT Table 7 HERE]

Sensitivity analyses

Due to the asymmetric nature of corporate carbon emissions across different industries, companies have different risk management strategies that reflect their operations, revenue, carbon intensity, and potential technological alternatives (Busch and Hoffmann, 2007). The current study includes extra sensitivity analysis undertaken to address the asymmetric nature of corporate carbon performance from high-emitting and low-emitting companies. The study follows previous literature (Bui et al., 2020; Jung et al., 2018), splitting companies in the sample based on the median carbon emissions intensity (*GHG_INT*) into high- and low-intensity companies and performing regression analysis. The results, presented in Table 8, are consistent with the findings of the main estimation models. The risks associated with companies' operations with high carbon emissions indicate that they may need to reconsider their borrowing capabilities. The capital market (including equity and debt markets) imposes a

higher risk premium and, consequently, a higher interest rate, based on the uncertainty related to corporate carbon emissions performance (Li et al., 2014; Maaloul, 2018).

Overall, the results remained consistent across a battery of sensitivity analyses, providing support for the current study's hypotheses.

[INSERT Table 8 HERE]

Conclusion

The main purpose of this study is to examine the impact of corporate carbon emissions performance on idiosyncratic risk and cost of capital (COC). It also estimates the average interest rate applied by the capital markets for corporate carbon emissions performance.

Using a sample of 748 company-year observations from 2007 to 2017 and controlling for industry and year fixed effects, the results support the two hypotheses of the study. The study incorporates extra tests to address concerns about systematic differences in the level of idiosyncratic risk and COC that may lead to potential spurious correlation. The results of this study are robust to a spectrum of company-, industry- and year-level sensitivity tests and tests of endogeneity.

The findings of this study show a positive correlation between higher corporate carbon emissions performance and idiosyncratic risk. In other words, poor corporate carbon emissions performance unfavourably increases company-specific risk. Corporate carbon emissions performance and related information are important for risk management. It impacts the evaluation of carbon-related liabilities and assets and, therefore, the cost of capital (COC). The findings of this study complement the findings by Jo and Na (2012) and Cooper et al. (2018), who document the higher operational risk exposures of companies with higher carbon emissions performance.

This study shows that higher corporate carbon emissions performance results in a higher cost of capital (COC). In other words, every additional metric ton of carbon emissions results in an average of 18–20% higher capital costs. This indicates that the capital market considers corporate carbon emissions in its risk assessments, leading to a higher cost for polluting companies. The measurements can help companies reduce their carbon emissions performance and COC and manage their optimal financing choices. This is consistent with findings in prior literature by Sharfman and Fernando (2008) and Bui et al. (2020). They provide evidence supporting the capital market's robust environmental risk assessment for lending or investment purposes.

The study's findings have several important implications for companies and their managers, regulators and the accounting literature.

The current study echoes the argument by Jo and Na (2012) that companies can control for idiosyncratic risk by managing their environmental performance. Corporate exposure to carbon emissions performance differs depending on companies' commitment to managing carbon emissions risks, with this eventually impacting the capital cost.

The study's findings help construct a better conceptual understanding of corporate strategic choice in managing corporate carbon emissions (He et al., 2021). This complements the argument by Sharfman and Fernando (2008) that improving corporate carbon emissions pays off with better corporate risk management and eventually reduce the company's cost of capital (COC).

The findings suggest that Australian-listed companies with high carbon emissions need to reassess their borrowing abilities regularly. The capital markets apply higher interest rates to high-carbon-emitting companies due to future uncertainty related to carbon emissions and their implications for companies (Li et al., 2014; Maaloul, 2018). This uncertainty also contributes to corporate carbon emissions reduction strategies and initiatives to deal with carbon emissions risks.

The current study recommends that regulators consider the financial risks associated with corporate carbon emissions during the development, evaluation and update of current legislation for carbon-related performance.

Prior literature recommends that a more advanced accounting system is required to meet the need for a low-carbon-emissions economy (He et al., 2021; Ratnatunga et al., 2011). The current study's finding not only corroborates this argument but also echoes the recommendation by Luo and Tang (2014) to expand the accounting, auditing and management teaching and training program to cover practice in a green business environment. The findings of this study contribute to the schemes that recognise carbon emissions allowance and its implications in financial accounting frameworks, as highlighted in prior literature (Lovell, 2014; Lovell et al., 2013; Warwick and Ng, 2012).

This study is not without limitations. The study sample includes only Australian-listed companies. The findings apply only to listed companies, limiting their generalisability to all companies, including non-listed ones. The study does not evaluate the costs of managing corporate carbon emissions, which may be interesting to investigate from lenders' and market

participants' perspectives. Future studies could investigate the moderating impact of these costs on the association between corporate carbon emissions and the cost of capital (COC).

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Tables

Table 1
Sample selection

Year	Samples with available GHG information	Samples with missing information	Total observations
2007	44	1	43
2008	55	3	52
2009	58	5	53
2010	68	4	60
2011	65	5	64
2012	73	5	68
2013	79	5	74
2014	82	6	74
2015	92	6	86
2016	93	6	87
2017	92	7	87
Total	801	53	748

Table 1 presents the sample selection process for all listed companies.
GHG: greenhouse gas/es.

Table 2
Sample distribution by industry

Year	Observations	%
Basic materials	155	21%
Communications	23	3%
Consumer cyclical	64	9%
Consumer non-cyclical	112	15%
Energy	73	10%
Financial	187	25%
Industrial	101	14%
Technology	7	1%
Utilities	26	3%
Total	748	100%

Table 2 presents the sample distribution by industry specification. The industry classification is based on the Bloomberg Industry Classification System (BICS).

