Empirical Essays in Corporate Finance: Implications of Market Participants and Corporate Social Responsibility

by

Haoying Zhou

A thesis submitted to the University of Birmingham for the degree of
DOCTOR OF PHILOSOPHY

Department of Finance
Birmingham Business School
College of Social Sciences
University of Birmingham, U.K.
January 2024

Abstract

In the first empirical investigation discussed in Part II, we study the impact of corporate culture on corporate social responsibility (CSR). We employ text analysis on companies' annual 10-K to measure corporate-level culture quantitatively based on the competing values framework (CVF). We find that collaborative culture promotes corporate CSR by circumventing environmental and social controversies and seizing environmental and social opportunities, while creative and competitive cultures diminish CSR by discounting environmental and social opportunities and aggravating their controversies, respectively. We also examine the moderating role of blockholders, documenting empirical evidence that blockholders substitute the culture-CSR relationship flagging the impact of corporate culture on CSR. Our results are robust after accounting for endogeneity using the instrumental variable (IV) approach, entropy balancing method, matched sample, alternative statistics approaches, and alternative measures of cultural dimensions, blockholders, and CSR.

In the second empirical investigation discussed in Part III, this study examines whether ESG blockholders drive the issuance of corporate green bonds, whose proceeds are primarily used to finance environmentally friendly activities. We show that ESG blockholders exert a positive influence on the issuance of green bonds. The issuance, in turn, benefits the existing shareholders as it lowers the cost of external financing over the following years. Moreover, we find that ESG blockholders effectively alter the positive relationship between green bond issuance and the cost of debt financing in the long term, compensating for the inadequacy of the long-term effects of green bond issuance on issuers' financing costs in the debt market. It

suggests that ESG blockholders are value-enhancing for green bond issuers. Furthermore, we indicate that after a temporary impact of the climate policy shock, ESG blockholders give higher emphasis to green action by driving green bond issuance to avoid exposure to more environmental risks. Overall, our findings imply that large financial institutions paying attention to environmental and social issues can play an important role in developing green bond markets.

In the third empirical investigation discussed in Part IV, we examine the impact of analyst activity on investor demand for bonds. Using comprehensive data on orderbook size in the primary market of corporate bonds, we provide robust evidence that higher analyst coverage and higher forecast accuracy have a positive impact on investor demand, whereas forecast dispersion has a negative impact. We also find that the impact is more pronounced if the bond has a less informative issuance procedure, such as non-green bonds, and if bond issuers have higher information asymmetry and low ESG performance. This evidence suggests that bond investors' demands overcome the information asymmetry associated with bond issuers using analysts' activity. Overall, our results are consistent with the bright side view and imply that analyst activity is a critical determinant of investor demand for corporate bonds.

To my loving Mum and Dad

Acknowledgements

This PhD journey has been one of the most challenging yet rewarding experiences of my life, and it would not have been possible without the encouragement and support of a few key individuals to whom I wish to express my deepest gratitude. First and foremost, I extend my greatest and most sincere appreciation to my supervisors, Dr Eilnaz Kashefi Pour, Dr Biwesh Neupane, and Dr Wasim Ahmad. Their excellent guidance, valuable comments, and continuous support, even during challenging times, have been my great source of strength. I am profoundly grateful for the countless hours they dedicated, the knowledge they imparted, and the experience they shared with me. Their impact extends far beyond this thesis and has shaped my growth in academia and research.

Also, my most heartfelt thanks are reserved for my dearest mum and dad. Their unconditional love and unswerving faith in my capabilities have been the driving force throughout my PhD journey. Their endless support and encouragement, especially in times of doubt, have given me the motivation and perseverance to continue.

My sincere gratitude is extended to my friends. They have brought joy and balance into my life, reminding me of the world beyond academia. I am grateful for their love and companionship. I want to send a special word of thanks to my best best friend, Dr Rongrui Duan: I do cherish your support and encouragement all the way from Bath to Birmingham, and I thank you with all my heart.

I am forever indebted to each of them for their pivotal roles in this significant chapter of my life.

Table of Contents

List of Figures

List of Tables

I. Introduction

1. Background

This thesis is set in the field of responsible and sustainable business practices. In an era marked by growing global awareness of environmental and social issues, the roles of businesses and financial markets in addressing these concerns have become a central focus of academic inquiry and social topics. In an influential essay in the New York Times in 1970, Friedman (1970) proposed a famous statement that the "social responsibility of business is to increase its profits". In the past decades, however, the notion of social responsibility has broadened and grown from a niche segment to a mainstream. Sheehy (2014) defines corporate social responsibility (CSR) as business self-regulation. In a broader context, CSR goes beyond the interests of shareholders (Wang *et al.*, 2016). It incorporates both environmental and social concerns into the sustainable economic development of an organisation (Aguilera *et al.*, 2007; Carroll and Buchholtz, 2014). The effectiveness of responsible and sustainable organisations depends upon catering to the expectations of various stakeholders. Thus, the prevalence of socially responsible and environmentally friendly practices in these organisations is a subject matter of further inquiry. Through a comprehensive analysis of theories and empirical studies, this thesis aims first to shed light on the determinants of CSR and then extend to related topics about its impacts, ultimately contributing to a deeper understanding of the implications of socially responsible and environmentally friendly practices for businesses, stakeholders, financial markets, and society at large.

Market participants, such as investors, play an indispensable role in financial systems, contributing to the efficient allocation of resources across different asset classes, facilitating liquidity and price discovery through their investment decisions, and maintaining market integrity, which are crucial for the efficiency and stability of financial markets. Within firms, investors, especially those who own sizeable stakes, have substantial influences over corporate control. In practice, these large investors are ubiquitous across firms. Since the paper by Shleifer and Vishny (1986), a body of work in corporate finance has modelled the monitoring role of large shareholders as a potential solution to agency problems. The larger the block stakes in a firm, the greater the benefits that shareholders can gain from effective management, thereby increasing the incentives for these blockholders to play a positive monitoring role. In addition to their focus on ensuring that the management itself acts in the best interests of shareholders, blockholders' activities are closely associated with their portfolio firms' strategic decisions, policies, and performance (Cronqvist and Fahlenbrach, 2009; Mishra, 2011; Clifford and Lindsey, 2016; Alvarez *et al.*, 2018; Erhemjamts and Huang, 2019) by their controlling power. Through either directly using voting power and disciplining firm management ('voice' or direct intervention) or indirectly threatening to trade their shares ('exit' or 'voting with their feet' or 'Wall Street Rule'), firms' decisions and policies are under these blockholders' monitoring and influences (Burkart *et al.*, 1997; Nenova, 2003; Parrino *et al.*, 2003; Edmans and Manso, 2011; Bar-Isaac and Shapiro, 2020). To some extent, the involvement of these blockholders itself might be viewed as a sign of confidence in the firm's governance and prospects, which can positively influence the perceptions of potential investors and stakeholders.

As another most important part of market participations, analysts act as a key intermediary between firms and financial markets, bridging the gap between firm-specific information and the investment decisions of other market participants, including investors. They not only

provide an extensive range of future insights about their covered firms to financial markets (Chen *et al.*, 2010; Charitou *et al.*, 2019) stimulating more investor responses in financial markets (Lehavy *et al.*, 2011) by playing a key informational role through interpretation and discovery of information (Asquith *et al.*, 2005; Li, 2020; Lof and Van Bommel, 2023), but also send a signal of corporate governance of their covered firms to market investors as one of the most important external monitoring agents. Compared to investors, analysts have better access to firm management. Both the interaction with management and the transparent information environment contributed by these analysts' activities make it difficult for the management to engage in value-destroying activities (Yu, 2008; Dyck *et al.*, 2010; Irani and Oesch, 2013). Similar to the role of large investors, analysts' choice of coverage itself also can positively signal firms' prospects in financial markets (Bradshaw *et al.*, 2006). Given the major issue of information asymmetry in financial markets, such information and signals are valuable and influential in affecting financial markets' capital allocation and efficiency. Hence, this thesis is motivated to further highlight the roles of investors and analysts, enhancing the comprehension of market participants' implications for firms and broad financial markets.

Cultural influences are fundamental to firms' full responses to social and environmental issues and ensure the thorough integration of CSR within the organisational structure (Linnenluecke and Griffiths, 2010). This fundamental way matters to firms to some extent that it identifies the organisation's goals through values and beliefs, guides its activities through implicit impacts, and blends its members through shared purposes and enduring norms (Schein and Schein, 2016; Groysberg *et al.*, 2018). Building on the theoretical evidence that corporate culture is critical for firms' behaviours, decisions, and policies, the aim of the study in Part II of this thesis is to explore the cultural impacts on firms' CSR using empirical analysis. In addition, the role of blockholders as the channel linking culture to firms' CSR is investigated

since these large shareholders who serve as a mainstay of governance mechanisms are significantly influential due to their direct and indirect intervention in the portfolio firms (Laeven and Levine, 2008; Edmans, 2014).

Green bond markets are a critical source of funds that provide long-term and large-scale financing for firms' environmentally friendly activities. The issuance of corporate green bonds is considered to be related to shareholders' engagement in environmental, social, and governance (ESG) in Part III. Compared to traditional blockholders, institutional blockholders who are engaged in ESG initiatives are typically more inclined to emphasise responsible shareholder actions and foster engagement in sustainable business practices within their portfolio firms. (Dimson *et al.*, 2015). Based on the theoretical and empirical findings that these blockholders with ESG initiatives are expected to intervene in the environment-related decision-making and financing policies (Cronqvist and Fahlenbrach, 2009), the aim of the study in Part III is to investigate their role played in the issuance of green bonds in their portfolio firms.

Analysts are a key intermediary between firms and financial markets, delivering a variety of firm-specific information and signals to market investors. The delivery of information and signals is of significant value, especially considering that investors often lack access to adequate value-relevant information in corporate bond markets. The issuance of new bonds is likely to suffer from information asymmetry, attributed to the illiquidity of bond trading in secondary markets (Wang and Wu, 2023), coupled with the complexity of information disclosed in prospectuses (Li *et al.*, 2023). Hence, in the analysis of Part IV, the intermediary roles of analysts in investors' demand for new corporate bonds are examined empirically.

2. Research Questions and Findings

As indicated above, the thesis is divided into several parts: Introduction (this Part), three chapters (Part II, III, and IV), and Conclusions (Part V). To provide the reader with an overview of the work, a brief introduction to each of the three chapters is given.

In Part II, we start by exploring what influences CSR and examine the relationship between corporate culture and CSR. Many researchers have contributed a number of answers to the factors. Among them, Wood (1991) proposed the key principles of CSR and argued that CSR is culture-bound. Firm-level culture identifies the business organisation's goals through values and beliefs, guides its activities through implicit impacts, and blends its members through shared purposes and enduring norms (Schein and Schein, 2016; Groysberg *et al.*, 2018), which suggests that corporate culture may be a root cause for firms to decide to involve in CSR. So, this study focuses on the cultural impacts and provides empirical evidence on whether and how corporate culture impacts CSR. We apply four cultural values (i.e., creation, control, competition, and collaboration) in Cameron *et al.* (2014)'s competing values framework (CVF) and quantitively measure them using text analysis to construct a given firm's cultural emphasis. The main finding shows that corporate culture matters. Specifically, the controlling culture within a firm enhances CSR by avoiding environmental and social controversies. Similarly, collaborating culture contributes to CSR by effectively seizing environmental and social opportunities. In contrast, cultural values that emphasise creativity and competitiveness tend to negatively impact CSR, either by neglecting these environmental and social opportunities or by intensifying associated controversies. Moreover, this study in Part II considers the moderating effects of governance mechanisms and hence introduces blockholders as a channel to further explore the cultural impacts on CSR. Due to their sizeable ownership, blockholders are a major part of the governance mechanism and influence their portfolio firms significantly (Edmans,

2014). We show that the moderating effect of blockholders on the culture-CSR relationship is significant, supporting the value-enhancing CSR practices.

In Part III, we highlight the environmental component of CSR and examine the relationship between ESG blockholders and corporate green bond issuance. As climate-related and environmental activities demand long-term and large-scale financing, green bond markets have emerged and become a critical source of funds for these activities. We are motivated to explore the factors that influence firms' corporate green bond issuance. Given that green bond issuance is associated with positive outcomes for shareholders (Tang and Zhang, 2020; Flammer, 2021) and that blockholders are a strong monitor (Shleifer and Vishny, 1986), we introduce ESG blockholders and investigate whether and how they influence the green bond issuance in their portfolio firms. ESG blockholders are identified in this study as institutional blockholders who are socially conscious and are actively engaged in environmental and social practices. In consideration of the impacts of increasing environmental issues on their portfolio firms, relative to traditional shareholders, ESG blockholders are expected to have more motivations to intervene in environment-related decision-making and financing policies (Cronqvist and Fahlenbrach, 2009), including issuing green bonds to finance green activities. In this empirical study, we show that ESG block ownership is significantly and positively related to the issuance of green bonds. Next, this study investigates whether the issuance of green bonds accrues any tangible benefits to the issuers by examining how the cost of debt and equity financing evolves following the issuance of green bonds. We document that the issuance of green bonds produces benefits from lowering financing costs in forthcoming years. Considering the signalling role of blockholders in financial markets (Brav *et al.*, 2008; Klein and Zur, 2009), we examine whether ESG blockholders further exert an influence on post-issuance financing costs and find that can effectively moderate the positive relation of green

issuance with the long-term cost of debt financing. This suggests that ESG blockholders are value-enhancing for green bond issuers. Finally, after introducing the 2016 Trump election as an exogenous shock to climate policy uncertainty, this study shows that ESG blockholders place a higher emphasis on green action to avoid higher exposure to environmental risks when facing climate policy uncertainty.

In Part IV, we extend our empirical analysis to the whole corporate bond market and place an emphasis on the demand side of bond markets. Excessive investor demand serves as an essential prerequisite, not only enabling firms to access external financing (Derrien, 2005; Krebbers *et al.*, 2023) but also facilitating portfolio diversification for investors (Asquith *et al.*, 2013). In the bond market, the issuance of new bonds may suffer from information asymmetry resulting from the illiquid trading of bonds in secondary markets (Wang and Wu, 2023) and complex information disclosed in prospectuses (Li *et al.*, 2023). Therefore, we are motivated to investigate whether analysts who are a key intermediary between firms and financial markets and deliver firm-specific information and signals to investors can affect the demand for corporate bonds issued by their covered firms. Using a comprehensive dataset of orderbook size in the primary market of corporate bonds, we provide robust evidence that higher analyst coverage and higher forecast quality have a positive impact on investor demand for corporate bonds. We then highlight the positive role of the analysts as the information intermediary by investigating bond and firm heterogeneity in the analysts' impacts on investor demand. We suggest that the impacts of analysts are more pronounced in issuers with a worse information environment. In particular, we find that the impacts of analysts are more pronounced in issuers with low ESG scores and high carbon emissions. Additionally, we find that investor demand is not significantly related to analyst forecast quality and coverage in the green bond issuers and only significantly related to those in non-green bond issuers. Given that analysts' activities are

informative when the information asymmetry associated with a firm is higher, this finding, in turn, contributes to green bond literature by adding evidence to the notion that green bonds have lower information asymmetry and better signalling associated with firms' environment commitment (Flammer, 2021; Risal *et al.*, 2023). Overall, these findings imply that analyst activities are a critical determinant of investor demand for corporate bonds.

The three parts have in common that they are both empirical in nature and that they aim to show facts of direct or indirect relevance to the firms' responsible and sustainable practices. These parts contain findings with implications for the firms, market participants, and regulators. In the concluding part of the thesis (Part V), certain limitations and potential research recommendations will be offered.

3. Research Contributions

The contribution of this thesis is threefold. Firstly, this thesis adds new empirical evidence for the key determinants of CSR. We shed light on a potential root cause behind CSR practices: an unobservable and informal mechanism, namely corporate culture. Using a quantitative measure of corporate culture, we add to the growing CSR literature on the critical role of cultural values in CSR. More importantly, this thesis makes the first attempt to provide evidence that cultural impacts on CSR depend on the influences of blockholders. It contributes to the ongoing exploration that bridges culture with the context of formal institutions and suggests that corporate governance may exert an influence on the cultural impacts on firms' CSR. Blockholders, with their sizeable ownership, are regarded as a mainstay of governance mechanisms. They are closely associated with their portfolio firms' strategies, decisions, and policies, including CSR, to increase the value of their holdings accordingly. More specifically, they have both incentives and capabilities to put pressure on the firms, through direct intervention or threat to exit, to implement CSR practices that are in their interests. By

introducing a governance channel involving blockholders, we offer more in-depth insight into the relationship between corporate culture and CSR. Consistent with their significant role in the governance channel, we show that this relationship can be moderated by blockholders encouraging their portfolio firms to focus on value-enhancing CSR practices only and to avoid activities resulting in agency problems and harming shareholder interests.

Secondly, to the best of our knowledge, this thesis provides the first robust evidence of the value of environmental and social awareness among large institutional investors in corporate green bond markets. This empirical evidence not only provides a crucial practical implication for green bond markets, indicating that the support of large responsible institutional investors is important for their development, but also contributes to institutional investor literature by highlighting the signalling role of institutional blockholders who have ESG initiatives in financial markets. The ESG reputation of these blockholders may send a positive signal to both bond and stock markets, indicating that under their responsible investing, their portfolio firms are more likely to engage in environmental and social activities and suffer from lower environmental risks. Also, we add new insights into the positive market reactions to green bond issuance by showing that the cost of debts and equity financing reduces following the green bond issuance. Specifically, firms that issue green bonds are rewarded by both debt and equity markets, benefiting from reduced debt costs in the short term and more favourable equity capital terms in the long term. This, in turn, underscores the signalling role of green bonds that send a positive signal of the firm's commitment to environmental sustainability, a value regarded by financial markets.

Thirdly, this thesis provides further insight into the demand side of bond markets and offers new evidence regarding the determinants that influence investor demand in corporate bond markets. Based on the level of oversubscription measured by comprehensive data on

orderbook size in the primary market of corporate bonds, we provide a novel perspective on investors' real response to a certain bond or a certain issuer. We then underline the positive role of analysts in the investors' demand for bonds by showing that the level of oversubscription is strongly related to analyst activities, including their coverage decisions and the quality of their research outputs. In the context of new bond issuances, problems of information asymmetry commonly arise due to the illiquid trading of bonds in secondary markets and the complexity of information disclosed in prospectuses. In such a challenging environment, analysts, acting as an important intermediary between firms and markets, deliver a variety of information and signals about their covered firms to markets, which is potentially valuable for bond investors. Specifically, they not only provide investors with a range of firm-specific information through interpretation and discovery of information but also convey a positive signal of a firm's governance as an important external monitoring agent. To a certain extent, their choice of coverage itself also signals firms' prospects in financial markets. This thesis makes an implication that the credible information and signals provided by these analysts indeed reduce market information asymmetry, thereby positively stimulating investor demand for bonds issued by their covered firms.