Table 3
Descriptive statistics

	Mean	Median	SD	Minimum	Maximum
WACC	2.1711	2.1615	0.3356	1.0541	3.2214
Idio_Risk	3.0341	3.0039	0.5721	1.2581	4.7154
GHG	886,014	197.05	2.4258	0.0064	660,651,008
GHG_INT	439.156	106.460	1476.83	0.3854	35,100
Z_Score	2.1317	2.0605	2.0703	-4.7542	9.5882
Beta	0.7509	0.7833	1.2127	-38.127	4.8354
ROA	1.3746	1.6267	1.1162	-5582.9	3.8755
M/B	3.9971	1.5417	27.717	0.0038	2094.3
LNTA	8.9401	8.8192	1.8328	2.1563	13.7915
LEV	0.5218	0.4923	0.2174	0	0.9707
PPE	3.9335	4.0783	1.7251	0.8452	8.1561
CAPEX	2.0269	1.9962	1.3633	1.6069	5.7001
GROWTH	2.2437	2.3148	1.2081	2.3953	7.7473
CASH	1.2975	1.3511	1.2031	0.4457	4.381

Table 3 presents descriptive statistics for the variables included in the estimation models: GHG, GHG_INT, WACC and Idiosyncratic risk, respectively, for greenhouse gas emissions, emissions intensity, the weighted average cost of capital, and idiosyncratic risk. Other company characteristics are presented, such as Z_Score, Beta, ROA, M/B, LNTA, LEVERAGE, PPE, CAPEX, GROWTH and CASH, for default risk, systematic risk, return on assets, market to book value, total assets, total debts; property, plant and equipment; capital expenditure; revenue growth; and cash, respectively. SD: standard deviation.

Table 4
Descriptive statistics by sector and analysis of variance (ANOVA)

Sector	Total GHG emissions (metric tons)		GHG emissions intensity (%)		Cost of capital (COC) (%)	
	Mean	Rank	Mean	Rank	Mean	Rank
Basic materials	4,270,085.10	1	846.26	1	2.3828	1
Communications	690.19	7	1.64	7	2.1314	5
Consumer cyclical	2,394.43	4	3.04	5	2.0547	8
Consumer non-cyclical	754.58	6	0.65	8	2.0910	7
Energy	2,672.25	3	9.07	3	2.1191	6
Financial	101.01	8	1.71	6	2.0120	9
Industrial	1,167.99	5	3.31	4	2.1646	3
Technology	15.15	9	0.09	9	2.1381	4
Utilities	11,218.15	2	24.97	2	2.3061	2
ANOVA	39.89***		63.36***		21.73***	

Table 4 presents descriptive statistics by industry sector and the analysis of variance (ANOVA) across industry sectors.

Table 5
Correlation matrix

Statistics	*Idio_risk*	*WACC*	*GHG*	*GHG_INT*	*Z_Score*	*Beta*	*ROA*	*M/B*	*LNTA*	*LEV*	*PPE*	*CAPEX*	*GROWTH*	*CASH*
Idio_Risk	1													
WACC	0.2029***	1												
GHG	0.1176***	0.1799***	1											
GHG_INT	0.2666***	0.2673***	0.5317***	1										
Z_Score	0.0812***	0.2556***	0.0757	-0.1104***	1									
Beta	-0.1765***	0.2060***	0.1837***	0.0061	0.0804***	1								
ROA	-0.2509***	0.0297	-0.0266	-0.0449	0.1119***	-0.1109***	1							
M/B	-0.2443***	-0.0875***	-0.0420	-0.1892***	0.0653***	0.0409***	0.4338***	1						
LNTA	-0.2711***	0.2316***	-0.0224	0.3587***	0.0477	0.2019***	-0.0720***	0.0543	1					
LEV	0.2302***	-0.3932***	-0.0255	-0.4388***	-0.2910***	0.0560	-0.1144***	0.2588***	0.5133***	1				
PPE	-0.1084***	-0.1194***	0.1493***	0.5636***	-0.2167***	-0.2041***	0.0386	-0.2104***	-0.3555***	-0.5046***	1			
CAPEX	-0.0779***	0.1289***	0.1573***	0.4986***	-0.1268***	-0.0272	0.0726	-0.0648	-0.2979***	-0.3897***	0.5869***	1		
GROWTH	0.1371***	0.1906***	0.0442	0.1676***	0.0575	0.0927***	0.0949***	0.0490	-0.0668	-0.0944***	0.1218***	0.1461***	1	
CASH	0.2085***	0.1982***	-0.1421	0.0903***	0.0259	-0.0778***	0.1338***	0.1075***	-0.1626***	-0.1948***	-0.0187	0.1023	0.0933***	1

Table 5 shows the Pearson correlation coefficients for this study's variables in the period from 2007–2017. Superscript asterisks ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 6
Regression analysis

Variables	Risk	
	(1)	(2)
GHG	1.3008***	
	(0.2562)	
GHG_INT		1.4605***
		(0.3070)
Z_Score	3.1918***	3.3587***
	(0.6398)	(0.6450)
Beta	-4.9488**	-4.6912**
	(2.3062)	(2.3114)
ROA	-0.5161***	-0.4904***
	(0.0723)	(0.0741)
M/B	-3.7388***	-3.7008***
	(0.9336)	(0.9376)
LNTA	-5.1463***	-3.9465***
	(0.5223)	(0.4110)
LEVERAGE	7.7545*	8.4664**
	(4.0361)	(4.0771)
PPE	0.4797	0.0598
	(0.5893)	(0.5896)
CAPEX	0.9094	0.7513
	(0.6050)	(0.6119)
GROWTH	0.9115**	0.7921**
	(0.3581)	(0.3633)
CASH	1.7448***	1.3821***
	(0.4346)	(0.4346)
Constants	5.7379***	5.9609***
	(5.0959)	(5.3257)
Year Fixed Effect	Yes	Yes
Industry Fixed Effect	Yes	Yes
Observations	748	748
R-squared	0.4665	0.4618

Table 6 presents the regression results of a company's idiosyncratic risk on its corporate GHG emissions and emissions intensity, including all control variables. Column (1) presents results on GHG emissions, while Column (2) presents results on emissions intensity. Coefficient estimates and standard errors are computed (in parentheses) using robust fixed-effect regression analysis. Superscript asterisks ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 7
Regression analysis

Variables	Cost of Capital (COC)	
	(1)	(2)
GHG	0.2004***	
	(0.0633)	
GHG_INT		0.2228***
		(0.0756)
Z_Score	0.3865**	0.4118**
	(0.1580)	(0.1589)
Beta	2.7112***	2.7539***
	(0.5695)	(0.5695)
ROA	0.0461**	0.0500***
	(0.0179)	(0.0182)
M/B	-0.3963*	-0.3905*
	(0.2306)	(0.2310)
LNTA	-0.1864	-0.0007
	(0.1290)	(0.1013)
LEVERAGE	-1.7044*	-1.5992
	(0.9967)	(1.0045)
PPE	0.1971	0.1143
	(0.1455)	(0.1453)
CAPEX	-0.0993	-0.1230
	(0.1494)	(0.1507)
GROWTH	0.2376***	0.2197**
	(0.0884)	(0.0895)
CASH	0.3759***	0.3882***
	(0.1073)	(0.1071)
Constants	6.2003***	6.5269***
	(1.2585)	(1.3121)
Year Fixed Effect	Yes	Yes
Industry Fixed Effect	Yes	Yes
Observations	748	748
R-squared	0.3002	0.2974

Table 7 presents the regression results of a company's cost of capital (COC) on its corporate GHG emissions and emissions intensity, including all control variables. Column (1) presents results on GHG emissions, and Column (2) presents results on emissions intensity. Coefficient estimates and standard errors are computed (in parentheses) using robust fixed-effect regression analysis. Superscript asterisks ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 8
Sensitivity analysis – intensity level

Variables	Risk		Cost of Capital (COC)	
	High intensity	Low intensity	High intensity	Low intensity
GHG	1.7983**		0.2759***	
	(0.8782)		(0.1784)	
GHG_INT		1.3460**		0.1601***
		(0.3244)		(0.0937)
Z_Score	3.4831	2.5286	0.3988***	0.4252***
	(1.8504)	(0.6490)	(0.3760)	(0.1874)
Beta	-3.9700	-0.7804	4.2624***	2.1193***
	(1.2893)	(2.3326)	(1.2779)	(0.6736)
ROA	-0.5680	-0.2735	0.0171***	0.0288***
	(0.1781)	(0.0862)	(0.0362)	(0.0249)
M/B	-2.8784	-4.4388	-0.1502***	-.4096***
	(1.7961)	(0.9442)	(0.5681)	(0.2727)
LNTA	-5.3363***	-4.9411***	0.1502***	-0.3018*
	(1.6550)	(0.5300)	(0.3363)	(0.1530)
LEVERAGE	2.5029***	5.9802	-4.8532***	-1.6688***
	(1.5438)	(4.4360)	(2.1424)	(1.2809)
PPE	3.3467**	0.2905	-0.3397*	0.1731*
	(2.5196)	(0.5634)	(0.5119)	(0.1627)
CAPEX	1.3393**	1.3033*	-0.1832	-0.0719
	(2.0010)	(0.5788)	(0.4066)	(0.1671)
GROWTH	0.3148	0.8656	0.0377*	0.3112***
	(0.9478)	(0.3605)	(0.1926)	(0.1041)
CASH	0.7168	1.7742	0.4065	0.4061
	(1.1499)	(0.4574)	(0.2336)	(0.1321)
Constants	6.9481***	4.8102***	2.6584***	2.7941***
	(1.0398)	(3.3448)	(2.8527)	(1.5433)
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	120	648	120	648
R-squared	0.4512	0.4695	0.3013	0.3010

Table 8 presents the regression results of sensitivity analysis for a company's idiosyncratic risk and cost of capital (COC) on its corporate GHG emissions and all control variables. Coefficient estimates and standard errors are computed (in parentheses) using robust fixed-effect regression analysis. Superscripts ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Appendix A

Industry definition and source

Category	Definition
Communications	Telecommunication Services
	Media and Entertainment
Consumer Cyclical (Discretionary)	Food & Staples Retailing
	Home & Office Products
	Leisure Products
	Recreation Facilities & Services
	Retail Discretionary
	Travel, Lodging & Dining
	Automotive
	Distributors
Consumer Non-Cyclical (Staples)	Retail Staples
	Health Care Equipment & Services
	Pharmaceuticals, Biotechnology & Life Sciences
Energy	Oil, Gas & Coal
	Renewable Energy
Financial	Asset Management
	Banking
	Institutional Financial Services
	Insurance
	Specialty Finance
Health Care	Biotech & Pharma
	Health Care Facilities and Services
	Medical Equipment Devices
Industrial	Aerospace & Defence
	Electrical Equipment
	Engineering & Construction Services
	Industrial Distribution
	Machinery
	Manufactured Goods
	Transportation & Logistics
	Waste & Environmental Service Equipment & Facilities
Basic Materials	Chemicals
	Construction Materials
	Containers & Packaging
	Metals & Mining
	Forest & Paper Products
	Iron & Steel
Technology	Technology Hardware & Equipment
	Semiconductors & Semiconductor Equipment
	Software & Services
Utilities	Utilities

Source: Bloomberg Industry Classification System (BICS)

Appendix B
Variable definitions

Category/Measure	Definition/Measurement
$Carbon\ emissions/GHG_{i,t}$	Total corporate GHG emissions (in metric tons) *i* in year *t* are measured as the total of direct emissions from GHG sources owned or controlled by the company (Scope 1) and indirect emissions caused by the company's consumption of electricity, heat, or steam (Scope 2)
$Emissions\ intensity\ /GHG\_INT_{i,t}$	Corporate GHG emissions intensity *i* in year *t* is measured as the ratio of total GHG emissions to total sales
$Weighted\ average\ cost\ of\ capital\ (WACC)\ /COC_{i,t}$	The cost of capital for firm *i* in year *t* is measured as follows: $WACC = \left(\frac{E}{D+E}\right) r_E + \left(\frac{D}{D+E}\right) r_D (1-T)$ where: $E = firm's\ equity\ market\ value$ $D = market\ value\ of\ the\ firm's\ debt$ $r_E = cost\ of\ equity\ capital$ $r_E = r_F + \beta_E (r_M - r_F)$ $r_M = market\ rate\ of\ return$ $r_F = risk\text{-}free\ rate\ of\ return$ $\beta_E = \frac{Cov(r_E, r_M)}{Var(r_M)}\ measures\ for\ systematic\ risk$ $r_D = cost\ of\ debt\ capital$ $r_D = [[(SD/TD) \times (CS \times DF)] + [(LD/TD) \times (CL \times DF)]] \times [1\text{-}T]$ $SD = short\text{-}term\ debt\ (in\ millions\ of\ C\$)$ $TD = total\ debt\ (in\ millions\ of\ C\$)$ $CS = cost\ of\ short\text{-}term\ debt\ (\%)$ $DF = debt\ adjustment\ factor\ (\%)$ $LD = long\text{-}term\ debt\ (in\ millions\ of\ C\$)$ $CL = cost\ of\ long\text{-}term\ debt\ (\%)$ $T = tax\ rate$
Z_Score	Default risk, Measured using the Altman's Z-Score developed by Edward Altman (1968), and then multiplied by -1 so that higher values represent a higher default risk,