II. Corporate Culture and CSR Nexus: Role of Blockholders

1. Introduction

From a niche segment of academic literature to a mainstream, corporate social responsibility (CSR) has been drawing scholars' and practitioners' attention to the economic and ethical responsibilities that organisations undertake for their stakeholders (e.g., Jo and Harjoto, 2011; Eccles *et al.*, 2014; Barko *et al.*, 2021). As an increasing number of firms deem CSR to be an important part of their firm activities, a critical question arises: What influences CSR?

Wood (1991) articulates three main principles of CSR, namely legitimacy, public responsibility, and managerial discretion, and argues that these principles are culture-bound, i.e., organisation culture is a primary factor that affects firms' CSR policies and practices. Despite organisations' growing involvement in the improvement of processes, products, and policies to underline their environmentally friendly practices as well as to improve their relationships with the stakeholders (Crane, 2000), scholars argue that these changes are superficial and insufficient (e.g., Welford, 1995; Stead and Stead, 1996; Hart and Milstein, 1999; Senge *et al.*, 2001; Husted, 2005). Their research manifests that cultural changes and transformation are fundamental ways to fully respond to social and environmental issues and realise the permeation of CSR throughout organisations (Linnenluecke and Griffiths, 2010). Corporate culture identifies the organisation's goals through values and beliefs, guides its

activities through implicit impacts, and blends its members through shared purposes and enduring norms (Schein and Schein, 2016; Groysberg *et al.*, 2018). Hence, culture matters a lot for organisations' behaviours, decisions, and policies (Gottesman and Morey, 2012; Davidson *et al.*, 2015; Omar *et al.*, 2015; Strese *et al.*, 2016; Jiang *et al.*, 2017; Pacelli, 2019).

Despite the overwhelming evidence on the importance of corporate culture, empirical evidence on the relationship between corporate culture and CSR is scarce. Newton and Harte (1997) imply that organisational eco-culture has a significant impact on firm environmental strategies. Howard-Grenville and Bertels (2012) emphasise that corporate culture shapes the relationship between business and the environment. Their study indicates that cultural changes in firms are likely to develop socially responsible practices and strategies that are aimed at improving the stakeholders' value (Parr, 2009; Galbreath, 2010). However, prior literature on cultural impacts concentrates on theoretical research or survey data and largely ignores the diversity of culture types within an organisation. This study aims to fill this gap in the literature by empirically investigating how different corporate cultures and their values influence firms' CSR practices.

We further explore a channel through which corporate culture influences firms' CSR practices. The literature that links culture with the context of formal institutions suggests that the impact of cultural values on firms' CSR may depend on corporate governance (Galbreath, 2010; Groysberg *et al.*, 2018; Graafland and Noorderhaven, 2020; Lawrence *et al.*, 2021; Andreou *et al.*, 2022). Blockholders, as a mainstay of governance mechanisms, are pervasive and exert significant influences through direct and indirect intervention in their organisations (Laeven and Levine, 2008; Edmans, 2014). We extend our analysis to understand whether and how blockholders influence the corporate culture – CSR relationship.

Empirical literature does not provide clear direction on how blockholders may affect the

relationship between corporate culture and CSR. Blockholders, by virtue of their sizeable ownership, are closely associated with their portfolio organisations' strategies, decisions, and policies, including CSR, to increase the value of their holdings (Cronqvist and Fahlenbrach, 2009; Mishra, 2011; Clifford and Lindsey, 2016; Alvarez *et al.*, 2018; Erhemjamts and Huang, 2019). This suggests that blockholders can put pressure on firms, through direct intervention or threat to exit, to affect the cultural impacts and implement CSR practices that are in shareholders' interests (Adams *et al.*, 2010; Aiken and Lee, 2020; Bar-Isaac and Shapiro, 2020). However, the benefits of CSR practices on firm value are disputed. On the one hand, a large strand of literature argues that long-term benefits and higher shareholder wealth can be generated through better CSR practices (Kim *et al.*, 2014; Borgers *et al.*, 2015; Dimson *et al.*, 2015; Riedl and Smeets, 2017; Albuquerque *et al.*, 2019; Ilhan *et al.*, 2021; Hoepner *et al.*, 2023); on the other hand, the agency problems and high costs associated with CSR activities can reduce short-term profits (Brown *et al.*, 2006; Fernando *et al.*, 2010; Krüger, 2015; Masulis and Reza, 2015). As a result, blockholders would require balancing the cost of firms' involvement in CSR activities and the economic benefits generated from them instead of complying with the cultural orientation. Given the monitoring role of blockholders, we suggest that the CSR considerations of these influential shareholders are likely to alter the cultural impacts on CSR practices.

In this study, we examine the relationship between corporate culture and CSR by focusing on a large sample of U.S. companies between 1993 and 2018. The measurement of corporate culture is based on the competing values framework (CVF) developed by Cameron *et al.* (2014). We follow Fiordelisi and Ricci (2014) to quantify the four CVF cultural dimensions (i.e., creation, control, competition, and collaboration) by conducting a textual analysis of 10-K reports available in the Edgar database of the U.S. Securities and Exchange Commission (SEC)

and construct measures of an organisation's cultural emphasis following Fiordelisi *et al.* (2019) and Andreou *et al.* (2022). We also collect 13D and 13G filings available in the Edgar database to measure the size of block ownership. To measure CSR practices, we use Environment and Social ratings collected from MSCI ESG KLD STATS. In consideration of the different number of strength indicators and concern indicators in each category varying over time, we construct a scaled measure of CSR by following Deng *et al.* (2013) and Servaes and Tamayo (2013). Moreover, in addition to the net measure of CSR scores used in most CSR studies, we make a distinction between positive indicators (i.e., CSR strengths) and negative indicators (i.e., CSR concerns). This distinction is important as firms may conceal the weaknesses of CSR by focusing only on strengths generated by firm CSR resources (Nofsinger *et al.*, 2019). To alleviate this consideration, we explore our research questions by examining CSR strengths and CSR concerns separately. In particular, the distinction is beneficial in order to examine the real effects of blockholders. Further, to better understand the preference of cultural values and blockholders regarding CSR, we conduct a granular examination by extending the baseline and moderation regression to study the five different dimensions of CSR activities separately. Unlike an aggregate CSR measure, the separation provides a detailed analysis of each specific social and environmental aspect and avoids offsetting different CSR dimensions (Nofsinger *et al.*, 2019; Chen *et al.*, 2020).

Our main result shows a strong relationship between corporate culture and CSR, suggesting that corporate culture is an important determinant of firms' socially responsible and environmentally friendly practices. More specifically, organisations that place a relatively higher emphasis on collaborative values (i.e., highlighting a harmonious work environment, relationships with stakeholders, and social and environmental issues) have higher CSR involvement through increased CSR strengths and decreased CSR concerns. CSR involvement

decreases in organisations that give cultural importance to creation (i.e., emphasising innovation and breakthrough) or competition (i.e., focusing on market shares and economic growth). The main results are robust and qualitatively consistent addressing endogeneity using the instrumental variable (IV) approach.

While exploring the possible governance channel, we find evidence that links blockholders to the cultural impacts on CSR. We find that blockholders influence CSR involvement and moderate the relationship between the four CVF cultural dimensions and CSR. That is, in the context of blockholders, the impact of culture on overall CSR performance in our main analysis is weakened, indicating a monitoring role of blockholders in CSR in U.S. firms. The monitoring role is also significant in CSR strengths and CSR concerns. The positive association between controlled culture with CSR strength and concerns, the creative culture with CSR concerns, and the negative association between competitive culture with CSR strengths and concerns are attenuated by the blockholders' ownership, which implies that blockholders monitor their portfolio firms to focus on value-enhancing CSR practices and to avoid activities resulting in agency problems and those harming shareholder interests (Gloßner, 2019). The findings are robust and consistent, controlling for endogeneity using the entropy balancing method, matched sample, alternative measures of CSR and corporate culture, and lead-lag specifications.

Our study contributes to the literature on CSR by adding empirical evidence for key determinants of CSR (Surroca and Tribó, 2008; Padgett and Galan, 2010; Adhikari, 2016; Dyck *et al.*, 2019) and contributes to the literature on corporate culture by extending studies examining the cultural impacts on firm outcomes (Sørensen, 2002; Fiordelisi and Ricci, 2014; Jiang *et al.*, 2017; Fiordelisi *et al.*, 2019; Wang *et al.*, 2021). Most prior studies pay attention to the influence of formal mechanisms, such as firm ownership (Han and Zheng, 2016) and institutional investors (Neubaum and Zahra, 2006; Erhemjamts and Huang, 2019; Cheng *et al.*,

2022), on CSR, and ignore an unobservable and informal mechanism, i.e., corporate culture. So, we add to the growing literature on the key role of cultural values in CSR. Different from the data sourced from the survey in Galbreath (2010), we collect culture data from an official database (i.e., SEC EDGAR), which is more objective and reliable. In addition, we employ the CVF (Cameron *et al.*, 2014), which is one of the most important corporate cultural value frameworks in business. Unlike the sample of Pasricha *et al.* (2018), which only focuses on the healthcare sector of the Indian social enterprise sphere, we cover a variety of industries in the U.S. and also examine the robustness of non-financial companies. Our results suggest that corporate culture plays a vital role in firms' CSR involvement.

Also, we add empirical evidence to the role of blockholders (Cronqvist and Fahlenbrach, 2009; Guthrie and Sokolowsky, 2010; Edmans, 2014; Jiang *et al.*, 2020). Our finding shows that when corporate culture has impacts on CSR, blockholders can play a monitoring role to alter the impacts. We are the first to show that cultural impacts on CSR depend on the effects of blockholders. Consistent with Gloßner (2019), we imply that under blockholders' monitoring, firms are encouraged to be involved in activities that enhance shareholder value.

The rest of this study is organised as follows: Section 2 summarises the literature review on culture, blockholders, and CSR, followed by the development of hypotheses. In Section 3, we provide our sample and measures and describe our data. In Section 4, we show our multivariate model and present our empirical analysis. We finally conclude our findings in Section 5.

2. Literature review and hypotheses

2.1 Corporate social responsibility (CSR)

With increasing public attention on CSR among practitioners and in the academic literature, a

wide variety of definitions of CSR has been proposed. For example, Sheehy (2014) sheds light on the complications arising from different political arguments and interests. According to the right-wing economic preference, there is a politically conservative view that the social responsibility of corporations is to make profits (Friedman, 1970), while the opposite party delivers CSR to build an equitable society. For business organisations, the managers define CSR in line with their requirements for fortune creation and may accept varying degrees of harm in the process. As Margolis and Walsh (2003) indicate, much chaos in CSR practice and literature may result from confusion in its definitions; hence, to provide a unifying framework, Sheehy (2014) clearly defines CSR as business self-regulation.

Broadly speaking, CSR considers a broader group of stakeholders beyond the shareholders (Wang *et al.*, 2016) and is the action of incorporating environmental and social concerns into the sustainable economic development of the business (Aguilera *et al.*, 2007; Carroll and Buchholtz, 2014). Much of the previous literature focuses on corporate responsibility in the social domain, such as employee welfare, local community volunteering, and corporate philanthropy (e.g. Kotler and Lee, 2008). However, with the increasingly growing environmental concerns, such as sea level rise, extreme temperatures resulting from climate change and greenhouse gas emissions (e.g. Bernstein *et al.*, 2019; Painter, 2020; Pankratz *et al.*, 2023), environmental responsibility is becoming a critical part of CSR.

The value-enhancing view of CSR suggests that CSR increases firm value by recognising and satisfying different stakeholders' environmentally friendly and socially responsible demands (Edmans, 2011; Deng *et al.*, 2013; Servaes and Tamayo, 2013; Ferrell *et al.*, 2016). Prior literature demonstrates that CSR can support organisations to reduce exposure to risks (Kim *et al.*, 2014; Albuquerque *et al.*, 2019; Gloßner, 2019; Ilhan *et al.*, 2021; Hoepner *et al.*, 2023), to improve reputation (Dimson *et al.*, 2015), and to seize opportunities of their

transition to sustainable development (Tcfd, 2017). Moreover, successful engagement in CSR practices leads to positive market reactions, which in turn increases shareholder wealth (e.g. Jo and Harjoto, 2011; Eccles *et al.*, 2014; Barko *et al.*, 2021).[1] Furthermore, CSR may help attract more external capital from investors, particularly those who prefer socially responsible investments (SRI) or tend to hedge against potential social and environmental risks. Institutional investors such as mutual funds, private equity investors, and venture capitalists are adapting their portfolios to increase the proportion of investments in CSR (e.g. Borgers *et al.*, 2015; Blackrock, 2016; Riedl and Smeets, 2017; Fu *et al.*, 2019). These investors play a role in the targeted organisations. Thus, the interaction between organisations and investors continually influences their CSR behaviours and raises external financing from various investors to create wealth for existing shareholders.

By contrast, the value-reducing view of CSR indicates that CSR can destroy shareholder value through managers' involvement in CSR practices for their interests at the expense of shareholders. This notion supports the "shareholder expense view" that suggests that CSR activities are wasteful investments enhancing managers' private benefits at the expense of shareholders (Benabou and Tirole, 2010, Cheng et al., 2013, Friedman, 1998, Jensen, 2001; Masulis & Reza, 2013). Therefore, CSR harms corporates' value due to investor concerns about value-decreasing CSR activities.

2.2 Corporate culture and CSR

Institutions can be classified as formal (e.g. laws, governance, compensation mechanisms) and informal (e.g. social norms, values, codes of conduct) institutions (North, 1991). Fenwick *et al.* (1999) and Williams and Triest (2009) show that top management attempts to consider and

[1] These findings are in line with the view of Copeland et al. (1994) that the decisions to invest in CSR activities made by managers help maximize the present value of future cash flows of the organizations.

undertake schemes through formal and informal control mechanisms - especially highlighting the role of the latter. Informal institutions here are broadly referred to as culture (Guiso *et al.*, 2015), which consists of cultural values (principles) and cultural norms (daily practice) (Graham *et al.*, 2022). Culture is one determinant of various firm decisions, actions, and overall performance (Williams and Triest, 2009; Hitka *et al.*, 2015). Hence, in order to understand firm policy, decisions, and ultimate performance, it is necessary to understand its corporate culture (Cronqvist *et al.*, 2007; Idris *et al.*, 2015; Jiang *et al.*, 2017).

Newton and Harte (1997) demonstrate a significant impact of organisational culture on firm environmental strategies. Howard-Grenville and Bertels (2012) emphasise that corporate culture shapes the relationship between business and the environment. Their study indicates that cultural changes in organisations are likely to develop the strategies and practices of CSR. Consistently, the analysis of Parr (2009) suggests that CSR values can lead firms to promote CSR business practices. However, this early research does not take the diversity of culture into account. Miska *et al.* (2018) show that cultures with future orientation are positively correlated with an organisation's sustainable practices, while a performance-oriented culture has a reverse impact. Upadhaya *et al.* (2018) reveal that innovative culture that encourages risk-taking and values practical actions prompts organisations to adopt socially responsible practices. Liao (2018) reports that four different dimensions of corporate culture exert different effects on an organisation's environmental innovations. These stated studies suggest the existence of a relationship between CSR and corporate culture. However, unlike previous studies that conduct surveys (Wood, 1991; Waldman *et al.*, 2006; Galbreath, 2010; García-Granero *et al.*, 2020), we use a quantitative method to measure corporate culture, following Andreou *et al.* (2022), Fiordelisi *et al.* (2019) and Fiordelisi and Ricci (2014), to examine the impact of corporate culture on its CSR practices. This measure adopts the corporate culture framework of Cameron

et al. (2014) to define corporate culture, which is based on the CVF developed by Quinn and Rohrbaugh (1983) and Quinn and Cameron (1983).[2] This framework helps top management consider comprehensively and act consistently to improve firm performance and value creation (Cameron *et al.*, 2014). The framework identifies two major dimensions. The first dimension presents an interval ranging from an internally oriented culture with an inclination for cohesion and harmonious internal relationships to an externally oriented culture with an inclination for differentiation and independence. The other dimension distinguishes the focus on flexibility and dynamism from the emphasis on stability and control. Together, both dimensions produce four corporate culture types (termed culture dimensions): collaboration, control, creation, and competition.[3]

2.2.1 Creation

A creation-oriented culture, called 'adhocracy' in the CVF, successfully copes with changing situations through flexible patterns. It also stresses external positioning, which highlights that organisations dominated by an adhocracy culture are expected to change their existing status and search for creative solutions in response to the external dynamic environment (Wei *et al.*, 2014).

---

[2] While as a single cultural framework, the CVF may not exhaustively capture every aspect, it incorporates most dimensions of corporate culture. Moreover, it has been empirically derived and validated in previous research (Linnenluecke and Griffiths, 2010; Cameron *et al.*, 2014). Furthermore, it has been widely employed in the relevant empirical study of organizational culture (e.g. Liao, 2018; Pasricha *et al.*, 2018)

[3] Further, Cameron *et al.* (2014) particularly shed light on the dynamics in the different *CRE_SCORE*s of corporate cultures. It should be noted that the four dimensions separately represent opposite assumptions. The dynamics separate corporate value creation strategies through two questions which are based on the speed and scope of corporate actions. One is 'How quickly would a corporate expect to create value (termed 'velocity')? Second is 'How much change would a corporate require creating value (termed 'magnitude')?' More specifically, in the continuum of velocity, from competition-oriented culture to collaboration-oriented culture, a fundamental value that emphasizes rapid value creation and short-term performance is separated from its counterpart that declares deliberate strategies and long-run performance. In the axis of magnitude, from creation-oriented culture to control-oriented culture, a focus on transformational change generated by innovation and extending breakthrough is distinct from a focus on small incremental change resulting from efficiency and continuous development of existing products and services.