	$Altman's\ Z-Score = 1.2 * (Working\ Capital\ /\ Tangible\ Assets) + 1.4 * (Retained\ Earnings\ /\ Tangible\ Assets) + 3.3 * (EBIT\ /\ Tangible\ Assets) + 0.6 * (Market\ Value\ of\ Equity\ /\ Total\ Liabilities) + (Sales\ /\ Tangible\ Assets)$
Beta	Company's systemic risk, showing the relationship between the volatility of the security and the volatility of the market
ROA	The indicator of a company's profitability, as a percentage Return on assets is the ratio of earnings before interest and taxes (EBIT) to total assets (TA) $ROA = \frac{EBIT}{TA}$
M/B	Market to book value, Measured by the ratio between market value and book value of equity of company i at the end of year t
$Company\ Size/LNTA_{i,t}$	The natural logarithm of total assets of a company *i* at the end of year *t*
$Debt\ or\ leverage/Leverage_{i,t}$	Leverage or total debt ratio measured as total debts divided by total assets of a company *i* at the end of year *t*
$Property, plant, and\ equipment/Leverage_{i,t}$	The ratio of property, plant and equipment to total sales of a company *i* at the end of year *t*
$Capital\ expenditure/Capex_{i,t}$	The capital expenditure divided by total sales of a company *i* at the end of year *t*
$Revenue\ growth/Growth_{i,t}$	The percentage change in sales over the prior year of a company *i* at the end of year *t*
$Liquidity/Cash_{i,t}$	The cash divided by total assets of a company *i* at the end of year *t*

Source: Bloomberg dataset

5.3. Chapter Summary

This chapter has presented the result of the examination of the impact of corporate carbon emissions performance disclosure on company's idiosyncratic risk and cost of capital (COC). The results support both hypotheses of this chapter indicating that higher corporate carbon emissions performance disclosure lead to a higher idiosyncratic risk and cost of capital (COC). The summary and conclusion of the results are included in the conclusion chapter (chapter 6). Chapter sis provide the brief of the results of all hypotheses of this thesis following by the thesis contributions and recommendations for future studies.

6. CHAPTER SIX: CONCLUSIONS

6.1. Chapter Introduction

The previous three empirical chapters have presented this study's investigation of the economic implications of corporate ESG performance disclosure on a company's financial performance. The economic implications of corporate GHG emissions performance disclosure on a company's financial performance have also been discussed.

The impact of corporate ESG performance disclosure on a company's cost of capital (COC) and, furthermore, on a company's idiosyncratic risk is investigated and presented in Chapter 3 (Paper 1). Chapter 4 (Paper 2) investigates the improvement in corporate ESG performance disclosure among Australian companies. The financial implications of higher corporate ESG performance disclosure levels for companies across all industries and within individual industry sectors are then examined. Chapter 5 (Paper 3) presents the investigation into the impact of corporate carbon emissions performance disclosure on a company's idiosyncratic risk and its cost of capital (COC).

The current chapter presents the conclusions of this study and is structured in the following manner. Section 6.2 provides a summary of the study's objectives, questions and hypotheses. Section 6.3 then summarises the study's key results. Section 6.4 outlines the research implications and contributions, followed by Section 6.5, which discusses the study's limitations and future research recommendations.

6.2. Summary of Research Objectives, Questions and Hypotheses

Corporate environmental, social, and governance (ESG) performance disclosure and its economic implications have recently become significant due to concerns about companies' sustainability (Bassen et al., 2006). Publicly listed companies are progressively becoming more active and taking more responsibility toward their ESG performance disclosure. The introduction of the Australian corporate ESG disclosure guidelines in 2011 by the Australian Council of Superannuation Investors (ACSI, 2011), one of Australia's largest institutional investors, is only one example of the importance of ESG performance disclosure. This increasing concentration has motivated researchers to investigate whether improving corporate ESG performance disclosure creates value for corporations. Prior studies investigate the relationships between corporate ESG performance disclosure and different aspects of operational, financial or equity market performance and a company's risk management

(Dhaliwal et al., 2011, Chava, 2014, Oware and Mallikarjunappa, 2020, Sharfman and Fernando, 2008, Chava, 2010, Goss and Roberts, 2011, El Ghoul et al., 2011). However, these prior studies provide inconclusive answers (Jiao, 2010, Margolis et al., 2009). The current study argues and provides empirical evidence that advocates the idea that corporate ESG performance disclosure could generate value for companies in the long run. This could be through the impact on the company's cost of capital (COC), idiosyncratic risk and market value, the latter represented by financial performance. The study also investigates the impact of corporate carbon emissions performance disclosure on a company's COC and its idiosyncratic risk.

To achieve the study's objectives, the following research questions were identified in Chapter 1.

RQ1. "What is the impact of corporate ESG performance disclosure on company's financial performance?"

RQ1.1. "What is the impact of corporate ESG performance disclosure on a company's cost of capital (COC)?"

RQ1.2. "What is the corporate ESG performance disclosure impact on a company's idiosyncratic risk?"

RQ1.3. "Do Australian companies demonstrate improvement in ESG performance disclosure and consequent improved financial performance over time?"

RQ1.4. "What is the impact of the level of corporate ESG performance disclosure on a company's financial performance?"

RQ2. "What is the impact of corporate carbon emissions performance disclosure on a company's financial performance?"

RQ2.1. "What is the impact of corporate carbon emissions performance disclosure on a company's idiosyncratic risk?"

RQ2.2. "What is the impact of corporate carbon emissions performance disclosure on a company's cost of capital (COC)?"