In organisations enriched with this culture, employees are given the freedom to think about potential opportunities as well as the autonomy to act to break through the current barriers (Dwyer *et al.*, 2003). In addition, the value of 'doing things first' stimulates employees to be proactive in changing, absorbing new knowledge, and attempting novelty. Such an orientation enables corporates to grasp new opportunities and devote their resources to responding to these opportunities, simultaneously offering them the key to broader stakeholder satisfaction (Lumpkin and Dess, 1996). Moreover, adhocracy cultures encourage the foundation of *solution-focused ad hoc teams* to undertake complex tasks and challenges (Cameron and Quinn, 2011). Since, in this culture, the amount of attention given to others' performance and achievement is high, stakeholder interests and needs are likely to be prevalent. Thus, based on the stakeholders' views, the demonstration of social responsibility is expected to be high. Therefore, we propose lower agency problems, consequential to a creative-oriented culture, may result in more CSR strategies, formulating the following hypothesis:

H1: *A corporate's creative culture is positively related to CSR.*

2.2.2 Control

The control-oriented culture is defined as a 'hierarchy' in the CVF. This cultural dimension emphasises control mechanisms and is characterised by focusing on economic gains while ignoring the external environment (Linnenluecke and Griffiths, 2010). Moreover, a corporate with a hierarchy culture aims at value creation through standardised procedures, consistency, uniformity, as well as timeliness. On the one hand, employees here are able to do things correctly and behave appropriately under formal rules and regulations (Cameron *et al.*, 2014) to enhance corporates' strengths. On the other hand, the formalised structure is sometimes stiff and suggests that the cognition of members is narrowed (Griffiths and Petrick, 2001; Linnenluecke *et al.*, 2009). Accordingly, inflexible control and rigid internal processes are

likely to lead to control-intensive organisational culture. In line with Cooke and Rousseau (1983, 1988), who argue that in a cultural environment where task orientations are most prevalent, and the focus is on high levels of controlling others, collaboration is less meaningful, and the amount of attention given to others is expected to be minimal. Hence, stakeholder interests and needs are likely to be neglected and fail to pursue the long-term benefits of CSR. Consequently, we propose the following hypothesis:

H2. *A firm's controlling culture is negatively related to CSR.*

2.2.3 Competition

The second stable culture is a competition-oriented culture, which is named 'market' in the CVF. This culture type attempts to reap external effectiveness by strengthening competitiveness, improving fast response, stressing customer focus, fostering decisiveness, as well as enhancing goal achievement (Cameron *et al.*, 2014).

Under the competitive culture, people believe that doing things fast would keep them invincible in the market, and the success of the corporate derives from the aggressive competition and a profitability focus (Cameron *et al.*, 2014). In other words, market cultures aim to seize market share and high profitability (Eisend *et al.*, 2016). Presumably, these corporates tend to avoid falling into controversial issues. Additionally, to achieve their goal and realise real advantages, corporates enriched with competitive culture emphasise the efficient use of resources and rational organisation of their operations while facing a dynamic environment (Scott and Davis, 2015). Cooke and Rousseau (1983, 1988) argue that in competitive cultures, task orientations are most prevalent, and the focus is on high levels of personal achievement and conflict rather than collaboration. Consistently, Galbreath (2010) documents that members of such corporates focus on self-profits, thereby neglecting

stakeholders' needs and benefits and reducing their attention to CSR. Under stakeholders' and shareholders' expense views, we expect the following hypothesis:

H3. *A firm's competitive culture is negatively related to CSR.*

2.2.4 Collaboration

The collaboration-oriented culture is termed 'clan' in the CVF. Clan culture emphasises internal maintenance where human affiliation is considered, and both employee competencies and humanistic care are strengthened by building consensus. Members are expected to be cooperative and other-oriented (Cameron and Quinn, 2011). In such cultures, the decentralised decision-making mode provides employees discretion and open communication to ensure flexibility in the dynamic environment (Cameron *et al.*, 2014).

Furthermore, the emphasis on internal staff development in clan organisations not only suggests that they tend to improve responsibility through building harmonious workplaces, including equal opportunities, diversity and inclusion, and work-life balance (Linnenluecke and Griffiths, 2010) but also implies that they are likely to extend beyond the needs and interest of internal members to those of stakeholders (Galbreath, 2010; Pasricha *et al.*, 2018). Company culture exhibited through a higher value of integrity, collaboration, and respect may improve corporates' information environments internally and with external stakeholders (Sørensen, 2002), thereby leading to lower agency conflicts, particularly those that arise due to managers' opportunistic behaviours (short-termism). Corporates with collaborative cultures are expected to act in response to stakeholder demand for CSR (Galbreath, 2010), to stand in an ethical position, and to concern themselves with human well-being, climate change, and other social and environmental issues (Linnenluecke and Griffiths, 2010). Thus, the flexible culture with interpersonal relationships, social interactions, and future visions is proposed to have a positive

influence on an organisation's CSR. Therefore, we expect that:

H4. *A corporate's collaborative culture is positively related to CSR.*

2.3 The moderating role of blockholders

Formal institutions, particularly their mechanism to monitor, cannot be neglected in organisations. As the mainstay of monitoring mechanisms, blockholders are ubiquitous across companies (Laeven and Levine, 2008; Edmans, 2014; Edmans and Holderness, 2017).[4] Due to the sizeable ownership, their involvement is closely associated with their firms' strategic decisions, policies, and performance (Cronqvist and Fahlenbrach, 2009; Mishra, 2011; Clifford and Lindsey, 2016; Alvarez *et al.*, 2018; Erhemjamts and Huang, 2019) and is likely to affect the intensity that firms place on certain culture values (Andreou *et al.*, 2022), which suggests that the monitoring role of blockholders could alter the impacts of firm values on the firm's CSR decisions by virtue of their controlling power. Therefore, given the potential significance of blockholders, it is critical to assess the moderating effect of blockholders on corporate culture and CSR.

The traditional view of corporate governance states that governance can be exerted through intervention by blockholders (Cronqvist and Fahlenbrach, 2009; Edmans and Manso, 2011). Blockholders not only have the ability to exert an influence on their portfolio firms but also have the motivation to monitor the firms for several reasons. First, their large block ownership gives them the ability to bear the costs of monitoring management (Edmans, 2014). These investors also possess higher firm information, as well as skills, experience, and expertise to monitor firms, which reduces costs (Kang *et al.*, 2018). Gloßner (2019) indicates that only

[4] In this study, following the required threshold of mandatory public disclosure by the U.S. Securities and Exchange Commission (SEC), a blockholder is defined as a beneficial owner with at least 5% of corporate securities and filing Schedules 13D or 13G with SEC.

blockholders can afford the expensive expenses, so they are capable of ensuring the management pursues a CSR strategy that is in shareholders' interest rather than blind investment. Institutional investors have typically been distant from direct involvement in firm management decisions. If they are not satisfied with their investee firms' corporate governance structure and performance, they voice their opinion by exiting their investment (Ferreira and Matos, 2008). However, opting for the exit strategy can be costly and may not align with their long-term objectives. Instead, blockholders seek to actively engage with their investee firms to bring positive changes in the governance structures and limit opportunistic managerial behaviours (Kang *et al.*, 2018). Second, shareholders with a sizeable stake are powerful in corporate control. Through direct means, they could participate in director elections (Adams *et al.*, 2010), vote on firm decisions (Bar-Isaac and Shapiro, 2020), and initiate proxy fights (Mulherin and Poulsen, 1998; Aiken and Lee, 2020). In this regard, Mangena *et al.* (2020) show that it is important for blockholders to curb actions that harm firm value. This means that activities that lower firm value and harm the interests of stakeholders could draw blockholders' attention to monitor the firm effectively. Third, firm value maximisation may give them incentives to alleviate the conflicts of interest with upper management through governance (Attig *et al.*, 2009). This can help ensure that the board is aligned with the firm's strategic goals and that it operates in the best interests of stakeholders. Based on the above analysis, we argue that corporate cultural dimensions play a less salient role in promoting the fulfilment of CSR for firms with higher blockholders (i.e., greater block ownership). Therefore, we propose that the effect of corporate culture on CSR behaviours is less pronounced in the presence of high blockholders' ownership, and hence, we hypothesise the following:

H5.1a. *Blockholders' ownership weakens the positive relationship between creative culture and CSR.*

H5.2a. *Blockholders' ownership weakens the negative relationship between controlling culture and CSR.*

H5.3a. *Blockholders' ownership weakens the negative relationship between competitive culture and CSR.*

H5.4a. *Blockholders' ownership weakens the positive relationship between collaborative culture and CSR.*

An alternative view, however, argues that blockholders may reduce monitoring intensity. Blockholders may focus on extracting private profits from their portfolio firms to achieve their objectives and avoid firm value maximisation (Shleifer and Vishny, 1986; Ruiz-Mallorquí and Santana-Martín, 2009). In this respect, Barclay and Holderness (1989) find that block trades are priced at substantial premiums, which they argue reflects the private benefits that belong to blockholders due to their voting power. Subsequent work by Nenova (2003), Dyck and Zingales (2004), and Chang and Mayers (2012) confirms the issue of the private benefits of control. Furthermore, an organisation may form a controlling coalition with its blockholders to reduce the intensity of monitoring. For example, credit agencies such as Moody's are likely to cater to their blockholders' economic interests by assigning relatively favourable credit ratings to their blockholders' portfolio firms (Kedia *et al.*, 2017). As a result, blockholders may exert insufficient monitoring effects on governing cultural impacts on an organisation's policies and practices.

H5.1b. *Blockholders' ownership strengthens the positive relationship between creative culture and CSR.*

H5.2b. *Blockholders' ownership strengthens the negative relationship between controlled culture and CSR.*

H5.3b. *Blockholders' ownership strengthens the negative relationship between competitive*

culture and CSR.

H5.4b. *Blockholders' ownership strengthens the positive relationship between collaborative culture and CSR.*

3. Sample, variables, and descriptive statistics

3.1 Sample

We start by collecting a sample of U.S. public firms across a period from 1993 to 2018.[5] We then collect information on blockholders and corporate culture using the Electronic Data Gathering, Analysis, and Retrieval system (EDGAR) of the U.S. SEC. CSR data are obtained from the MSCI ESG KLD STATS, spanning 1993-2018. The financial statement data are obtained from the *Compustat* database, and the stock trading data are from the Centre for Research in Security Prices (CRSP) monthly and daily files.

After merging the stated databases, the final sample consists of 3,856 organisations with a total of 26,233 company-year observations. As for industries, a relatively large proportion of these companies represented manufacturing (47.34%), followed by services (19.15%) and other industries (33.51%).

3.2 Measure of CSR

MSCI ESG KLD STATS is one of the most extensively used databases to obtain Environmental and Social (ES) ratings. It provides a large dataset with an annual collection of approximately 3000 U.S. publicly traded firms and various ES indicators. In particular, thousands of data points of each organisation are collected, and seven major areas (i.e., Community, Diversity, Corporate Governance, Employee Relations, Human Rights, Product, and Environment) are

[5] KLD provides ES ratings with time series data going back to 1991 and discontinued updating ES scores in 2018.

included in the multidimensional measure. Following prior CSR literature, corporate governance is excluded because CSR mainly focuses on the ES criteria (Servaes and Tamayo, 2013; Cronqvist and Yu, 2017; Lins *et al.*, 2017; Amin *et al.*, 2020). Additionally, the definition of corporate governance in KLD is different from the conventional definition in finance (Jo and Harjoto, 2011; Nofsinger *et al.*, 2019). The corporate governance ratings, which were reclassified and renamed from the "Other" category in 2002, appear insufficient to measure the governance activities in practice. Also, we exclude human rights, which was added in 2002; this category mainly focuses on non-U.S. operations and misses many observations (Cho *et al.*, 2013; Amin *et al.*, 2020; Chen *et al.*, 2020). KLD presents a binary summary of positive performance indicators ("strengths") and negative performance indicators ("concerns") for each area. This unique reporting scheme enables us to avoid the shortcomings of an aggregated measure of ES criteria by separating strengths and concerns in each specific ES.

For each of the five criteria considered, we measure CSR as the difference between the strengths and concerns. Some previous CSR studies (e.g. Gloßner, 2019) use *Raw CSR* calculated by subtracting the sum of concerns from the sum of strengths across all categories considered. However, given that the number of strength indicators and concern indicators in each category varies over time, the simple summing approach is potentially limited by lacking comparability across years and categories (Mănescu, 2011). To overcome the drawback, we use a relative aggregation approach to construct *Scaled CSR* following Deng *et al.* (2013) and Servaes and Tamayo (2013). We scale the strength (concern) for each criterion by dividing the number of strengths (concerns) by the maximum possible number of strength (concern) indicators for that criterion in that year and then taking the sum of scaled strengths net of the

sum of scaled concerns to obtain the scaled total CSR scores.[6] The normalised measure allows for varying scale factors of strengths and concerns across years and criteria and gives these five criteria equal weight (Albuquerque *et al.*, 2019).[7]

3.3 Measure of blockholders

Blockholding information is obtained from both Schedule 13D and Schedule 13G forms of SEC in the EDGAR system. Both forms are referred to as "beneficial ownership reports" and are used to report shareholder ownership of 5% or more of a voting class of a company's equity securities.[8] We download all SC 13D and SC 13G forms and their amendments reported in the sample period (1993-2018) and then extract the details about the organisations, the identity of blockholders, and the positions of blockholdings. We measure the size of block ownership (BLOCKHOLD) using the percentage of shares owned by blockholders.

3.4 Measure of corporate culture

Based on the corporate culture framework of Cameron *et al.* (2014), we quantitatively measure four dimensions of corporate culture. We obtain company filings by downloading the 10-K reports filed between 1993 and 2018 from the EDGAR system of the SEC. For each filing, we conduct a textual analysis to quantify and estimate each corporate culture dimension of Cameron *et al.* (2014). Here, the characteristics of U.S. public companies are supposed to be reflected in officially written documents such as 10-K reports. To estimate the four cultural

[6] In our further analysis, we also capture both single measures of strengths and concerns (i.e. *Scaled CSR_strength* and *Scaled CSR_concerns*) across all five categories. Nofsinger *et al.* (2019) point out several potential limitations of the net CSR score, including the offset of negative indicators in a category against positive indicators in that category. To eliminate this counteraction, the strengths and concerns are also employed in the regression model separately in order to examine the attitudes of blockholders to the positive and negative ES performance.
[7] For robustness checks, we also use raw CSR and industry-adjusted CSR (see robustness check analysis).
[8] SC 13G is a more abbreviated version of SC 13D. The beneficial owners are eligible to file the SC 13G form in lieu of the SC 13D form when they are certain institutions or passive investors such as institutional investors with no intention of influencing corporate control and individuals whose ownership in the organization is below 20% and who have not acquired equity security with the intent of influencing control over the company.

dimensions using textual analysis, we adopt the vocabulary summarised by Fiordelisi and Ricci (2021). They identified a large set of words for each aspect through a two-step procedure. First, certain synonyms in the CVF of Cameron *et al.* (2014) are selected to describe each dimension of the corporate culture. Second, all synonyms selected in the first step were looked up in the Harvard IV Psychosocial Dictionary to identify additional synonyms. Following Fiordelisi *et al.* (2019), we first calculate the score of each dimension by scaling the frequency of the words associated with a specific cultural dimension by the frequency of the words for all four CVF cultural values as follows:

$$Culture\_SCORE = \frac{The\ number\ of\ words\ associated\ with\ each\ value\ of\ culture}{Total\ number\ of\ words\ for\ four\ CVF\ cultural\ values} \quad (A1)$$

Culture_SCORE refers to one of the four cultural values (creative, controlled, competitive, and collaborative).

We then follow Andreou *et al.* (2022) to calculate the average value of the second, third, and fourth lag of a corporation's cultural score for each firm. Finally, we use a dummy variable to measure the importance that the firm places on the specific cultural dimension.[9] The variables creative (*CRE*), controlled (*CON*), competitive (*COM*), and collaborative (*COL*) are each given a value of one if its corresponding average value for the given firm in the given year is above the industry median, which is based on a 2-digit SIC code.

3.5 Control variables

We control for *firm size (SIZE), which is* measured by the natural log of total assets. It can be expected that larger firms will have more resources available to support CSR activities. Additionally, as prior studies (e.g. Hoffman, 1996) have shown, *firm size* may predict larger

[9] For robustness checks, we also measure corporate culture by cultural scores and decile ranking value (see robustness checks in Section 4.3).

block ownership and a positive association with external pressure on company activities. *Firm age (AGE)* is controlled for and measured by the natural log of the number of years since it initially appeared in the CRSP database. We include *leverage (LEV)* and *asset tangibility (TAN)* to measure credit constraints and return on assets (ROA) as the measures of profitability to capture financial performance since an organisation's adoption of CSR practices may be linked to its financial slack (Hong *et al.*, 2012). As the *leverage* increases, for example, a firm allocates more of its assets to debts and interest, possibly reducing the resources available for its CSR activities (Graves and Waddock, 1994; Neubaum and Zahra, 2006). We further control for *the Market-to-book ratio (MB) as the* higher potential firm valuation has a positive relationship with CSR. We control for *Liquidity (LIQ),* which measures an organisation's ability to pay off its current liabilities with its current assets. We expect that when an organisation has more abundant slack resources, such as current assets, it is more likely to conduct CSR activities (Neubaum and Zahra, 2006). We further control for *volatility (VOLA)* proxies for business risks and *Amihud illiquidity (AMIHUD)* (Amihud, 2002), which is likely to be associated with blockholders via voice or exit (Edmans *et al.*, 2013). The detailed descriptions of these control variables are listed in Appendix A.[10]

3.6 Descriptive statistics

Table A1 provides basic summary information about the key variables used in our main analysis. There are significant variations in CSR performance across industries over time; we attempt to control for the sources of these variations.

Panel A of Table A1 shows social and environmental scores for the full sample. The sample consists of 26,233 company-year observations from 1993 to 2018. We adopt a scaled

[10] To reduce the influence of outliers, we winsorize all continuous variables at the 1st and 99th percentiles.

measure of CSR in our main regressions and decompose the aggregated CSR into strengths and concerns. For an average company, its CSR performance, especially the social dimensions, is still an issue that should be focused on. The average organisation gives much attention to improving the social positive performance (average social strength score is 0.221); however, it ignores social concerns (average social concern score is 0.313), which could lead a firm to be involved in controversies and even induce disappointing overall social performance (average social total score is –0.092). As for the environmental dimension, the average organisation may need not only to take action to deal with climate change and other concerns but also take the initiative in environmental opportunities to improve its strength score (0.041). With respect to the four social sub-categories, an average organisation is best at managing social activities related to the Community but worst at handling controversies over Diversity issues.

Table A1: Summary statistics

This table shows summary statistics of environmental and social scores, corporate culture, and blockholding. Panel A shows scaled environmental and social scores for the full sample. We include Community, Diversity, Employee Relations, Product, and Environment in the CSR index. Each category captures the score of strengths, a score of concerns, and the overall score, which is the net of strength score and concern score. To give the five categories equal weight, the raw strength (concern) scores are scaled by dividing the maximum possible number of strength (concern) indicators for that category in that year (*Scaled-CSR total)*. *Scaled_CSR strengths* and *Scaled_CSR concerns* include strengths and concerns, respectively. Panel B shows summary information grouped by industry and year. It reports the cross-section heterogeneity among U.S. firms along the scaled CSR scores, the four dimensions of corporate culture, and both blockholding estimates. We categorise firms within the range of SIC codes of 1000-1499, 2000-3999, and 4000-4999 as industrial firms. N is the number of observations. All continuous variables are winsorised at the 1st and 99th percentiles.

Panel A: CSR scores in each category

	N	Mean	Std. Dev.	Min	Median	Max
Social						
Scaled community total score	26,233	0.015	0.146	-0.500	0.000	1.000
Scaled community strength score	26,233	0.032	0.136	0.000	0.000	1.000
Scaled community concern score	26,233	0.021	0.118	0.000	0.000	1.000
Scaled diversity total score	26,233	-0.086	0.281	-0.667	0.000	0.667
Scaled diversity strength score	26,233	0.075	0.146	0.000	0.000	0.667
Scaled diversity concern score	26,233	0.157	0.215	0.000	0.000	0.667
Scaled employee relations total score	26,233	-0.013	0.150	-0.400	0.000	0.444
Scaled employee relations strength score	26,233	0.053	0.108	0.000	0.000	0.500
Scaled employee relations concern score	26,233	0.067	0.118	0.000	0.000	0.500
Scaled product total score	26,233	-0.019	0.128	-0.500	0.000	0.333
Scaled product strength score	26,233	0.023	0.076	0.000	0.000	0.333
Scaled product concern score	26,233	0.041	0.110	0.000	0.000	0.500
Scaled social total score	26,233	-0.107	0.409	-1.056	-0.075	1.306
Scaled social strength score	26,233	0.179	0.305	0.000	0.000	1.614
Scaled social concern score	26,233	0.286	0.299	0.000	0.250	1.333
Environmental						
Scaled environmental total score	26,233	0.016	0.114	-0.333	0.000	0.500
Scaled environmental strength score	26,233	0.041	0.103	0.000	0.000	0.500
Scaled environmental concern score	26,233	0.026	0.080	0.000	0.000	0.429
CSR						
Scaled-CSR total	26,233	-0.092	0.454	-1.160	-0.075	1.567
Scaled-CSR strengths	26,233	0.221	0.366	0.000	0.091	1.952
Scaled-CSR concerns	26,233	0.313	0.332	0.000	0.250	1.576

Panel B: Group by industry and year

		Overall	Industry		Year			
			Industrial	Non-Industrial	1993	2003	2013	2018
	N	26,233	16,964	9,269	101	342	1,471	1,485
Scaled-CSR total	SD.	0.454	0.473	0.418	0.502	0.461	0.636	0.474
	Mean	-0.092	-0.092	-0.094	-0.009	0.077	0.022	0.167
Scaled-CSR strengths	SD.	0.366	0.391	0.31	0.327	0.336	0.589	0.414
	Mean	0.221	0.246	0.177	0.301	0.372	0.362	0.321
Scaled-CSR concerns	SD.	0.332	0.350	0.291	0.344	0.343	0.302	0.254
	Mean	0.313	0.337	0.270	0.310	0.295	0.34	0.153
BLOCKHOLD	SD.	0.189	0.187	0.189	0.058	0.176	0.181	0.170
	Mean	0.337	0.323	0.362	0.097	0.269	0.363	0.361
Number of blockholders	SD.	1.839	1.834	1.837	0.659	1.681	1.770	1.577
	Mean	3.690	3.595	3.864	1.366	3.254	4.195	3.927

Panel C: Full sample

	N	Mean	Std. Dev	Min	Median	Max
CRE	22,267	0.486	0.500	0.000	0.000	1.000
CON	22,267	0.505	0.500	0.000	1.000	1.000
COM	22,267	0.608	0.488	0.000	1.000	1.000
COL	22,267	0.368	0.482	0.000	0.000	1.000
BLOCKHOLD	26,233	0.337	0.189	0.053	0.309	0.886
SIZE	26,233	7.145	1.582	3.866	7.042	11.129
AGE	26,233	2.768	0.887	0.693	2.833	4.443
LEV	26,233	0.221	0.200	0.000	0.197	0.903
TAN	26,233	0.266	0.234	0.008	0.187	0.895
ROA	26,233	0.020	0.143	-0.728	0.045	0.272
VOLA	26,233	43.569	20.683	14.982	38.899	121.852
LIQ	26,233	2.615	2.180	0.456	1.947	13.424
MB	26,233	3.361	4.614	-12.951	2.376	29.489
AMIHUD	26,233	0.014	0.042	0.000	0.002	0.304

In Panel B, average CSR performance shows significant variations across industries and years. Our sample is dominated by industrial organisations (64.66%), such as manufacturing, transportation, and mining.[11] Both absolute scores of strengths and absolute scores of concerns (0.246 and 0.337, respectively) of industrial organisations are, on average, higher than those of non-industrial organisations (0.177 and 0.270, respectively). Panel B of Table A1 also shows CSR over time. On average, CSR performance significantly increases from 1993 to 2018; in particular, social and environmental negative activities reduce from 0.31 in 1993 to 0.153 in 2018. From unreported summary statistics for annual CSR scores, we find that overall CSR has outperformed since 2012 in the U.S., and the performance of positive activities peaks in 2013. Block ownership and the number of blockholders also show increasing trends over time. Both rise initially from an average of 9.7% and an average of 1.366 blocks to an average of 36.1% and 3.927 blocks during the 25 years.

[11] We also summarize statistics for each industry division (not reported). Interestingly but not surprisingly, non-industrial organizations in agriculture, forestry, and fishing (i.e., SIC codes of 0100-0999), on average, have lower aggregated CSR scores than industrial organizations.

Table A2: Correlation matrix

This table shows Pearson correlation coefficients for the main variables. Statistical significance at *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Scaled-CSR total (1)	1								
Scaled-CSR strengths (2)	0.687***	1							
Scaled-CSR concerns (3)	-0.611***	0.144***	1						
CRE (4)	-0.025***	0.00900	0.045***	1					
CON (5)	0.060***	0.131***	0.065***	-0.143***	1				
COM (6)	-0.035***	-0.120***	-0.084***	-0.086***	-0.417***	1			
COL (7)	-0.039***	-0.032***	0.014**	-0.135***	-0.102***	-0.273***	1		
BLOCKHOLD (8)	-0.097***	-0.193***	-0.079***	0.049***	-0.090***	0.059***	0.00700	1	
SIZE (9)	0.233***	0.501***	0.227***	0.019***	0.215***	-0.156***	-0.070***	-0.225***	1
LEV (10)	0.00100	0.048***	0.051***	0.013*	0.053***	-0.044***	-0.00900	0.053***	0.330***
MB (11)	0.094***	0.059***	-0.064***	-0.0110	-0.018***	-0.013**	0.034***	-0.041***	-0.057***
ROA (12)	0.074***	0.095***	0.00300	-0.013*	0.078***	-0.025***	-0.054***	-0.130***	0.239***
TAN (13)	-0.068***	0.055***	0.154***	0.103***	0.093***	-0.140***	0.026***	-0.084***	0.272***
LIQ (14)	-0.055***	-0.142***	-0.079***	0.017**	-0.134***	0.096***	0.028***	0.085***	-0.394***
AGE (15)	0.129***	0.275***	0.122***	-0.018***	0.216***	-0.195***	0.0100	-0.298***	0.385***
AMIHUD (16)	-0.101***	-0.124***	0.00300	-0.016**	-0.059***	0.012*	0.064***	0.091***	-0.375***
VOLA (17)	-0.170***	-0.204***	0.011*	0.038***	-0.125***	0.042***	0.063***	0.184***	-0.387***

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
LEV (10)	1							
MB (11)	-0.048***	1						
ROA (12)	-0.115***	0.034***	1					
TAN (13)	0.297***	-0.110***	0.055***	1				
LIQ (14)	-0.316***	0.023***	-0.119***	-0.319***	1			
AGE (15)	0.059***	-0.044***	0.174***	0.155***	-0.174***	1		
AMIHUD (16)	-0.039***	-0.077***	-0.209***	-0.030***	0.066***	-0.099***	1	
VOLA (17)	-0.021***	-0.050***	-0.430***	-0.067***	0.176***	-0.305***	0.339***	1

4. Empirical results

4.1 Baseline results: impact of corporate culture

The main aim of this study is to empirically analyse the impacts of corporate culture on firms' socially responsible practices. Using a multivariate approach, we estimate the following baseline model.

$$CSR_{i,t} = \beta_0 + \beta_1 * CRE_{i,t} + \beta_2 * CON_{i,t} + \beta_3 * COM_{i,t} + \beta_4 * COL_{i,t} + \beta_5 * Controls_{i,t} + Year\ effects + Industry\ effects + State\ effects + \varepsilon_{i,t} \quad (A2)$$

where the dependent variable CSR is the total scaled scores of both the environmental pillar and social pillars in firm *i* and in year *t*. The independent variables of interest are four corporate culture dimensions relatively emphasized within a given organization. CRE represents the creative firm where an organization places emphasis on creation-oriented culture estimate. CON measures the controlling firm where an organization places emphasis on control-oriented culture. COM measures the competitive firm where an organization places emphasis on competition-oriented culture. COL is the collaborative firm where an organization places emphasis on collaboration-oriented culture. $Controls$ encompasses a vector of time-varying firm characteristics that may affect CSR, including size, leverage, market-to-book ratio, ROA, tangibility, cash flows, liquidity, age, Amihud illiquidity, and stock volatility[12]. All regressions include year effects since CSR might be related to macroeconomic changes, KLD's rating methodology changes, and other variations over the sample time. Industry dummies and State dummies are also included in the model due to unobservable heterogeneity across industries and States in the U.S. Therefore, this model allows us to eliminate bias caused by unobservable

[12] This study also considers a concern that CSR in year t might be affected by firm characteristics in year t-1, so we re-estimate the baseline model by using lagged control variables. The results are generally similar to our main results reported in Table A3-A14.

variables that change over time and vary in industries or States. We further use robust standard errors to obtain unbiased estimates of OLS coefficients under heteroscedasticity.[13] We report the correlation among these variables in Table A2.

We report the main results of baseline regressions in Panel A in Table A3, which shows regressions of corporate culture on total scaled CSR scores. In Models (1 – 4), we regress total CSR scores on create (*CRE*), control (*CON*), compete (*COM*), and collaborate (*COL*), respectively. The coefficient of *CRE* is significantly negative (β = –0.019, p<0.01), which is consistent with *H1a*. We do not find any support for *H2* as the coefficient of *CON* is insignificant. The coefficient of *COM* is significantly negative (β = –0.017, p<0.01), which is also consistent with *H3.* Collaborative culture (*COL*) is also significant and positive (β = 0.010, p<0.05), which is consistent with *H4*.

The economic significance shows that one standard deviation increase in a firm's creative culture (*CRE*) is associated with a 0.95% decrease in its overall CSR performance, which is about 2.09% of the total CSR scores' sample standard deviation and is greater than another cultural emphasis. Our result is not surprising given that the word bag of creative culture contains risk and venture, which is associated with uncertainty. Although organisations that emphasise creative values might pursue risky activities such as CSR, their risk-taking is likely to act blindly and ignore social and environmental uncertainties facing the organisations (Miska *et al.*, 2018). In this regard, Mithani (2017) indicates that a high emphasis on creation-related activities tends to attenuate an organisation's attention to CSR, i.e., it is difficult to take innovation and CSR into consideration simultaneously. Moreover, competitive culture (*COM*) results in a 1.83% reduction, and collaborative culture (*COL*) results in a 1.27% increment in

[13] When robust standard errors are clustered at the firm level, the results are qualitatively consistent with the main results reported in Table A3.

total CSR scores' standard deviation, respectively. These significant relationships support our predictions that corporate culture can strongly affect an organisation's CSR decisions and practices. In Model 5, we include four dimensions of corporate culture simultaneously. The results are similar to Models (1 – 4) except for the coefficient of *CON,* which changes to be significant and negative, consistent with *H2*.

Table A3: Regression of dominant culture on CSR

This table presents the results of the impact of corporate culture and blockholders on scaled CSR. We include Community, Diversity, Employee Relations, Product, and Environment in the CSR index. Each category captures the score of strengths, a score of concerns, and the overall score, which is the net of strength score and concern score. To give the five categories equal weight, the raw strength (concern) scores are scaled by dividing the maximum possible number of strength (concern) indicators for that category in that year *(Scaled-CSR total*). In Panel A, Models (1–4) provide the regression results of each cultural dimension, respectively. CRE, CON, COM, and COL. Model 5 simultaneously includes the four dimensions of CVF culture in regression. In Panel B, we add an interaction term between each cultural dimension and block ownership (*BLOCKHOLD*), namely *CRE*BLOCKHOLD*, *CON*BLOCKHOLD*, *COM*BLOCKHOLD*, and *COL*BLOCKHOLD*, into the baseline regression model. All models include lagged control variables firm size (*SIZE*), leverage (*LEV*), market-to-book ratio (*MB*), *ROA*, tangibility (*TAN*), liquidity (*LIQ*), firm age (AGE), Amihud illiquidity (*AMIHUD*), and volatility (*VOLA*). All variables are defined in the Appendix A. All models control industry (2-digit SIC codes), state, and year effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)
Panel A: Baseline regression of dominant culture on CSR					
CRE	-0.019***				-0.024***
	(0.006)				(0.006)
CON		-0.000			-0.013**
		(0.006)			(0.006)
COM			-0.017***		-0.025***
			(0.006)		(0.007)
COL				0.010*	-0.001
				(0.006)	(0.006)
SIZE	0.082***	0.082***	0.081***	0.082***	0.082***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
LEV	-0.104***	-0.103***	-0.102***	-0.103***	-0.103***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
MB	0.006***	0.006***	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ROA	-0.016	-0.016	-0.013	-0.014	-0.012
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
TAN	-0.048**	-0.053***	-0.058***	-0.053***	-0.052***
	(0.019)	(0.019)	(0.020)	(0.019)	(0.020)
LIQ	-0.003***	-0.004***	-0.004***	-0.004***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
AGE	0.012***	0.013***	0.011**	0.013***	0.012**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
AMIHUD	0.424***	0.430***	0.424***	0.427***	0.418***
	(0.066)	(0.067)	(0.067)	(0.067)	(0.067)
VOLA	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)
Constant	-0.597***	-0.605***	-0.580***	-0.604***	-0.590***
	(0.140)	(0.142)	(0.142)	(0.142)	(0.139)
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	22,267	22,267	22,267	22,267	22,267
R-squared	0.233	0.233	0.233	0.233	0.235
Panel B: Moderation regression of blockholders' impacts on culture-CSR relation					
CRE	-0.038***				-0.043***
	(0.013)				(0.014)
CRE*BLOCKHOLD	0.057*				0.062*
	(0.031)				(0.033)
CON		0.026**			-0.001
		(0.013)			(0.015)
CON*BLOCKHOLD		-0.079**			-0.036
		(0.031)			(0.036)
COM			-0.038***		-0.045***
			(0.013)		(0.016)
COM*BLOCKHOLD			0.064*		0.065
			(0.033)		(0.040)
COL				0.001	-0.015
				(0.013)	(0.014)
COL*BLOCKHOLD				0.029	0.047
				(0.031)	(0.035)
BLOCKHOLD	-0.114***	-0.051***	-0.126***	-0.099***	-0.158***
	(0.022)	(0.020)	(0.027)	(0.020)	(0.054)
SIZE	0.080***	0.080***	0.080***	0.080***	0.080***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
LEV	-0.094***	-0.094***	-0.093***	-0.093***	-0.094***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
MB	0.006***	0.005***	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ROA	-0.019	-0.019	-0.015	-0.017	-0.013
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
TAN	-0.046**	-0.052***	-0.056***	-0.052***	-0.050**
	(0.019)	(0.019)	(0.020)	(0.019)	(0.020)
LIQ	-0.003***	-0.003***	-0.003***	-0.004***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
AGE	0.010**	0.010**	0.009*	0.010**	0.009*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
AMIHUD	0.427***	0.428***	0.426***	0.427***	0.417***
	(0.066)	(0.066)	(0.066)	(0.066)	(0.066)
VOLA	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.569***	-0.602***	-0.554***	-0.584***	-0.521***
	(0.143)	(0.145)	(0.145)	(0.146)	(0.143)
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	22,267	22,267	22,267	22,267	22,267
R-squared	0.234	0.234	0.234	0.234	0.235

To address the concern of endogeneity, we apply the 2SLS IV approach, which requires an instrument for corporate culture: a variable that satisfies the conditions of exogeneity and

relevance. We use the industry-city-year average of corporate culture as our IV.[14, 15] We calculate the within-sample arithmetic means of each of the four types of cultural values by industry and by year. We re-estimate Equation (A2) using this instrument and report the results in Table A4 (we do not report control variables for brevity).[16] Second-stage results are presented in Models (1 – 4), where dependent variables are total CSR scores. Controlling for endogeneity, the 2SLS-IV regression results are generally consistent with our main results of baseline regressions reported in Table A3.