Three coherent academic papers were developed for this study to test the associations identified by the literature review as needing to be investigated.

The first paper (Chapter 3) is entitled "Corporates' sustainability disclosures impact the cost of capital and idiosyncratic risk". The study's findings in Paper 1 relate to the impact of corporate ESG performance disclosure on a company's cost of capital (COC) and its

idiosyncratic risk. In Paper 1 (Chapter 3), two hypotheses are developed to investigate the two sub-questions of the first research question (RQ1.1 and RQ1.2) as follows:

H1: There is an inverse association between the level of corporate ESG performance disclosure and a company's cost of capital (COC).

H2: There is an inverse association between the level of corporate ESG performance disclosure and a company's idiosyncratic risk.

The second paper (Chapter 4) is entitled "The heterogeneous impact of ESG performance improvement on financial performance across industries". This study's findings are related to the impact of corporate ESG performance disclosure on a company's financial performance, represented by the company's market value. To answer the other two sub-questions of the first research question (RQ1.3 and RQ1.4), the following three hypotheses are developed and investigated within Paper 2 (Chapter 4):

H3: Australian companies have improved their ESG performance disclosure over time.

H4: There is a positive association between corporate ESG performance disclosure and a company’s financial performance over time.

H5: There are heterogeneous differences across industries in the association between corporate ESG performance disclosure and a company's financial performance over time.

The third paper (Chapter 5) concentrates on the specific impact of corporate carbon emissions performance disclosure on a company's cost of capital (COC) and its idiosyncratic risk. It is entitled "Corporate carbon emissions performance, idiosyncratic risk and overall capital costs". The following two hypotheses are developed and investigated in Paper 3 (Chapter 5) to answer the two sub-questions of the second research question (RQ2.1 and RQ2.2):

H6: There is a positive association between corporate carbon emissions performance disclosure and a company’s idiosyncratic risk.

H7: There is a positive association between corporate carbon emissions performance disclosure and a company's overall cost of capital (COC).

6.3. Summary of Research Findings

Table 6.1 summarises the current study’s findings for every hypothesis. The first five hypotheses, H1–H5, investigate the first research question of the study. These five hypotheses are postulated to examine the economic implications of corporate ESG performance disclosure on a company's financial performance over time for all Australian-listed companies. The next

two hypotheses, H6 and H7, are developed to answer the study's second main research question, which examines the impact of corporate carbon emissions performance disclosure on a company's idiosyncratic risk and its cost of capital (COC). The subsections which follow accordingly summarise the results of these hypotheses, as shown in Table 6.1.

Table 6-1: Results Summary

Hypotheses		Dependent Variables	Findings
Corporate Environmental, Social and Governance Performance Disclosure			
H1	There is an inverse association between the level of corporate ESG performance disclosure and a company's cost of capital (COC).	Cost of Capital (COC)	Supported (- sig)
H2	There is an inverse association between the level of corporate ESG performance disclosure and a company's idiosyncratic risk.	Company's Idiosyncratic Risk	Supported (- sig)
H3	Australian companies have demonstrated an improvement in their ESG performance disclosure over time.	Longitudinal Changes in Corporate ESG Performance Disclosure	Supported (+ sig)
H4	There is a positive association between corporate ESG performance disclosure and a company's financial performance over time.	Financial Performance (Market Value)	Supported (+ sig)
H5	There are heterogeneous differences across industries in the association between corporate ESG performance disclosure and a company's financial performance.	Financial Performance (Market Value)	Supported (+ sig)
Corporate Carbon Emissions Performance Disclosure			
H6	There is a positive association between corporate carbon emissions performance disclosure and a company's idiosyncratic risk.	Company's Idiosyncratic Risk	Supported (+ sig)
H7	There is a positive association between corporate carbon emissions performance disclosure and a company's overall cost of capital (COC).	Cost of Capital (COC)	Supported (+ sig)

6.3.1. Corporate ESG Performance Disclosure and Cost of Capital (COC)

The first hypothesis (H1) predicts a favourable and adverse association between corporate ESG performance disclosure and a company's cost of capital (COC) (using a measure combining the capital costs called the weighted average cost of capital [WACC]). After several robustness checks, including a sensitivity test, the findings support the first hypothesis (H1). The results are consistent with the findings by El Ghoul et al. (2011), Cheng et al. (2014), and El Ghoul et al. (2018), which provide evidence on the moderating impact of corporate ESG performance disclosure on COC. This is also in line with the extant literature, supporting the theoretical

argument that companies that are perceived as more sustainable would achieve cheaper capital resources (Merton, 1987, Heinkel et al., 2001, Dhaliwal et al., 2011).

Referring to the legitimacy theory, the finding of this study shows that corporate ESG performance disclosure reduces the COC through the impact on the perception of the financial resource providers. Corporate ESG performance disclosure attracts capital market attention by providing extra information required for a company's financial assessment. This would reduce the information asymmetry between the financial resource providers and improves corporate transparency. Thus, the capital market applies a cheaper and better condition to the resource granted to these companies (Deegan and Rankin, 1996). The results imply that the capital market (including the debt and equity market) requests lower returns for the companies with higher ESG performance disclosure. Therefore, the capital market considers the companies' sustainability over the long run and the potential for higher returns in the short run.

Consistent with the existing literature, the results of other control variables show that the coefficients follow the same direction. In line with the findings by Aggarwal et al. (2010), property, plant and equipment (PPE) and the debt ratio (LEVERAGE) are negatively correlated with COC. On the other hand, total assets (LNTA), capital expenditure (CAPEX), revenue growth (GROWTH) and the liquidity ratio (CASH) are positively correlated with COC. Regarding other nonfinancial elements of the company, although BOARD_SIZE is positively correlated with the COC, no significant association is found between the AUDIT COMMITTEE and COC.