Table A4: 2SLS IV Regression

This table presents the robust results of 2SLS IV Regression for the impacts of culture on overall CSR. We include Community, Diversity, Employee Relations, Product, and Environment in the CSR index. Each category captures the score of strengths, the score of concerns, and the overall score, which is the net of strength score and concern score. To give the five categories equal weight, the raw strength (concern) scores are scaled by dividing the maximum possible number of strength (concern) indicators for that category in that year *(Scaled-CSR total*). We employ the industry-city average value of each dimension of CVF culture as a corresponding instrument. Models 1-4 present the second-stage regression results. In each first-stage regression estimation, the independent variable is one of four CVF cultural dimensions, and the independent variable is the industry-city average of its culture score (i.e., *CRE_SCORE, CON_SCORE, COM_SCORE*, or COL*_SCORE*). We perform standard tests which show that the instruments are valid. The Kleibergen–Paap rk Wald F statistic of weak identification test is reported. Each regression also includes control variables (not reported for brevity), namely firm size (*SIZE*), leverage (*LEV*), market-to-book ratio (*MB*), *ROA*, tangibility (*TAN*), liquidity (*LIQ*), firm age (AGE), Amihud illiquidity (*AMIHUD*), and volatility (*VOLA*). All variables are defined in the Appendix A. All regressions also control industry (2-digit SIC codes), state, and year effects. Robust standard errors are in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity.

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)
Panel A: First-stage results				
CRE_AVG	7.364***			
	(0.115)			
CON_AVG		2.480***		
		(0.077)		
COM_AVG			4.320***	
			(0.072)	
COL_AVG				6.248***
				(0.099)
Panel B: IV Regression for Scaled-CSR total				
CRE	-0.080***			
	(0.016)			

[14] Industry-city-year average value is calculated by averaging its culture score of one cultural dimension within an industry based on 2-digit SIC code in a city.

[15] We also employ Industry-zip-year, which is based on first 3 digits of a 5-digit zip code, as an instrument for corporate culture. We find that the results are qualitatively similar to those of industry-city-year average in Table A4. The results are available upon request.

[16] The Kleibergen-Paap rk Wald F statistics in all 2SLS IV regressions is above the 10% critical value of the Stock and Yogo (2005) test, which rejects the null hypothesis of weak relevance of the excluded instrument.

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)
CON		0.061**		
		(0.028)		
COM			-0.027*	
			(0.016)	
COL				0.045***
				(0.015)
Control variables	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES
State effects	YES	YES	YES	YES
Year effects	YES	YES	YES	YES
Observations	22,264	22,264	22,264	22,264
Weak Identification	4105.431	1037.586	3634.215	3975.019

4.2 Moderating role of blockholders

In this section, we investigate whether blockholders, an important part of the predominant governance mechanisms in organisations, are a channel through which corporate culture influences firms' CSR. Prior literature suggests that block ownership matters for monitoring (Konijn *et al.*, 2011; Edmans, 2014; Basu *et al.*, 2016; Mangena *et al.*, 2020) and further impacts firms' decision-making (Clifford and Lindsey, 2016; Alvarez *et al.*, 2018). Thus, we include the size of block ownership measured by the percent of shares controlled by blockholders in our moderation regressions.

In Table A3, Panel B reports the regression results for the moderating effects of blockholders estimated using the following regression model.

$$\begin{aligned} CSR_{i,t} = {} & \beta_0 + \beta_1 * CRE_{i,t} + \beta_2 BLOCKHOLD_{i,t} * CRE_{i,t} + \beta_3 * CON_{i,t} \\ & + \beta_4 BLOCKHOLD_{i,t} * CON_{i,t} + \beta_5 * COM_{it} + \beta_6 BLOCKHOLD_{i,t} * COM_{i,t} \\ & + \beta_7 * COL_{i,t} + \beta_8 BLOCKHOLD_{it} * COL_{i,t} + \beta_9 BLOCKHOLD_{i,t} \\ & + \beta_{10} Controls_{i,t} + Year\ effects + Industry\ effects \\ & + State\ effects + \varepsilon_{i,t} \end{aligned} \quad (A3)$$

where the proxy $BLOCKHOLD$ represents the size of blockholders' ownership. The interaction terms of four dimensions of corporate culture (i.e., CRE, CON, COM, and COL) with $BLOCKHOLD$ capture the impacts of corporate culture on CSR, depending on blockholders. We interpret an interaction term of an opposite sign to the corresponding coefficient of culture

in the main effect (in Models 1 – 5) as indicating a negative effect of blockholders, i.e., block ownership weakens the impact of the cultural value. In contrast, an interaction term's same sign to the coefficient of culture is interpreted as a positive effect of blockholders, i.e., block ownership strengthens the impact of that cultural value. In the moderation analysis, the total effects of corporate culture on CSR are estimated by both coefficients of interaction term and the coefficient of cultural intensity.

We start our analyses of moderating effects by examining the role of blockholders in the culture-CSR relationship (see Table A3, Models 1 – 5 in Panel B). As predicted, we find that blockholders exert significant moderation effects that attenuate the impacts of corporate culture on CSR, including overall CSR. In relation to aggregated CSR scores, the results of four cultural variables in Panel B are similar to those in Panel A. In Panel B, Model (1) shows that *CRE*BLOCKHOLD* is significant and positive (β = 0.057, p<0.10), suggesting its negative influence is lessened if the firm has large blockholders. The coefficient of the interaction term is larger in magnitude and opposite in sign to that of *CRE*. This implies that for a firm with large blockholders, the negative impact of *CRE* is decreased and even enough to be offset. In Model (2), the moderating effect is different in firms with stronger controlling culture as *CON*BLOCKHOLD* is negative and significant (β = –0.079, p<0.05), while the standalone coefficient of *CON* is positive and significant (β = 0.026, p<0.05). This is consistent with *H5.2a.* When we examine the competitive cultures in Model (3), the interaction term between *COM* and *COM*BLOCKHOLD* is significant and positive, suggesting the negative impact of competitive culture weakens when blockholders' ownership increases consistent with *H5.3a*. In Model (4), the interaction term shows an insignificantly positive moderating effect on collaborative value – overall CSR relationship. In Model (5), we include all the variables in the same regression. While most of the moderating effects of blockholders disappear, the

moderating role of *CRE*BLOCKHOLD* remains the same. Overall, creation- and competition-oriented firms tend to be socially responsible in the presence of blockholders.

4.3 CSR strengths and concerns

The overall CSR level of an organisation obtained from net KLD score measures assumes that each strength and concern has equal importance. However, it is difficult to hold this assumption in reality (Gloßner, 2019). Therefore, in this section, we separately analyse the relevance of cultural impacts to CSR strengths and CSR concerns. Panel A of Table A5, Models (1 – 4), depicts the regression results for the relationship of scaled scores of CSR strengths with four cultural dimensions. The significant positive coefficients of both control-intensive (*CON*) and collaboration-intensive (*COL*) cultures show their support for a firm's CSR through managing environmental and social risks or opportunities. The competitive (*COM*) cultures still perform negatively in improving CSR strengths, though the effect of creative (*CRE*) culture is insignificant. In Model (5), when we include four cultural variables simultaneously, the coefficient of COM remains negative and significant, and the negative coefficient of CRE culture becomes significant, while the significantly positive effects of both CON and COL disappear.

In Models (6 – 10), the moderating effects of blockholders are stronger than those in Table A3, especially for the interaction of controlling culture. Interestingly, *CON*BLOCKHOLD* in Model (7) is significant and negative, which suggests that the effect of larger block ownership attenuates the positive effect of the relative emphasis on controlling values on CSR strengths. *COM*BLOCKHOLD* in Model (8) is significant and positive, which is opposite in sign to the main effect of COM, implying that the effect of larger block ownership weakens the negative effect of the relative emphasis on competitive values on CSR strengths.

In Panel B, we report the different impacts of corporate culture on CSR concerns. The results in Models (1 – 4) show that competitive culture (*COM*) and collaborative culture (*COL*) have a negative relationship with CSR concerns; however, the coefficients of the other two cultural dimensions are significantly positive. The results suggest that only firms with a relatively high emphasis on competitive culture or collaborative culture perform well in circumventing environmental and social controversies. Combined with the results in Table A3, it shows that the negative impact of competition-intensive culture on aggregated CSR scores is the result of neglecting CSR activities in improving strengths; however, the negative effect of creation-intensive culture on aggregated CSR scores is caused by ignoring CSR strengths and aggravating CSR controversies. This might be the reason why a high emphasis on creative values exerts a stronger negative influence on overall CSR performance. A controlled culture that focuses on stability leads firms to pay attention to CSR strengths and has no negative impact on overall CSR performance, albeit it does not motivate firms to avoid controversies. Only the high intensity of collaborative culture achieves improvement in both CSR strengths and CSR concerns in firms. When we incorporate all cultural dimensions in a single model, the effect of *COM* disappears, but the effect of other cultural dimensions remains the same.

The results in Models (6 – 10) show that while the coefficient of CRE in Model (6) and CON in Model (7) continue to be significantly positive, their interactions with block ownership are significantly negative, suggesting that their positive relationships with CSR concerns are weakened if the firm has larger block ownership. The coefficients of COM remain significant and negative (Model 8), but the coefficient of its corresponding interaction term is significant and positive, suggesting that large block ownership lessens the negative effects of a firm's relative emphasis on competitive culture.

Table A5*:* Regression of dominant culture on CSR strengths and concerns

This table presents the results for the impact of corporate culture and blockholders on *Scaled-CSR strengths* in Panel A and *Scaled-CSR concerns* in Panel B. We include Community, Diversity, Employee Relations, Product, and Environment in the CSR index. Each category captures the score of strengths, the score of concerns, and the overall score, which is the net of strength score and concern score. To give the five categories equal weight, the raw strength (concern) scores are scaled by dividing the maximum possible number of strength (concern) indicators for that category in that year *(Scaled-CSR total*). *Scaled-CSR strengths* and *Scaled-CSR concerns* include strengths and concerns, respectively. Models 1–4 provide the regression results of each cultural dimension, respectively. CRE, CON, COM and COL. Model 5 simultaneously includes the four dimensions of CVF culture in regression. In Models (6-10), we include an interaction term between each cultural dimension and block ownership (*BLOCKHOLD*), namely *CRE*BLOCKHOLD*, *CON*BLOCKHOLD*, *COM*BLOCKHOLD*, and *COL*BLOCKHOLD*, as an explanatory variable. All models include control variables firm size (*SIZE*), leverage (*LEV*), market-to-book ratio (*MB*), *ROA*, tangibility (*TAN*), liquidity (*LIQ*), firm age (AGE), Amihud illiquidity (*AMIHUD*), and volatility (*VOLA*). All variables are defined in the Appendix A. All models control industry (2-digit SIC codes), state, and year effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)	Model 6 (Create)	Model 7 (Control)	Model 8 (Compete)	Model 9 (Collaborate)	Model 10 (All)
Panel A: Regression of dominant culture on Scaled-CSR strengths										
CRE	-0.005				-0.008*	0.010				0.007
	(0.004)				(0.004)	(0.010)				(0.010)
CRE*BLOCKHOLD						-0.038*				-0.037
						(0.022)				(0.024)
CON		0.009**			-0.004		0.047***			0.021*
		(0.004)			(0.005)		(0.009)			(0.011)
CON*BLOCKHOLD							-0.115***			-0.072***
							(0.023)			(0.026)
COM			-0.029***		-0.032***			-0.072***		-0.065***
			(0.004)		(0.005)			(0.010)		(0.012)
COM*BLOCKHOLD								0.131***		0.105***
								(0.023)		(0.029)
COL				0.009**	-0.001				0.001	-0.011
				(0.004)	(0.005)				(0.009)	(0.011)
COL*BLOCKHOLD									0.023	0.034
									(0.022)	(0.025)
BLOCKHOLD						-0.104***	-0.070***	-0.203***	-0.133***	-0.149***
						(0.015)	(0.014)	(0.019)	(0.015)	(0.039)
SIZE	0.147***	0.147***	0.146***	0.147***	0.146***	0.145***	0.144***	0.144***	0.145***	0.144***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)	Model 6 (Create)	Model 7 (Control)	Model 8 (Compete)	Model 9 (Collaborate)	Model 10 (All)
LEV	-0.197***	-0.196***	-0.195***	-0.197***	-0.195***	-0.183***	-0.183***	-0.182***	-0.183***	-0.182***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
MB	0.006***	0.006***	0.006***	0.006***	0.006***	0.005***	0.005***	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ROA	-0.099***	-0.099***	-0.093***	-0.097***	-0.093***	-0.102***	-0.102***	-0.096***	-0.100***	-0.094***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
TAN	0.006	0.004	-0.003	0.004	-0.001	0.008	0.006	0.000	0.007	0.001
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
LIQ	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
AGE	0.040***	0.039***	0.038***	0.040***	0.038***	0.036***	0.035***	0.034***	0.036***	0.034***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
AMIHUD	0.926***	0.926***	0.918***	0.926***	0.916***	0.928***	0.923***	0.921***	0.926***	0.914***
	(0.047)	(0.047)	(0.047)	(0.047)	(0.046)	(0.046)	(0.046)	(0.046)	(0.046)	(0.046)
VOLA	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.828***	-0.830***	-0.788***	-0.828***	-0.781***	-0.814***	-0.827***	-0.744***	-0.803***	-0.759***
	(0.069)	(0.069)	(0.069)	(0.070)	(0.069)	(0.071)	(0.069)	(0.070)	(0.071)	(0.071)
Industry effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267
R-squared	0.374	0.374	0.375	0.374	0.375	0.377	0.377	0.379	0.377	0.379
Panel B: Regression of dominant culture on Scaled-CSR concerns										
CRE	0.015***				0.016***	0.043***				0.045***
	(0.004)				(0.004)	(0.009)				(0.009)
CRE*BLOCKHOLD						-0.083***				-0.085***
						(0.022)				(0.023)
CON		0.011***			0.011**		0.024***			0.024**
		(0.004)			(0.005)		(0.009)			(0.010)
CON*BLOCKHOLD							-0.040*			-0.037
							(0.022)			(0.026)
COM			-0.012***		-0.007			-0.032***		-0.019*
			(0.004)		(0.005)			(0.009)		(0.011)

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)	Model 6 (Create)	Model 7 (Control)	Model 8 (Compete)	Model 9 (Collaborate)	Model 10 (All)
COM*BLOCKHOLD								0.061***		0.038
								(0.023)		(0.028)
COL				-0.004	-0.002				-0.006	-0.002
				(0.004)	(0.005)				(0.009)	(0.010)
COL*BLOCKHOLD									0.006	-0.000
									(0.022)	(0.025)
BLOCKHOLD						0.003	-0.017	-0.074***	-0.039***	-0.001
						(0.015)	(0.015)	(0.019)	(0.015)	(0.037)
SIZE	0.064***	0.063***	0.064***	0.064***	0.063***	0.063***	0.063***	0.063***	0.063***	0.062***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
LEV	-0.091***	-0.091***	-0.091***	-0.092***	-0.090***	-0.087***	-0.087***	-0.088***	-0.088***	-0.086***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
MB	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.079***	-0.079***	-0.077***	-0.080***	-0.078***	-0.080***	-0.080***	-0.077***	-0.081***	-0.078***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
TAN	0.053***	0.056***	0.054***	0.057***	0.050***	0.053***	0.057***	0.055***	0.058***	0.051***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
LIQ	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
AGE	0.026***	0.025***	0.025***	0.026***	0.025***	0.025***	0.024***	0.024***	0.025***	0.024***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
AMIHUD	0.494***	0.487***	0.486***	0.491***	0.491***	0.493***	0.486***	0.487***	0.491***	0.488***
	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)
VOLA	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.217*	-0.212*	-0.194*	-0.211*	-0.209*	-0.228**	-0.212*	-0.178	-0.204*	-0.221**
	(0.112)	(0.113)	(0.113)	(0.113)	(0.111)	(0.109)	(0.112)	(0.112)	(0.112)	(0.110)
Industry effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267
R-squared	0.290	0.290	0.290	0.289	0.290	0.291	0.290	0.290	0.290	0.291

4.4 CSR components

In this section, we examine the impact of culture and blockholders on five components of CSR, which are Community, Diversity, Employee Relations, Product, and Environment, to investigate how cultural dimensions impact CSR components. To conserve space, we suppress all control variables and report the coefficient estimates of our test variables, cultural dimensions, and blockholders in Table A6. In Panel A, only the estimates on *CRE* in *Community and Environment* regressions (Models 1 and 5) are significantly negative, indicating that creative cultures reduce CSR through community and environmental issues. The interaction variables for blockholders (*CRE*BLOCKHOLD*) are positive and significant in *Community* and *Environment* regressions. The results for controlling cultures (*CON*) change to be insignificant when we have a component analysis of CSR. However, for competitive cultures (*COM*), the results are negative in *Diversity* (Model 2) and positive in *Employee Relations* (Model 3), while the interacting variable (*COM*BLOCKHOLD*) is positive and significant in Model (2). For collaborative cultures, the positive coefficient of *COL* suggests that collaborative firms are more likely to place emphasis on employee relations. However, the pronounced and negative impact of *COL* in the *Community* and *Environmental* pillars of CSR indicates that collaborative firms may not pay much attention to the community and environment.

Panels B and C present estimates related to the strengths and concerns of each of the five constituent areas of the CSR index, respectively. For creative firms, the significant and positive coefficients of *CRE* of both *Employee Relations* strengths (Model 3 in Panel B) and concerns (Model 3 in Panel C) suggest that they attempt to improve employee welfare, though they ignore the controversies. Also, *CRE* is significantly and positively related to *Community* and *Environmental* issues (Models 1 and 5 in Panel C). However, the interaction terms (*CRE*BLOCKHOLD*) in regressions of both pillars are significant and negative in Panel C,

indicating that the existence of blockholders reduces the concerns. In organisations with controlling values, the coefficients of *Diversity* (Model 2) and *Environment* (Model 5) strengths are positive. The interaction variable of blockholders (*CON*BLOCKHOLD*) in *Diversity* strengths regression is negative, which weakens the positive effects of the controlling culture. The regression result of *Environment* concerns displays a positive standalone coefficient of *CON* and a negative coefficient of *CON*BLOCKHOLD* in Panel C. Conversely, the negative regression results of strengths in Panel B suggest that firms with *COM* or *COL* are less likely to pay attention to CSR strengths. Especially, the coefficient of *COM* estimate is significantly negative in each CSR component strength except for *Employee Relations* (Model 3). However, the negative results of concerns for competitive cultures, *COM*, in Models (1) and (3 – 5) also suggest that competitive firms tend to improve CSR by eliminating concerns. In Model (2), *COM* is positively related to *Diversity* concerns. The opposite coefficients of the interaction variable (*COM*BLOCKHOLD*) to the standalone coefficients of *COM* in Panels B and C indicate that the positive or negative effects of *COM* are possibly offset against blockholders, which is similar to the results of *COL*.