6.3.2. Corporate ESG Performance Disclosure and Idiosyncratic Risk

This thesis's second hypothesis (H2) postulates a mitigating impact of corporate ESG performance disclosure on a company's idiosyncratic risk. The results reveal a mitigating impact, which is consistent with the literature (El Ghoul et al., 2011, Mishra and Modi, 2013, Cheng et al., 2014, Dhaliwal et al., 2014b, Becchetti et al., 2015b). The findings indicate that companies with better ESG performance benefit from lower idiosyncratic risk. The diminishing impact of the corporate ESG performance disclosure on a company's idiosyncratic risk is consistent with the findings of earlier studies, including Jo and Na (2012), Mishra and Modi (2013), Becchetti et al. (2015a) and Harjoto and Laksmana (2018).

Among other control variables, the size of the company (LNTA), the property, plant, and equipment ratio (PPE), revenue growth (GROWTH) and liquidity (CASH) with a negative coefficient shows the same strong result at the 1% level of statistical significance. At the same

time, capital expenditure (CAPEX) is negatively associated with idiosyncratic risk at the 5% level of statistical significance. The results also report a positive association between the BOARD_SIZE and the idiosyncratic risk consistent with the result of the first estimation model.

The results support the prediction by the legitimacy theory discussed in the theoretical section of this study. Consistent with the theoretical discussion, corporate ESG performance disclosure improves a company's legitimacy and mitigates the idiosyncratic risks associated with ESG activities (Jo and Na, 2012, Becchetti et al., 2015a). The negative impact of higher corporate ESG performance disclosure on idiosyncratic risk complements the results for the first hypothesis and the diminishing impact of corporate ESG performance disclosure on the COC. This approach differentiates this study from prior literature investigating only the impact of corporate sustainability performance disclosure on capital costs.

This paper (chapter two) also uses the exclusive elements of corporate ESG performance disclosure (environmental (ENV), social (SOC) and governance (GOV)) to re-evaluate both hypotheses of this paper. The findings corroborate this study's preliminary results and support both hypotheses (H1 and H2), indicating a robust adverse relationship between the exclusive element of corporate ESG performance disclosure and cost of capital and the company's idiosyncratic risk.

6.3.3. Australian Corporate ESG Performance Disclosure Assessment

The second paper (chapter 4) first investigates this thesis's third hypothesis (H3) and evaluates the Australian corporate ESG performance disclosure improvement. The results significantly improve overall corporate ESG performance disclosure over the designated period. The improvement in corporate ESG performance disclosure is meaningful and in line with the previous literature (Galbreath, 2013). This is consistent with previous studies by Galbreath (2013) and Klettner et al. (2010), which show that Australian companies demonstrate significant improvement in ESG performance over time. The corporate ESG performance disclosure improvement is supported by introducing and further improving the ASX Corporate Governance Principles and Recommendation in 2003[15].

[15] Australian companies and stakeholders are increasingly concentrated on corporate ESG performance and its risks (Hanson & Tranter, 2006). This has led to the incorporation and improvement in the ASX Corporate Governance Principles and Recommendations in 2003 and related risk guideline in 2007 (CGC), 2007) In the third edition of this guideline, recommendation 7.4 states that "*listed entity should disclose whether it has any material exposure to economic, environmental and social sustainability risks and, if it does, how it manages or*

6.3.4. Corporate ESG Performance Disclosure and Financial Performance

The fourth hypothesis (H4) predicts a positive relationship between corporate ESG performance disclosure and a company's financial performance (measured by the company's market value). Paper 2 presents empirical support for the favourable implication of corporate ESG performance disclosure on financial performance over time, consistent with previous studies in the literature (Jo and Harjoto, 2011, Margolis et al., 2009, Brooks and Oikonomou, 2018). Furthermore, the findings indicate that a higher level of corporate ESG performance disclosure increases a company's financial performance longitudinally. The findings are consistent with prior literature. In line with the study result by Jo and Harjoto (2011), and Brooks and Oikonomou (2018), the overall relationship between corporate ESG and financial performance is positive and significant, including all companies in different industries sectors. Therefore, the fourth hypothesis (H4) is supported.

6.3.5. Industry Impacts

The fifth hypothesis (H5) postulates that industry characteristics impact on the relationship between corporate ESG performance disclosure and financial performance. Heterogeneous differences are thus found to be evident across industries in the association between corporate ESG performance disclosure and a company's financial performance. In Paper 2, the study investigates corporate ESG performance disclosure by targeting diverse stakeholders in different industries. The study's findings support the argument that corporate ESG performance does not benefit companies equally between industries (Fish and Wood, 2017, McWilliams and Siegel, 2011, Feng et al., 2017). While the study's findings do not support a negative relationship between corporate ESG performance disclosure and financial performance across different industries, they reveal positive and significant associations exist for only a few industry sectors. This is in line with the results of the studies by Omar and Zallom (2016) and Gholami et al. (2022). They document inconsistent results between the ESG and financial performance across industries. Companies operating in different industry sectors are often significantly regulated and subject to diverse challenges by their stakeholders. The growing demands of customers, communities and regulators need to be addressed while maintaining the operational costs. The energy, industrial and material companies specifically need to ensure

intends to manage those risks" (AUSTRALIAN SECURITIES EXCHANGE (ASX) CORPORATE GOVERNANCE COUNCIL (CGC), 2014).

the employees' safety requirements environmental performance improvements such as the reduction in greenhouse gas emissions and other specific challenges while maintaining industry compliance (Spence, 2011, Gholami et al., 2022). The results show that corporate ESG performance and corporate financial performance vary between different sectors. Therefore, the sixth hypothesis of this study is supported. Therefore, enough evidence is found to advocate for a heterogeneous relationship between corporate ESG performance disclosure and financial performance across different industries consistent with the fifth hypothesis (H5).

6.3.6. Corporate Carbon Emissions Performance Disclosure and Idiosyncratic Risk

This thesis's sixth hypothesis (H6) predicts a positive association between corporate carbon emissions performance and a company's idiosyncratic risk. The primary purpose of the third paper (chapter 5) is to investigate the impact of corporate carbon emissions performance (a particular element of corporate environmental performance disclosure) on the company's idiosyncratic risk. The results presented in Table V (Panel A) shows a positive and significant association for sectors, including basic materials, communications, consumer non-cyclical, energy and industrial. On the other hand, no significant association has been witnessed for other sectors. In other words, although the overall relationship is positive, but is not consistent across different sectors. This indicates that companies with higher carbon emissions have higher idiosyncratic risk, consistent with the findings in prior literature (Cai et al., 2016, Benlemlih et al., 2018). Across all other control variables, systematic risk (*Beta*), return on assets (*ROA*), market to book value (*M/B*), and company size (*LNTA*) shows a negative association with idiosyncratic risk at a 1% statistical significance level. This is consistent with prior literature that finds that companies with larger assets diversify their operations; therefore, they have lower idiosyncratic risk (Benlemlih et al., 2018, Tzouvanas et al., 2020). Larger companies attract more stakeholder attention (Bansal, 2005). Therefore, they tend to manage their environmental performance better, resulting in less idiosyncratic risk (Gebhardt et al., 2001). Similarly, companies with higher capital expenditure (*CAPEX*) are likely to have lower idiosyncratic risk.

On the other hand, companies with higher leverage (*LEVERAGE*) are riskier as they are exposed to a higher risk of default. Similarly, the higher the default risk (*Z_scores*), the higher the idiosyncratic risk. Finally, other control variables, including property, plant and equipment (*PPE*), revenue growth (*GROWTH*) and liquidity (*CASH*), are positively associated with idiosyncratic risk; however, they are not robust in the model's specification. Taken together,

the results from the control variables are consistent to a considerable extent with relevant studies, including Benlemlih et al. (2018) and Jo and Na (2012) and Cai et al. (2016). This study also incorporates extra analysis to address concerns over the potential existence of systematic differences in idiosyncratic risk and COC in different industries. The findings support the main hypotheses of this paper. The results support the thesis's sixth hypothesis (H6) and show a positive association between higher corporate carbon emissions performance and idiosyncratic risk. They are indicating that poor corporate carbon emissions performance increases idiosyncratic risk.

6.3.7. Corporate Carbon Emissions Performance Disclosure and Cost of Capital (COC)

Corporate carbon emissions performance disclosure impacts the assessment of carbon-related liabilities and assets, consequently, on a company's cost of capital (COC). The final hypothesis (H7) predicts a positive association between corporate carbon emissions performance disclosure and a company's cost of capital (COC). The COC has a statistically significant and positive association with the following control variables, namely the default risk (*Z_Score*), systematic risk (*Beta*), return on assets (*ROA*), market to book value (*M/B*), debt ratio (*LEVERAGE*), and revenue growth rate (*GROWTH*). This indicates that companies with a higher risk of default, higher systematic risk, higher profitability, higher market value, higher debt ratio and revenue growth rate have to pay the higher capital costs to raise capital. This is consistent with prior literature by Sharfman and Fernando (2008) and Bui et al. (2020). Overall, the results from all control variables are in line with prior literature.

Companies with higher carbon emissions encounter a higher financial cost when sourcing their capital needs through the capital markets. The results complement the findings in prior literature (Jo and Na, 2012, Benlemlih et al., 2018), documenting the higher-risk exposures of companies with higher carbon emissions performance. Furthermore, the results provide empirical evidence that higher corporate carbon emissions performance leads to higher capital costs indicating that the capital market includes corporate carbon emissions in its risk assessment procedures, resulting in a higher cost for polluting companies. This is consistent with prior studies in the literature by Sharfman and Fernando (2008) and Bui et al. (2020), who support a robust environmental risk assessment by the capital market for lending or investment purposes. Therefore, the seventh hypothesis (H7) is supported.

6.4. Research Contributions

This study makes several practical and theoretical contributions to the literature related to the economic implications of corporate ESG performance disclosure. The following sub-sections outline these contributions.

6.4.1. Contributions to Literature

The first paper argues that the adverse impact of corporate ESG performance disclosure on COC and idiosyncratic risk have two reasons. First, improved corporate ESG performance disclosure contributes to better stakeholder engagement (Choi and Wang, 2009, Jones, 1995). This improves mutual trust between the company and stakeholders, improves agency issues, and reduces related costs (Eccles et al., 2014). First, better corporate ESG performance disclosure is associated with better stakeholder engagement (Choi and Wang, 2009, Jones, 1995). This will help improve mutual trust between the company and stakeholders, reducing agency issues and related costs (Eccles et al., 2014). Since the literature argues that market imperfections such as information asymmetries result in higher corporate capital costs, the result of this study shows that companies with better ESG performance disclosure can achieve a cheaper COC. Second, companies with better ESG performance tend more to disclose their ESG performances (Dhaliwal et al., 2011), consequently appearing more transparent and accountable. This will reduce the information asymmetries between the company and capital market, including the debt and equity market, thus mitigating the company's idiosyncratic risk.

The findings of this study contribute to the literature on whether promoting ESG performance by companies is value-enhancing, value-decreasing, or neutral. This study recommends that higher ESG performance disclosure contributes to corporate value generation by reducing capital costs. While prior studies focus on the impact of corporate ESG performance disclosure on value generation and access to financial resources, this study finds that ESG performance disclosure is essential as it also influences a company's idiosyncratic risk.

The results of the second paper have several implications. Firstly, the findings demonstrate that stakeholder pressure is the main driver for corporate ESG performance improvement across Australian companies. While stakeholder pressure on corporations in Australia is intense, the strength and scale of ESG performance improvement are impacted by an industry's characteristics. This is consistent with the study by Galbreath (2010), who argues that the type of corporation and industrial strategy impacts a corporation's ESG performance.

There are implications for ESG performance when management aims to satisfy diverse stakeholders in different industries. Consistent with prior literature, this study recommends that managers are likely to improve corporate financial performance by improving corporate ESG performance (Albertini, 2013). However, it is important to consider corporate ESG performance in a way that is appropriate for each company's strategy in a particular industry. This study indicates that the ESG performance does not equally benefit corporations across different sectors, with different stakeholder groups providing support for prior studies (Omar and Zallom, 2016, Gholami et al., 2022). This study recommends that managers consider their respective industry's characteristics and whether corporate ESG performance is essential to their financial performance. The industry sector differences result in various organisational strategies that weigh business objectives differently (Ortas et al., 2015). This study's findings guide managers by highlighting that investing in ESG performance generates different financial outcomes in different industry sectors. Managers should wisely prioritise resource and budget allocations to ESG activities that substantially impact financial performance in the different industry sectors.