Table A6: Regression of dominant culture on CSR components

This table presents the results of the impact of corporate culture and blockholders on CSR components. Panel A-C demonstrates the results of regressions on *CSR* components *total*, *CSR strengths* components, and *CSR concerns* components, respectively. We include Community, Diversity, Employee Relations, Product, and Environment in the CSR index. We have each cultural dimension named *CRE*, *CON*, *COM* and *COL.* The models also include an interaction term between each cultural dimension and block ownership (*BLOCKHOLD*), namely *CRE*BLOCKHOLD*, *CON*BLOCKHOLD*, *COM*BLOCKHOLD*, and *COL*BLOCKHOLD*, as an explanatory variable. All models include control variables (not reported for brevity) firm size (*SIZE*), leverage (*LEV*), market-to-book ratio (*MB*), *ROA*, tangibility (*TAN),* liquidity (*LIQ*), firm age (AGE), Amihud illiquidity (*AMIHUD*), and volatility (*VOLA*). All variables are defined in the Appendix A. All models control industry (2-digit SIC codes), state, and year effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Community	Diversity	Employee Relations	Product	Environment
	Model 1	Model 2	Model 3	Model 4	Model 5
Panel A: The impact of blockholders and corporate culture on CSR components					
CRE	-0.014***	0.001	-0.001	-0.004	-0.017***
	(0.005)	(0.007)	(0.005)	(0.004)	(0.004)
CRE*BLOCKHOLD	0.022*	0.011	-0.006	-0.003	0.022***

	Community	Diversity	Employee Relations	Product	Environment
	Model 1	Model 2	Model 3	Model 4	Model 5
	(0.011)	(0.019)	(0.011)	(0.010)	(0.009)
CON	0.002	0.001	0.002	-0.005	0.001
	(0.005)	(0.008)	(0.005)	(0.004)	(0.004)
CON*BLOCKHOLD	-0.004	-0.018	-0.014	-0.002	-0.005
	(0.012)	(0.021)	(0.012)	(0.011)	(0.009)
COM	-0.005	-0.051***	0.011**	-0.004	0.002
	(0.006)	(0.008)	(0.005)	(0.005)	(0.004)
COM*BLOCKHOLD	-0.002	0.085***	-0.019	0.004	-0.002
	(0.013)	(0.023)	(0.013)	(0.012)	(0.010)
COL	-0.016***	-0.001	0.012**	-0.005	-0.007*
	(0.005)	(0.008)	(0.005)	(0.004)	(0.004)
COL*BLOCKHOLD	0.026**	0.005	-0.018	0.008	0.029***
	(0.012)	(0.020)	(0.012)	(0.010)	(0.009)
BLOCKHOLD	-0.039**	-0.090***	0.020	0.001	-0.045***
	(0.018)	(0.031)	(0.018)	(0.016)	(0.013)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	22,267	22,267	22,267	22,267	22,267
R-squared	0.102	0.323	0.176	0.152	0.194
Panel B: The impact of blockholders and corporate culture on CSR strengths components					
CRE	0.004	-0.006	0.007**	-0.001	-0.001
	(0.004)	(0.004)	(0.003)	(0.002)	(0.003)
CRE*BLOCKHOLD	-0.017*	0.002	-0.020***	-0.002	0.004
	(0.010)	(0.011)	(0.007)	(0.006)	(0.007)
CON	0.004	0.011**	0.001	-0.001	0.006*
	(0.005)	(0.005)	(0.004)	(0.003)	(0.003)
CON*BLOCKHOLD	-0.007	-0.040***	-0.008	-0.010	-0.013
	(0.010)	(0.012)	(0.008)	(0.006)	(0.008)
COM	-0.022***	-0.022***	-0.002	-0.008***	-0.011***
	(0.005)	(0.005)	(0.004)	(0.003)	(0.004)
COM*BLOCKHOLD	0.030**	0.036***	0.003	0.009	0.024***
	(0.012)	(0.013)	(0.009)	(0.007)	(0.009)
COL	-0.010**	-0.006	0.004	-0.001	-0.002
	(0.005)	(0.004)	(0.003)	(0.002)	(0.003)
COL*BLOCKHOLD	0.019*	0.011	-0.004	0.004	0.012*
	(0.010)	(0.011)	(0.008)	(0.006)	(0.007)
BLOCKHOLD	-0.043***	-0.039**	-0.016	-0.013	-0.042***
	(0.016)	(0.018)	(0.012)	(0.009)	(0.011)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	22,267	21,008	22,267	22,267	22,267
R-squared	0.180	0.238	0.225	0.107	0.300
Panel C: The impact of blockholders and corporate culture on CSR concerns components					
CRE	0.023***	-0.005	0.008**	0.004	0.014***
	(0.004)	(0.005)	(0.003)	(0.003)	(0.002)
CRE*BLOCKHOLD	-0.049***	-0.009	-0.012	0.001	-0.015***
	(0.009)	(0.015)	(0.009)	(0.008)	(0.005)
CON	0.003	0.009	-0.001	0.004	0.007***

	Community	Diversity	Employee Relations	Product	Environment
	Model 1	Model 2	Model 3	Model 4	Model 5
	(0.004)	(0.006)	(0.004)	(0.004)	(0.002)
CON*BLOCKHOLD	-0.003	-0.018	0.005	-0.007	-0.010*
	(0.009)	(0.016)	(0.009)	(0.009)	(0.006)
COM	-0.023***	0.030***	-0.014***	-0.004	-0.013***
	(0.005)	(0.006)	(0.004)	(0.004)	(0.003)
COM*BLOCKHOLD	0.041***	-0.050***	0.023**	0.004	0.027***
	(0.010)	(0.017)	(0.010)	(0.010)	(0.006)
COL	0.006	-0.005	-0.009**	0.005	0.004*
	(0.004)	(0.006)	(0.004)	(0.004)	(0.002)
COL*BLOCKHOLD	-0.006	0.007	0.016*	-0.005	-0.014***
	(0.009)	(0.016)	(0.009)	(0.009)	(0.006)
BLOCKHOLD	-0.006	0.052**	-0.038***	-0.013	0.002
	(0.014)	(0.023)	(0.014)	(0.013)	(0.008)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	22,267	22,267	22,267	22,267	22,267
R-squared	0.181	0.319	0.236	0.275	0.359

4.5 Robustness checks

From the baseline regressions, we show that different dimensions of corporate culture moderated by blockholders have different effects on a firm's CSR. However, potential endogeneity may bias our results. We attempt to employ several approaches to check the robustness of our results and to further mitigate the endogeneity concerns. One concern of our empirical analysis is that endogeneity of the firm dimension of culture and unobservable firm, industry, and State characteristics may drive our OLS results to be biased. A further concern is the possibility that our results are driven by potential reverse causality between corporate culture and company-level variables. To alleviate these concerns, we employ several robustness checks, including matching methods, lead-lag specification approach, and alternative measures of corporate culture, blockholders, and CSR.

Table A7: Entropy balancing co-variates

This table reports a comparison of the mean, variance, and skewness of the variables between the treated and control groups.

Covariate balance						
Before: Without weighting						
	High CSR			Low CSR		
	Mean	Variance	Skewness	Mean	Variance	Skewness
SIZE	7.275	2.447	0.2625	6.981	2.529	0.3539
LEV	0.2168	0.03829	0.964	0.2255	0.04254	0.9057
MB	3.609	23.38	2.369	3.048	18.47	2.34
ROA	0.02541	0.01927	-2.777	0.01316	0.0221	-2.789
TAN	0.2513	0.04966	1.174	0.2849	0.06023	0.9298
LIQ	2.572	4.454	2.681	2.669	5.127	2.426
AGE	2.805	0.7506	-0.352	2.722	0.827	-0.2646
AMIHUD	0.01175	0.001402	5.862	0.01764	0.002126	4.515
VOLA	41.65	402.9	1.459	46	448.8	1.269
After: With weighting						
	High CSR			Low CSR		
	Mean	Variance	Skewness	Mean	Variance	Skewness
SIZE	7.275	2.447	0.2625	7.274	2.448	0.2624
LEV	0.2168	0.03829	0.964	0.2169	0.03831	0.9641
MB	3.609	23.38	2.369	3.608	23.38	2.369
ROA	0.02541	0.01927	-2.777	0.02537	0.01929	-2.777
TAN	0.2513	0.04966	1.174	0.2514	0.0497	1.174
LIQ	2.572	4.454	2.681	2.572	4.456	2.68
AGE	2.805	0.7506	-0.352	2.805	0.7508	-0.3519
AMIHUD	0.01175	0.001402	5.862	0.01178	0.001406	5.853
VOLA	41.65	402.9	1.459	41.67	403.2	1.458

Table A8: Regression of dominant culture on CSR based on the entropy balanced sample

This table presents the results for the impact of corporate culture and blockholders on *Scaled-CSR total* in Panel A, *Scaled-CSR strengths* in Panel B, and *Scaled-CSR concerns* in Panel C. We include Community, Diversity, Employee Relations, Product, and Environment in the CSR index. Each category captures the score of strengths, the score of concerns, and the overall score, which is the net of strength score and concern score. To give the five categories equal weight, the raw strength (concern) scores are scaled by dividing the maximum possible number of strength (concern) indicators for that category in that year *(Scaled-CSR total*). *Scaled-CSR strengths* and *Scaled-CSR concerns* include strengths and concerns*,* respectively. Models 1–4 provide the regression results of each cultural dimension, respectively. CRE, CON, COM and COL. Model 5 simultaneously includes the four dimensions of CVF culture in regression. In Models (6-10), we include an interaction term between each cultural dimension and block ownership (*BLOCKHOLD*), namely *CRE*BLOCKHOLD*, *CON*BLOCKHOLD*, *COM*BLOCKHOLD*, and *COL*BLOCKHOLD*, as an explanatory variable. All models include control variables firm size (*SIZE*), leverage (*LEV*), market-to-book ratio (*MB*), *ROA*, tangibility (*TAN*), liquidity (*LIQ*), firm age (AGE), Amihud illiquidity (*AMIHUD*), and volatility (*VOLA*). All variables are defined in the Appendix A. All models control industry (2-digit SIC codes), state, and year effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)	Model 6 (Create)	Model 7 (Control)	Model 8 (Compete)	Model 9 (Collaborate)	Model 10 (All)
Panel A: Regression of dominant culture on Scaled-CSR total										
CRE	-0.016***				-0.020***	-0.028**				-0.034**
	(0.006)				(0.007)	(0.014)				(0.015)
CRE*BLOCKHOLD						0.039				0.046
						(0.034)				(0.037)
CON		-0.002			-0.014**		0.019			-0.005
		(0.006)			(0.007)		(0.014)			(0.016)
CON*BLOCKHOLD							-0.066*			-0.026
							(0.034)			(0.039)
COM			-0.015**		-0.023***			-0.033**		-0.041**
			(0.007)		(0.008)			(0.015)		(0.018)
COM*BLOCKHOLD								0.055		0.061
								(0.036)		(0.044)
COL				0.008	-0.002				-0.006	-0.020
				(0.006)	(0.007)				(0.014)	(0.016)
COL*BLOCKHOLD									0.042	0.058
									(0.034)	(0.039)
BLOCKHOLD						-0.092***	-0.044**	-0.108***	-0.092***	-0.144**
						(0.024)	(0.022)	(0.030)	(0.022)	(0.060)
Constant	-0.579***	-0.584***	-0.564***	-0.584***	-0.545***	-0.559***	-0.584***	-0.543***	-0.565***	-0.514***
	(0.146)	(0.148)	(0.148)	(0.148)	(0.146)	(0.150)	(0.151)	(0.151)	(0.152)	(0.150)

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)	Model 6 (Create)	Model 7 (Control)	Model 8 (Compete)	Model 9 (Collaborate)	Model 10 (All)
Controls	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267
R-squared	0.178	0.178	0.178	0.178	0.178	0.179	0.179	0.179	0.179	0.179
Panel B: Regression of dominant culture on Scaled-CSR strengths										
CRE	-0.004				-0.007	0.013				0.009
	(0.004)				(0.005)	(0.010)				(0.011)
CRE*BLOCKHOLD						-0.049**				-0.044*
						(0.023)				(0.025)
CON		0.008*			-0.005		0.044***			0.018
		(0.004)			(0.005)		(0.010)			(0.011)
CON*BLOCKHOLD							-0.112***			-0.066**
							(0.023)			(0.027)
COM			-0.027***		-0.029***			-0.071***		-0.065***
			(0.005)		(0.006)			(0.010)		(0.012)
COM*BLOCKHOLD								0.135***		0.111***
								(0.024)		(0.030)
COL				0.008*	-0.001				-0.002	-0.013
				(0.004)	(0.005)				(0.010)	(0.011)
COL*BLOCKHOLD									0.030	0.041
									(0.023)	(0.026)
BLOCKHOLD						-0.084***	-0.055***	-0.191***	-0.120***	-0.139***
						(0.016)	(0.014)	(0.020)	(0.015)	(0.040)
Constant	-0.811***	-0.813***	-0.776***	-0.811***	-0.769***	-0.801***	-0.815***	-0.737***	-0.789***	-0.751***
	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)	(0.072)	(0.071)	(0.071)	(0.072)	(0.072)
Controls	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267
R-squared	0.342	0.342	0.343	0.342	0.343	0.344	0.345	0.346	0.344	0.347

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)	Model 6 (Create)	Model 7 (Control)	Model 8 (Compete)	Model 9 (Collaborate)	Model 10 (All)
Panel C: Regression of dominant culture on Scaled-CSR concerns										
CRE	0.012***				0.013***	0.036***				0.037***
	(0.004)				(0.005)	(0.010)				(0.011)
CRE*BLOCKHOLD						-0.070***				-0.071***
						(0.025)				(0.026)
CON		0.012***			0.011**		0.027***			0.024**
		(0.004)			(0.005)		(0.010)			(0.012)
CON*BLOCKHOLD							-0.047*			-0.038
							(0.025)			(0.029)
COM			-0.011**		-0.006			-0.034***		-0.022*
			(0.005)		(0.006)			(0.010)		(0.013)
COM*BLOCKHOLD								0.072***		0.049
								(0.026)		(0.032)
COL				-0.004	-0.003				-0.003	-0.001
				(0.005)	(0.005)				(0.010)	(0.011)
COL*BLOCKHOLD									-0.003	-0.005
									(0.025)	(0.028)
BLOCKHOLD						-0.002	-0.012	-0.079***	-0.034**	-0.011
						(0.018)	(0.017)	(0.022)	(0.016)	(0.043)
Constant	-0.207*	-0.203*	-0.188	-0.203*	-0.201*	-0.214*	-0.206*	-0.171	-0.197*	-0.208*
	(0.118)	(0.119)	(0.119)	(0.119)	(0.118)	(0.116)	(0.118)	(0.119)	(0.118)	(0.117)
Controls	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267	22,267
R-squared	0.306	0.306	0.305	0.305	0.306	0.306	0.306	0.306	0.306	0.307

4.5.1 Matching

We first construct two matching samples using two types of procedures: entropy-balanced and propensity score matching. Specifically, we split company-year observations into treatment (high CSR) and control (low CSR) groups based on the median CSR. Entropy balancing reweights observations in the control sample such that the mean, variance, and skewness of all covariates are balanced across the treatment and control groups (Hainmueller, 2012). We balance all covariates in the control sample in the first three moments and present the reweighted descriptive statistics in Table A7. The matching procedure results in almost identical distributions for the matching variables in the treatment and control groups. We replicate the main regressions and present results in Table A8. Our inferences almost remain unchanged, especially regarding the dominant role of corporate culture in and monitoring effects of blockholders on CSR strengths and CSR concerns, respectively.

We also employ propensity score matching to identify low CSR companies that are as similar as possible to the high CSR companies. We select the nearest neighbour based on controlled company-level characteristics: firm size (SIZE), leverage (LEV), market-to-book ratio (MB), ROA, tangibility (TAN), liquidity (LIQ), firm age (AGE), Amihud illiquidity (AMIHUD), and volatility (VOLA). In Table A9, we show that no significant differences are remaining in the company characteristics between the treatment and control groups. We then re-estimate the regressions using the propensity score matching sample and report the results in Table A10. Similar to the results of the entropy-balanced sample, different culture has different but sound impacts on CSR, and blockholders effectively moderate these positive or negative cultural impacts on CSR strengths and concerns, which is generally consistent with our main analyses based on Tables A3 and A5.

Table A9: Propensity Score Matching Co-variates

This table shows the result of the balancing test for treatments and the control group. Panel A describes statistics for the variables matching firm characteristics, and Panel B presents statistics for other key variables, including four cultural values and block ownership. The last column reports the p-value of the difference-in-means.