The third paper contributes to the literature as it seems to be the initial study to evaluate the impact of corporate carbon emissions performance on both idiosyncratic risk and the cost of capital (COC). This paper echoes the argument by Jo and Na (2012) that companies could manage their idiosyncratic risk by controlling their environmental performance. Company exposure to carbon emissions depends on their commitment to managing the carbon emissions that can eventually impact the capital cost. The study's findings help construct a better conceptual understanding of corporate strategic choice in managing corporate carbon emissions (He et al., 2021). This complements the argument by Sharfman and Fernando (2008) that improving corporate carbon emissions pays off with better corporate risk management and eventually reduce the company's cost of capital (COC). The findings suggest that Australian-listed companies with high carbon emissions need to reassess their borrowing abilities regularly. The capital markets apply higher interest rates to high-carbon-emitting companies due to future uncertainty related to carbon emissions and their implications for companies (Li et al., 2014, Maaloul, 2018). This uncertainty also contributes to corporate carbon emissions reduction strategies and initiatives to deal with carbon emissions risks.

6.4.2. Practical Contributions

The findings of the first paper (Paper 1) have several implications. They extend the ESG

literature by highlighting the role of capital markets (such as financial institutions and banks, institutional investors and the equity capital market) in companies' consideration of corporate ESG strategies and performance (Lee and Faff, 2009, El Ghoul et al., 2011, Goss and Roberts, 2011). ESG performance disclosure-compliant companies benefit from lower lending costs in the capital market, as they appear to have reduced uncertainty and less risk exposure due to their ESG performance disclosure. Moreover, financial advisors accept investors' tendency towards responsible investments and justify their investment recommendations accordingly. This paper discusses how managers could generate tangible benefits by successfully implementing ESG strategies and achieving higher levels of ESG performance and disclosure, thus accessing cheaper financial resources. These strategies contribute to society and reward companies with cheaper capital costs and lower idiosyncratic risk. Managers of companies with lower levels of ESG performance disclosure must consider developing ESG-related operational strategies. Promoting corporate ESG performance through active public disclosure provides the company with a positive image. The ESG-responsible companies attract capital market participants and manage their access to cheaper capital costs. Company decision-makers must comprehend how capital markets (including debt capital and equity capital markets) respond to corporate ESG performance disclosure. This could help establish an optimal level of ESG performance disclosure that helps companies maximise the favourable impacts on their operational performance and idiosyncratic risk.

In line with the findings in prior literature (Daszynska-Zygadlo et al., 2016), the second paper (Paper 2) highlights the importance of managers setting ESG performance goals and related strategies. This paper suggests that corporate managers tend to improve corporate ESG performance to pursue their company's financial benefits (Albertini, 2013). It argues that it is essential to consider corporate ESG performance suitable for each company's strategy in different industries. This finding indicates that corporate ESG performance does not equally benefit companies across industries, thus supporting prior studies (Feng et al., 2017, Omar and Zallom, 2016, Daszynska-Zygadlo et al., 2016). This diversity means that a company's managers need to identify salient stakeholders in their specific industry, as discussed by the managerial branch of stakeholder theory (Deegan, 2014). This paper suggests that corporate managers consider their industry's characteristics and whether corporate ESG performance disclosure is essential to their company's financial performance. The differences between industries lead to various organisational settings and strategies that give different weights to business objectives (Ortas et al., 2015). The study's findings in Paper 2 guide managers by

highlighting that corporate ESG performance disclosure generates varied financial results across different industries. Therefore, managers need to wisely prioritise their company's resources, allocating them to corporate ESG activities that impact their company's financial performance sustainably and taking account of the characteristics in different industry sectors.

The study findings presented in the third paper (Paper 3) recommend that Australian-listed companies with high carbon emissions regularly re-evaluate their borrowing abilities. The capital market applies a higher interest rate to high-carbon-emitting companies due to future uncertainty and its implications for these companies (Li et al., 2014, Maaloul, 2018). This uncertainty also contributes to corporate carbon emissions reduction strategies and schemes to control carbon emissions risks. This paper recommends that regulators consider the financial risks associated with corporate carbon emissions performance disclosure during the development, evaluation and update of carbon-related legislation. Prior studies argue that a more advanced accounting system is required to meet the need for a low-carbon-emissions economy (Ratnatunga et al., 2011). The study's findings in Paper 3 corroborate this argument and echo the suggestion by Luo and Tang (2014) that accounting, auditing and management teaching programs be expanded to include practice in a green business environment. In practical terms, the findings could be incorporated into schemes that recognise carbon emissions implications and their consideration in financial accounting standards, as highlighted in prior literature (Warwick and Ng, 2012, Lovell et al., 2013, Lovell, 2014).

6.5. Research limitations and Future Research Recommendations

Generally, investors' understanding of corporate ESG performance is impacted by a country's culture and diverse economic situations (Salaber, 2007, Jolie, 2019). While this study includes large Australian listed companies, future studies may either examine the hypotheses among non-listed or small and medium-sized companies within an industry sector or across different industries, as discussed by Mohammad and Wasiuzzaman (2021). Investors' understanding of higher- or lower-ESG-performance companies may be impacted by a country's culture or diverse economic situations (Khlif et al., 2015). Cross-country and cross-cultural studies on the association between corporate ESG performance, COC and idiosyncratic risk would be interesting. It is also interesting to investigate the change in a company's COC overtime when companies with lower ESG performance enhance their investment in improving ESG related concerns. Future studies may investigate the impact of corporate ESG performance disclosure on a company's COC and idiosyncratic risk across different industries or for non-

listed companies and small to medium-sized companies, as recommended by previous literature (Mohammad and Wasiuzzaman, 2021). The majority of the literature investigating corporate ESG performance disclosure were conducted in the US and UK. Although this study expands the literature, it only examines Australian companies. Hence, it is limited by generalizability. As the findings of this paper apply only to listed companies, this limits their generalisability to all companies, including non-listed companies. In addition, the paper neither investigates the costs of managing corporate carbon emissions performance, which may interest the capital market. Future studies could evaluate the moderating impact of associated costs on the relationship between corporate carbon emissions performance and the cost of capital (COC).

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