	Unmatched	Mean		% bias	% reduction	t stats	p > t
	Matched	High CSR	Low CSR		in bias		
Panel A: Matching Characteristics							
SIZE	U	7.275	6.9814	18.6		14.98	0.000
	M	7.0332	7.046	-0.8	95.6	-0.57	0.569
LEV	U	0.21685	0.22547	-4.3		-3.46	0.001
	M	0.21927	0.2188	0.2	94.6	0.16	0.873
ROA	U	0.0254	0.01317	8.5		6.86	0.000
	M	0.01579	0.01601	-0.2	98.2	-0.1	0.917
MB	U	3.6094	3.0495	12.2		9.77	0.000
	M	3.1773	3.217	-0.9	92.9	-0.63	0.530
TAN	U	0.25119	0.28492	-14.4		-11.64	0.000
	M	0.26897	0.26538	1.5	89.4	1.06	0.289
LIQ	U	2.5713	2.6693	-4.5		-3.61	0.000
	M	2.6642	2.6788	-0.7	85	-0.46	0.647
AGE	U	2.8055	2.7227	9.3		7.52	0.000
	M	2.7355	2.7464	-1.2	86.8	-0.86	0.391
AMIHUD	U	0.01175	0.01764	-14		-11.4	0.000
	M	0.0152	0.01509	0.3	98.2	0.18	0.858
VOL	U	41.653	45.997	-21		-16.97	0.000
	M	44.835	44.625	1	95.2	0.71	0.480
Panel B: Other Characteristics							
CRE	U	0.47537	0.50067	-5.1		-3.75	0.000
	M	0.47981	0.49784	-3.6	28.8	-2.3	0.022
CON	U	0.51297	0.49564	3.5		2.57	0.010
	M	0.48914	0.5008	-2.3	32.7	-1.49	0.137
COM	U	0.60311	0.61425	-2.3		-1.69	0.091
	M	0.60412	0.62066	-3.4	-48.4	-2.16	0.031
COL	U	0.35896	0.37927	-4.2		-3.12	0.002
	M	0.38115	0.37378	1.5	63.7	0.97	0.333
BLOCKHOLD	U	0.33126	0.34358	-6.5		-5.25	0.000
	M	0.33579	0.34191	-3.2	50.4	-2.24	0.025
N		9,618	9,618				

Table A10: Regression of dominant culture on CSR based on the PS matching samples

This table presents the results for the impact of corporate culture and blockholders on *Scaled-CSR total* in Panel A, *Scaled-CSR strengths* in Panel B, and *Scaled-CSR concerns* in Panel C. We include Community, Diversity, Employee Relations, Product, and Environment in the CSR index. Each category captures the score of strengths, a score of concerns, and the overall score, which is the net of strength score and concern score. To give the five categories equal weight, the raw strength (concern) scores are scaled by dividing the maximum possible number of strength (concern) indicators for that category in that year *(Scaled-CSR total*). *Scaled-CSR strengths* and *Scaled-CSR concerns* include strengths and concerns*,* respectively. Models 1–4 provide the regression results of each cultural dimension, respectively. CRE, CON, COM and COL. Model 5 simultaneously includes the four dimensions of CVF culture in regression. In Models (6-10), we include an interaction term between each cultural dimension and block ownership (*BLOCKHOLD*), namely *CRE*BLOCKHOLD*, *CON*BLOCKHOLD*, *COM*BLOCKHOLD*, and *COL*BLOCKHOLD*, as an explanatory variable. All models include control variables firm size (*SIZE*), leverage (*LEV*), market-to-book ratio (*MB*), *ROA*, tangibility (*TAN*), liquidity (*LIQ*), firm age (AGE), Amihud illiquidity (*AMIHUD*), and volatility (*VOLA*). All variables are defined in the Appendix A. All models control industry (2-digit SIC codes), state, and year effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)	Model 6 (Create)	Model 7 (Control)	Model 8 (Compete)	Model 9 (Collaborate)	Model 10 (All)
Panel A: Regression of dominant culture on Scaled-CSR total										
CRE	-0.020***				-0.026***	-0.039***				-0.043***
	(0.007)				(0.007)	(0.014)				(0.015)
CRE*BLOCKHOLD						0.057				0.053
						(0.035)				(0.038)
CON		-0.006			-0.022***		0.019			-0.007
		(0.007)			(0.007)		(0.014)			(0.017)
CON*BLOCKHOLD							-0.073**			-0.045
							(0.036)			(0.041)
COM			-0.023***		-0.033***			-0.038**		-0.044**
			(0.007)		(0.008)			(0.015)		(0.018)
COM*BLOCKHOLD								0.047		0.036
								(0.037)		(0.045)
COL				0.016**	0.002				0.011	-0.005
				(0.007)	(0.007)				(0.015)	(0.016)
COL*BLOCKHOLD									0.014	0.023
									(0.035)	(0.039)
BLOCKHOLD						-0.100***	-0.039*	-0.102***	-0.079***	-0.109*
						(0.025)	(0.023)	(0.031)	(0.024)	(0.061)
Constant	-0.695***	-0.716***	-0.683***	-0.713***	-0.648***	-0.672***	-0.710***	-0.663***	-0.698***	-0.621***
	(0.121)	(0.120)	(0.121)	(0.120)	(0.121)	(0.121)	(0.120)	(0.122)	(0.121)	(0.123)
Controls	v	Included	Included	Included	Included	Included	Included	Included	Included	Included

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)	Model 6 (Create)	Model 7 (Control)	Model 8 (Compete)	Model 9 (Collaborate)	Model 10 (All)
Industry effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	16,242	16,242	16,242	16,242	16,242	16,242	16,242	16,242	16,242	16,242
R-squared	0.122	0.122	0.122	0.122	0.123	0.123	0.123	0.123	0.123	0.125
Panel B: Regression of dominant culture on Scaled-CSR strengths										
CRE	-0.007				-0.010**	0.010				0.009
	(0.005)				(0.005)	(0.010)				(0.011)
CRE*BLOCKHOLD						-0.049**				-0.052**
						(0.024)				(0.025)
CON		0.007*			-0.005		0.044***			0.022*
		(0.005)			(0.005)		(0.010)			(0.012)
CON*BLOCKHOLD							-0.108***			-0.081***
							(0.024)			(0.028)
COM			-0.028***		-0.031***			-0.062***		-0.054***
			(0.005)		(0.006)			(0.011)		(0.013)
COM*BLOCKHOLD								0.102***		0.071**
								(0.025)		(0.031)
COL				0.010**	0.000				-0.003	-0.012
				(0.005)	(0.005)				(0.010)	(0.011)
COL*BLOCKHOLD									0.039*	0.039
									(0.024)	(0.026)
BLOCKHOLD						-0.080***	-0.054***	-0.166***	-0.120***	-0.100**
						(0.016)	(0.015)	(0.021)	(0.016)	(0.042)
Constant	-0.813***	-0.818***	-0.781***	-0.818***	-0.768***	-0.805***	-0.810***	-0.747***	-0.795***	-0.754***
	(0.077)	(0.076)	(0.076)	(0.077)	(0.077)	(0.077)	(0.075)	(0.077)	(0.077)	(0.077)
Controls	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	16,242	16,242	16,242	16,242	16,242	16,242	16,242	16,242	16,242	16,242
R-squared	0.318	0.318	0.320	0.318	0.320	0.321	0.322	0.323	0.321	0.324
Panel C: Regression of dominant culture on Scaled-CSR concerns										
CRE	0.014***				0.017***	0.047***				0.051***
	(0.005)				(0.005)	(0.011)				(0.011)
CRE*BLOCKHOLD						-0.098***				-0.099***

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)	Model 6 (Create)	Model 7 (Control)	Model 8 (Compete)	Model 9 (Collaborate)	Model 10 (All)
						(0.026)				(0.028)
CON		0.016***			0.020***		0.030***			0.035***
		(0.005)			(0.006)		(0.011)			(0.012)
CON*BLOCKHOLD							-0.041			-0.044
							(0.026)			(0.031)
COM			-0.005		0.004			-0.021*		-0.006
			(0.005)		(0.006)			(0.011)		(0.013)
COM*BLOCKHOLD								0.051*		0.028
								(0.027)		(0.033)
COL				-0.008*	-0.003				-0.017	-0.009
				(0.005)	(0.005)				(0.011)	(0.012)
COL*BLOCKHOLD									0.027	0.017
									(0.027)	(0.029)
BLOCKHOLD						0.017	-0.010	-0.060***	-0.041**	0.015
						(0.019)	(0.018)	(0.023)	(0.018)	(0.045)
Constant	-0.085	-0.068	-0.065	-0.072	-0.089	-0.099	-0.067	-0.051	-0.063	-0.102
	(0.103)	(0.101)	(0.102)	(0.102)	(0.101)	(0.101)	(0.101)	(0.102)	(0.101)	(0.101)
Controls	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	16,242	16,242	16,242	16,242	16,242	16,242	16,242	16,242	16,242	16,242
R-squared	0.249	0.249	0.249	0.249	0.250	0.250	0.249	0.249	0.249	0.251

4.5.2 Lead-lag specifications

To further address endogeneity concerns, we follow Kashefi-Pour *et al.* (2020) to use lagged values of time-variant cultural and blockholders' variables to re-estimate our regressions.[17] The results for total CSR scores, CSR strength, and CSR concerns are reported in Panels A, B, and C of Table A11, respectively (control variables not reported for brevity). The results are similar to the main findings reported in Tables A3 and A5.

Table A11: First lag of corporate culture and blockholders on CSR

This table presents the results of the robustness check using the first lag of cultural dimensions and blockholders on scaled CSR. Panel A- C demonstrates the results of regressions on *Scaled-CSR total*, *Scaled-CSR strengths*, and *Scaled-CSR concerns*, respectively. We include Community, Diversity, Employee Relations, Product, and Environment in the CSR index. Each category captures the score of strengths, the score of concerns, and the overall score, which is the net of strength score and concern score. To give the five categories equal weight, the raw strength (concern) scores are scaled by dividing the maximum possible number of strength (concern) indicators for that category in that year *(Scaled-CSR total*). *Scaled-CSR strengths* and *Scaled-CSR concerns* include strengths and concerns, respectively. We create and include an interaction term between each cultural dimension and block ownership (*BLOCKHOLD*) as an explanatory variable shown in Models (1 – 4). Model 5 includes the four interaction terms simultaneously, as shown in the column. Each regression also includes control variables (not reported for brevity), namely firm size (*SIZE*), leverage (*LEV*), market-to-book ratio (*MB*), *ROA*, tangibility (*TAN*), liquidity (*LIQ*), firm age (AGE), Amihud illiquidity (*AMIHUD*), and volatility (*VOLA*). All variables are defined in the Appendix A. Both models control industry (2-digit SIC codes), state, and year effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)
Panel A: The impact of blockholders and first lag of culture on Scaled-CSR total					
L.CRE	-0.047***				-0.059***
	(0.015)				(0.016)
L.CRE*L.BLOCKHOLD	0.087**				0.111***
	(0.036)				(0.039)
L.CON		0.026*			-0.015
		(0.015)			(0.017)
L.CON*L.BLOCKHOLD		-0.097***			-0.010
		(0.036)			(0.043)
L.COM			-0.054***		-0.071***
			(0.015)		(0.019)
L.COM*L.BLOCKHOLD			0.113***		0.141***
			(0.038)		(0.047)
L.COL				-0.002	-0.028*
				(0.015)	(0.016)
L.COL*L.BLOCKHOLD				0.046	0.092**
				(0.037)	(0.041)

[17] We also check the regression results with the second and third lags of explanatory variables, respectively in the untabulated analysis. Our results are qualitatively similar to those in Table A4, supporting our key findings, namely the significant effects of corporate culture on CSR.

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)
L.BLOCKHOLD	-0.131***	-0.045*	-0.158***	-0.109***	-0.261***
	(0.026)	(0.024)	(0.031)	(0.024)	(0.063)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	17,637	17,637	17,637	17,637	17,637
R-squared	0.244	0.244	0.244	0.244	0.245
Panel B: The impact of blockholders and first lag of culture on Scaled-CSR strengths relation					
L.CRE	0.005				-0.001
	(0.011)				(0.012)
L.CRE*L.BLOCKHOLD	-0.023				-0.014
	(0.026)				(0.028)
L.CON		0.039***			0.007
		(0.011)			(0.013)
L.CON*L.BLOCKHOLD		-0.114***			-0.053*
		(0.027)			(0.031)
L.COM			-0.076***		-0.074***
			(0.012)		(0.014)
L.COM*L.BLOCKHOLD			0.151***		0.137***
			(0.028)		(0.034)
L.COL				0.008	-0.008
				(0.011)	(0.012)
L.COL*L.BLOCKHOLD				0.015	0.039
				(0.027)	(0.029)
L.BLOCKHOLD	-0.114***	-0.072***	-0.218***	-0.132***	-0.193***
	(0.019)	(0.017)	(0.023)	(0.017)	(0.046)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	17,637	17,637	17,637	17,637	17,637
R-squared	0.391	0.391	0.393	0.391	0.393
Panel C: The impact of blockholders and first lag of culture on Scaled-CSR concerns relation					
L.CRE	0.045***				0.051***
	(0.010)				(0.011)
L.CRE*L.BLOCKHOLD	-0.091***				-0.105***
	(0.026)				(0.027)
L.CON		0.018*			0.028**
		(0.010)			(0.012)
L.CON*L.BLOCKHOLD		-0.027			-0.052*
		(0.025)			(0.030)
L.COM			-0.020*		-0.000
			(0.010)		(0.012)
L.COM*L.BLOCKHOLD			0.035		-0.008
			(0.026)		(0.032)
L.COL				0.006	0.015
				(0.010)	(0.011)
L.COL*L.BLOCKHOLD				-0.024	-0.045
				(0.026)	(0.029)
L.BLOCKHOLD	0.006	-0.024	-0.059***	-0.028*	0.061
	(0.018)	(0.017)	(0.022)	(0.017)	(0.043)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	17,637	17,637	17,637	17,637	17,637
R-squared	0.298	0.298	0.298	0.297	0.299

4.5.3 Alternative measures

We also use alternative measures of corporate culture and CSR to further check the robustness of our results. In addition to *Scaled CSR*, we further standardise the measure of CSR performance based on Standard Industrial Classification (SIC). Likewise, to measure *Adjusted CSR*, scaled CSR scores of all categories are industry-adjusted using the average value of all firms within a given industry in a given year (Benson and Davidson, 2010; Cho *et al.*, 2013; Ioannou and Serafeim, 2015).

Table A12: Alternative measure of CSR

This table presents the results of the robustness check for the impact of cultural dimensions and blockholders on alternative measures of CSR. Panel A- C demonstrates the results of regressions on *Adjusted-CSR total*, *Adjusted-CSR strengths*, and *Adjusted-CSR concerns*, respectively. We include Community, Diversity, Employee Relations, Product, and Environment in the CSR index. Each category captures the score of strengths, the score of concerns, and the overall score, which is the net of strength score and concern score. To give the five categories equal weight, the raw strength (concern) scores are scaled by dividing the maximum possible number of strength (concern) indicators for that category in that year. We then adjust the scaled CSR based on a 2-digit SIC code *(Adjusted-CSR total*). *Adjusted-CSR strengths* and *Adjusted-CSR concerns* include strengths and concerns, respectively. We create and include an interaction term between each cultural dimension and block ownership (*BLOCKHOLD*) as an explanatory variable shown in Models 1 – 4. Model 5 includes the four interaction terms simultaneously, as shown in the column. Each regression also includes control variables (not reported for brevity), namely firm size (*SIZE*), leverage (*LEV*), market-to-book ratio (*MB*), *ROA*, tangibility (*TAN*), liquidity (*LIQ*), firm age (AGE), amihud illiquidity (*AMIHUD*), and volatility (*VOLA*). All variables are defined in the Appendix A. All models control industry (2-digit SIC codes), state, and year effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)
Panel A: The impact of blockholders and culture on Adjusted-CSR total					
CRE	-0.040***				-0.043***
	(0.012)				(0.013)
CRE*BLOCKHOLD	0.060**				0.062*
	(0.030)				(0.032)
CON		0.019			-0.002
		(0.012)			(0.014)
CON*BLOCKHOLD		-0.059*			-0.024
		(0.030)			(0.035)
COM			-0.029**		-0.034**

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)
			(0.013)		(0.015)
COM*BLOCKHOLD			0.052		0.051
			(0.032)		(0.039)
COL				0.009	-0.005
				(0.012)	(0.014)
COL*BLOCKHOLD				0.004	0.021
				(0.030)	(0.034)
BLOCKHOLD	-0.116***	-0.061***	-0.120***	-0.090***	-0.146***
	(0.021)	(0.019)	(0.026)	(0.020)	(0.052)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	22,267	22,267	22,267	22,267	22,267
R-squared	0.107	0.107	0.107	0.107	0.108
Panel B: The impact of blockholders and culture on Adjusted-CSR strengths					
CRE	0.009				0.007
	(0.009)				(0.010)
CRE*BLOCKHOLD	-0.043**				-0.044*
	(0.022)				(0.023)
CON		0.045***			0.022**
		(0.009)			(0.011)
CON*BLOCKHOLD		-0.102***			-0.069***
		(0.022)			(0.025)
COM			-0.066***		-0.058***
			(0.010)		(0.012)
COM*BLOCKHOLD			0.119***		0.090***
			(0.023)		(0.028)
COL				0.004	-0.006
				(0.009)	(0.010)
COL*BLOCKHOLD				0.011	0.018
				(0.022)	(0.024)
BLOCKHOLD	-0.100***	-0.073***	-0.194***	-0.126***	-0.129***
	(0.015)	(0.013)	(0.019)	(0.014)	(0.038)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	22,267	22,267	22,267	22,267	22,267
R-squared	0.324	0.324	0.326	0.324	0.326
Panel C: The impact of blockholders and culture on Adjusted-CSR concerns					
CRE	0.043***				0.045***
	(0.009)				(0.009)
CRE*BLOCKHOLD	-0.085***				-0.089***
	(0.022)				(0.023)
CON		0.028***			0.027***
		(0.009)			(0.010)
CON*BLOCKHOLD		-0.045**			-0.046*
		(0.022)			(0.025)
COM			-0.033***		-0.020*
			(0.009)		(0.011)

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)
COM*BLOCKHOLD			0.059***		0.032
			(0.022)		(0.027)
COL				-0.008	-0.004
				(0.009)	(0.010)
COL*BLOCKHOLD				0.010	-0.000
				(0.022)	(0.024)
BLOCKHOLD	0.006	-0.013	-0.070***	-0.038***	0.011
	(0.015)	(0.014)	(0.019)	(0.014)	(0.036)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	22,267	22,267	22,267	22,267	22,267
R-squared	0.098	0.097	0.098	0.097	0.099

Adjusted CSR considers different implications of indicators in five KLD categories that result from industry heterogeneity (Cho *et al.*, 2013). We repeat our results using *adjusted CSR*, *adjusted CSR strengths,* and *adjusted CSR concerns*. The results are reported in Table A12 (without control variables) and are qualitatively consistent with our main results. Alternatively, we use the raw CSR as an alternative measure of CSR to support our findings, which are reported in the untabulated table.

Likewise, for the alternative measure of corporate culture, we determine the relative emphasis of four cultural dimensions in a firm by transforming dummy variables to decile rankings, namely CRE_DECI, CON_DECI, COM_DECI, and COL_DECI, following Andreou *et al.* (2022).[18] We show that although four dimensions of culture can coexist in a firm, some may be more dominant than others (Quinn and Kimberly, 1984; Zammuto *et al.*, 2000; Linnenluecke and Griffiths, 2010). The results presented in Table A13 are similar to our main results, further supporting their robustness. Alternatively, we also use the cultural scores to estimate four

[18] We first estimate the cultural orientation of a corporate by employing the value of decile ranking of an organization's intensity score across that industry in that year to measure the relative importance that the organization gives to the specific cultural dimension, using variables CRE_DECI, CON_DECI, COM_DECI, and COL_DECI.

dimensions of corporate culture, which still support the robustness of our key findings, reported in the untabulated table.

Table A13: Alternative measure of corporate culture

This table presents the results of the robustness check using alternative measures of cultural dimensions and blockholders on scaled CSR. Panel A- C demonstrates the results of regressions on *Scaled-CSR total*, *Scaled_CSR strengths*, and *Scaled_CSR concerns*, respectively. We include Community, Diversity, Employee Relations, Product, and Environment in the CSR index. Each category captures the score of strengths, the score of concerns, and the overall score, which is the net of strength score and concern score. To give the five categories equal weight, the raw strength (concern) scores are scaled by dividing the maximum possible number of strength (concern) indicators for that category in that year *(Scaled-CSR total*). *Scaled_CSR strengths* and *Scaled_CSR concerns* include strengths and concerns, respectively. We create and include an interaction term between each cultural dimension measured by decile rankings of cultural scores and block ownership (*BLOCKHOLD*), namely *CRE_DECI*BLOCKHOLD*, *CON_DECI*BLOCKHOLD*, *COM_DECI*BLOCKHOLD*, and *COL_DECI *BLOCKHOLD*, as an explanatory variable as shown in Models 1–4. Model 5 includes the four interaction terms simultaneously. Each regression also includes control variables (not reported for brevity), namely firm size (*SIZE*), leverage (*LEV*), market-to-book ratio (*MB*), *ROA*, tangibility (*TAN*), liquidity (*LIQ*), firm age (*AGE*), Amihud illiquidity (*AMIHUD*), and volatility (*VOLA*). All variables are defined in the Appendix A. All models control industry (2-digit SIC codes), state, and year effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)
Panel A: The impact of blockholders and culture on Scaled-CSR total					
BLOCKHOLD	-0.153***	-0.066*	-0.071*	-0.117***	-0.112
	(0.039)	(0.035)	(0.041)	(0.027)	(0.196)
CRE_DECI	-0.009***				-0.010***
	(0.002)				(0.003)
CRE_DECI *BLOCKHOLD	0.009*				0.009
	(0.006)				(0.008)
CON_DECI		0.001			-0.002
		(0.002)			(0.004)
CON_DECI *BLOCKHOLD		-0.005			-0.004
		(0.006)			(0.010)
COM_DECI			-0.001		-0.002
			(0.002)		(0.004)
COM_DECI *BLOCKHOLD			-0.004		-0.004
			(0.006)		(0.012)
COL_DECI				0.004*	0.002
				(0.003)	(0.004)
COL_DECI *BLOCKHOLD				0.006	0.004
				(0.006)	(0.010)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	26,233	26,233	26,233	26,233	26,233
R-squared	0.226	0.225	0.225	0.225	0.226
Panel B: The impact of blockholders and culture on Scaled-CSR strengths					
BLOCKHOLD	-0.085***	0.059**	-0.262***	-0.142***	-0.012
	(0.028)	(0.025)	(0.028)	(0.019)	(0.140)

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)
CRE_DECI	-0.001				-0.001
	(0.002)				(0.002)
CRE_DECI *BLOCKHOLD	-0.004				-0.007
	(0.004)				(0.006)
CON_DECI		0.012***			0.007**
		(0.002)			(0.003)
CON_DECI *BLOCKHOLD		-0.029***			-0.023***
		(0.004)			(0.007)
COM_DECI			-0.012***		-0.007**
			(0.002)		(0.003)
COM_DECI *BLOCKHOLD			0.023***		0.009
			(0.004)		(0.008)
COL_DECI				0.000	-0.001
				(0.002)	(0.003)
COL_DECI *BLOCKHOLD				0.008*	0.006
				(0.004)	(0.007)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	26,233	26,233	26,233	26,233	26,233
R-squared	0.357	0.359	0.358	0.357	0.359
Panel C: The impact of blockholders and culture on Scaled-CSR concerns					
BLOCKHOLD	0.057**	0.111***	-0.186***	-0.021	0.033
	(0.028)	(0.025)	(0.030)	(0.020)	(0.145)
CRE_DECI	0.008***				0.008***
	(0.002)				(0.002)
CRE_DECI *BLOCKHOLD	-0.012***				-0.013**
	(0.004)				(0.006)
CON_DECI		0.010***			0.007***
		(0.002)			(0.003)
CON_DECI *BLOCKHOLD		-0.022***			-0.014*
		(0.004)			(0.007)
COM_DECI			-0.011***		-0.007**
			(0.002)		(0.003)
COM_DECI *BLOCKHOLD			0.025***		0.016*
			(0.004)		(0.009)
COL_DECI				-0.004**	-0.004
				(0.002)	(0.003)
COL_DECI *BLOCKHOLD				0.001	0.003
				(0.004)	(0.007)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	26,233	26,233	26,233	26,233	26,233
R-squared	0.281	0.282	0.282	0.281	0.283

Considering the concern about the structure of blockholding, we weight the blockholding ownership based on the number of blocks as an alternative measure of block

ownership to further check the robustness. We repeat our results by replacing *BLOCKHOLD* with *BLOCKWEIGHT*. Our results in Table A14 are qualitatively similar to our main results, providing additional evidence of robustness.

Table A14: Alternative measure of blockholders

This table presents the results of the robustness check using alternative measures of cultural dimensions and blockholders on scaled CSR. Panel A- C demonstrates the results of regressions on *Scaled-CSR total*, *Scaled_CSR strengths*, and *Scaled_CSR concerns*, respectively. We include Community, Diversity, Employee Relations, Product, and Environment in the CSR index. Each category captures the score of strengths, the score of concerns, and the overall score, which is the net of strength score and concern score. To give the five categories equal weight, the raw strength (concern) scores are scaled by dividing the maximum possible number of strength (concern) indicators for that category in that year *(Scaled-CSR total*). *Scaled_CSR strengths* and *Scaled_CSR concerns* include strengths and concerns, respectively. We create and include an interaction term between each cultural dimension and blockholder variable measured by weighted block ownership (*BLOCKWEIGHT*) as an explanatory variable shown in Models 1 – 4. Model 5 includes the four interaction terms simultaneously, as shown in the column. Each regression also includes control variables (not reported for brevity), namely firm size (*SIZE*), leverage (*LEV*), market-to-book ratio (*MB*), *ROA*, tangibility (*TAN*), liquidity (*LIQ*), firm age (AGE), amihud illiquidity (*AMIHUD*), and volatility (*VOLA*). All variables are defined in the Appendix A. All models control industry (2-digit SIC codes), state, and year effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)
Panel A: The impact of blockholders and culture on Scaled-CSR total					
CRE	-0.042***				-0.045***
	(0.012)				(0.013)
CRE*BLOCKWEIGHT	0.247**				0.231*
	(0.115)				(0.124)
CON		0.015			-0.010
		(0.012)			(0.015)
CON*BLOCKWEIGHT		-0.173			-0.043
		(0.116)			(0.141)
COM			-0.045***		-0.050***
			(0.013)		(0.015)
COM*BLOCKWEIGHT			0.302**		0.273*
			(0.119)		(0.145)
COL				0.028**	0.008
				(0.012)	(0.014)
COL*BLOCKWEIGHT				-0.184	-0.079
				(0.115)	(0.126)
BLOCKWEIGHT	-0.474***	-0.273***	-0.535***	-0.279***	-0.579***
	(0.081)	(0.074)	(0.096)	(0.077)	(0.204)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	22,264	22,264	22,264	22,264	22,264
R-squared	0.234	0.234	0.234	0.234	0.235
Panel B: The impact of blockholders and culture on Scaled-CSR strengths					
CRE	0.009				0.004
	(0.009)				(0.010)
CRE*BLOCKWEIGHT	-0.146*				-0.123
	(0.082)				(0.089)

	Model 1 (Create)	Model 2 (Control)	Model 3 (Compete)	Model 4 (Collaborate)	Model 5 (All)
CON		0.018**			0.000
		(0.009)			(0.011)
CON*BLOCKWEIGHT		-0.096			-0.045
		(0.084)			(0.108)
COM			-0.041***		-0.045***
			(0.010)		(0.012)
COM*BLOCKWEIGHT			0.123		0.143
			(0.087)		(0.109)
COL				-0.001	-0.011
				(0.009)	(0.010)
COL*BLOCKWEIGHT				0.106	0.112
				(0.083)	(0.086)
BLOCKWEIGHT	-0.110*	-0.136**	-0.257***	-0.229***	-0.234
	(0.061)	(0.053)	(0.074)	(0.054)	(0.156)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	22,264	22,264	22,264	22,264	22,264
R-squared	0.374	0.374	0.376	0.374	0.376
Panel C: The impact of blockholders and culture on Scaled-CSR concerns					
CRE	0.044***				0.041***
	(0.009)				(0.009)
CRE*BLOCKWEIGHT	-0.309***				-0.267***
	(0.081)				(0.086)
CON		0.006			0.009
		(0.009)			(0.010)
CON*BLOCKWEIGHT		0.061			0.029
		(0.082)			(0.094)
COM			-0.003		-0.002
			(0.009)		(0.010)
COM*BLOCKWEIGHT			-0.098		-0.041
			(0.084)		(0.097)
COL				-0.026***	-0.020**
				(0.009)	(0.010)
COL*BLOCKWEIGHT				0.234***	0.182*
				(0.083)	(0.093)
BLOCKWEIGHT	0.288***	0.111**	0.196***	0.041	0.206
	(0.057)	(0.054)	(0.068)	(0.051)	(0.136)
Control variables	Included	Included	Included	Included	Included
Industry effects	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES
Observations	22,264	22,264	22,264	22,264	22,264
R-squared	0.291	0.290	0.290	0.290	0.291

5. Conclusion

We examine the impacts of corporate culture on firms' involvement in CSR in the U.S. market. We use Cameron *et al.* (2014) four CVF cultural dimensions (i.e., creation, control, competition, and collaboration) and employ a quantified measure of corporate culture following Fiordelisi

and Ricci (2014) and Andreou *et al.* (2022) in our main analysis. Our findings indicate that culture matters, and blockholders moderate the relationship between corporate culture and CSR. We show robust evidence that different dimensions of corporate culture have different impacts on CSR policies and practices.

First, overall CSR performance increases in organisations that give cultural importance to collaboration and decreases in organisations that give cultural importance to creation or competition. Second, firms that place a relatively higher emphasis on creative cultural values have the weakest orientation to participate in CSR. Third, when we examine CSR strengths and CSR concerns separately, we find that the strongly negative impacts of creative culture on CSR are mainly caused by its strong positive relationship with CSR concerns and a relatively weak negative relationship with CSR strengths. Conversely, the positive impacts of collaborative culture on CSR are the results of its positive relationship with CSR strengths and weak negative relationship with CSR concerns. We also report that the significant and negative impacts of competitive culture on overall CSR result from neglecting practices that improve CSR strengths but reduce CSR concerns.

Fourth, we seek a formal institution channel through which cultural impacts on CSR are moderated. Our results show blockholders' ownership has moderating effects on the relationship between culture and CSR. The monitoring effects of large block ownership significantly weaken and even offset the negative impact of organisations' neglecting CSR in pursuit of innovation and breakthrough, i.e., firms with a strong creation culture. Moreover, the moderating effect is also observed between the relationship of culture with CSR strengths and CSR concerns. Blockholders not only attenuate the negative influences of competitive culture on strengths and positive influences of creative culture and controlling culture on concerns but also lessen the positive influence of controlling culture and negative influence of competitive

culture on CSR concerns. In the granular examination of various CSR components, competitive firms and collaborative firms are more likely to improve the aspect of employee relations. We also find that blockholders exert significant moderating effects on overall performance, strengths, or concerns in each component to eliminate the negative impacts as well as reduce the excessive positive actions to support CSR. Therefore, we imply that blockholders, through monitoring, encourage their firms to concentrate on value-enhancing CSR activities and to avert those harmful to shareholders' interests. Our results are robust to the battery of alternative testing.

We contribute to the literature on CSR and culture by suggesting that corporate culture matters in firm CSR policies and practices. Prior studies such as Fiordelisi and Ricci (2014) have demonstrated that different dimensions of corporate culture have different impacts on firm outcomes. We extend this strand of the literature by showing various cultural impacts on firms' involvement in CSR. By examining CSR strengths and CSR concerns separately, we contribute and present novel empirical evidence to the extant CSR literature. We find that the positive or negative relationship between culture and overall CSR performance is a result of culture-leading firms having different focuses on CSR strengths and CSR concerns. For instance, the strongly negative impacts of creative culture can be traced to its weak negative correlation with CSR strengths and its strong positive correlation with CSR concerns. Our findings also contribute to the previous empirical literature on corporate governance by adding evidence to the role of blockholders in an organisation's decision-making. We are the first to show that the monitoring effects of blockholders can significantly moderate the culture–CSR relationship.

Our study has important managerial implications for organisations facing environmental and social issues. The primary impacts of corporate culture on CSR imply that to improve CSR, firms need to do more than have strategic planning or CSR investments. Changing values,

beliefs, and attitudes to CSR is a critical step. The findings will allow boards and managers to better understand their relative cultural emphasis to seize opportunities or reduce risks in environmental and social issues, thereby promoting the organisation's sustainable development. An extension of our analysis considers the monitoring role of blockholders in moderating culture–CSR relationships, implying that large block ownership enables managers to focus on value-enhancing CSR projects. Thus, both culture and formal governance mechanisms work together to influence the overall CSR.

III. ESG Blockholders and Corporate Green Bonds

1. Introduction

The rising concerns of risks due to environmental issues have led to an increasing number of financial decisions on environmental activities. The extent of the impacts of environmental issues is still uncertain, but the consensus is that these issues are worrisome. Many governments have taken actions to seek a sustainable economic transition, which is exerting far-reaching influence on markets, firms, and investors. Especially, since the Paris Climate Agreement was adopted in 2015, the public has been aware of the importance of green action. To conduct this green action, long-term and large-scale financing is demanded.

Green bond markets have emerged and become a critical source of funds for these green activities. A growing body of theoretical and empirical research has studied the characteristics of green bonds and the evolution of various firm-level outcomes following the issuance of green bonds, such as green bond premiums and stock prices around the announcement day (Tang and Zhang, 2020; Flammer, 2021), changes in investor base (Sangiorgi and Schopohl, 2021), environmental performance (Flammer, 2021), and stock liquidity (Tang and Zhang, 2020) However, few studies pay attention to the determinants of corporate green bond issuance. For instance, García *et al.* (2023) analyse the corporate governance characteristics of green bond issuers and find that firms with the presence of a sustainability committee, a higher proportion

of women directors, better environmental scores, and lower carbon emissions are likely to issue green bonds.

An unexplored issue thus far is whether the presence of ESG-conscious investors plays any role in the issuance of the green bond. Given that green bond issuance is positively associated with shareholder interests (Tang and Zhang, 2020; Flammer, 2021) and that blockholders are a strong monitor (Shleifer and Vishny, 1986), we investigate the impacts of institutional blockholders with ESG initiatives (hereafter "ESG blockholders") on the green bond issuance in their portfolio firms.

The motivation for this study comes from the fact that a growing number of institutional blockholders with increasing ESG concerns are placing high importance on initiatives taken by their portfolio firms that enhance ESG benefits as well as reduce costs and risks by internalising the ESG externalities. In this line, Hoepner *et al.* (2023) show that shareholders' engagement in ESG issues, especially those addressing environmental topics, can improve shareholders' value by reducing firms' downside risks. Moreover, compared to traditional institutional investors, ESG blockholders have a greater incentive to highlight responsible shareholder action and engagement in sustainable business in the portfolio firms due to their ESG initiative (Dimson *et al.*, 2015). To internalise the increasing environmental externalities, ESG blockholders are expected to intervene in environment-related decision-making and financing policies (Cronqvist and Fahlenbrach, 2009), including issuing a green bond to finance green activities. As Edmans and Manso (2011) show, these blockholders can exert influences not only through threat to exit but also through direct intervention via a public shareholder proposal. Considering their substantial ownership and monitoring role, an enquiry into the influences of ESG blockholders is important.

To empirically examine the influence of ESG blockholders on the green bond market,

we extract information about blockholders from the SEC EDGAR database and then merge it with their ESG level based on MSCI ESG KLD STATS. We identify ESG blockholders as those who have ESG initiatives and are actively involved in ESG issues. We acquire green bond information from the Bloomberg Fixed Income database. Considering the small sample of green bonds and endogeneity concerns, we construct matching control firms to obtain convincing results; specifically, the control firms are conventional bond issuers. We then conduct the nearest neighbour-matching based on a set of matching co-variates, which ensures that treated green bond issuers and control firms are as highly similar as possible. Based on the matched sample, we find that ESG block ownership is significantly and positively related to the issuance of green bonds. This finding is consistent with previous governance literature, such as Edmans (2014), that blockholders who have sizeable stakes can exercise their power to influence environment-related policies to reflect their ESG preference.

Next, we also investigate whether the issuance of green bonds accrues any tangible benefits to the issuers by examining how the cost of debt and equity financing evolves following the issuance of green bonds. First, we follow Duffee (1998) and Chen and King (2014) to estimate the cost of debt using the weighted average of bond yield spread and then examine the relationship between green bond issuance and the cost of debt. The empirical results indicate that green bond issuance significantly reduces the cost of debts in the short term. Second, we employ implied cost of capital derived from I/B/E/S analyst estimates following Gebhardt *et al.* (2001) as another measure of financing costs. We find that green bond issuance is significantly and negatively related to the 3-year-ahead cost of capital following the issuance, which suggests that despite the slow response of investors in stock markets, issuing green bonds is beneficial for shareholders. The result is consistent with the signalling role of green bonds in prior work, which is that issuing a green bond provides a positive signal of firms' commitments

to environmental sustainability (Flammer, 2021).

In consideration of the impact of blockholders on portfolio firms and the signalling role of ESG blockholders in security markets, we further examine whether ESG blockholders have a moderating effect on the relationship between green bond issuance and financing costs. We find that the coefficient of the interaction term between green issuance and high ESG block ownership dummy is only significantly negative when the coefficient of green issuance is significantly positive, indicating that ESG blockholders can effectively moderate the positive relation of green issuance with the cost of financing. In other words, high ownership of ESG blockholders is likely to compensate for the weakness of green issuance and reduce the cost of financing.

Finally, as prior studies (e.g., Ilhan *et al.*, 2021) demonstrate that climate policy uncertainty might have heterogeneous effects across firms and industries, we introduce the 2016 Trump election as an exogenous shock to climate policy. From the empirical results, we find that the issuance of green bonds post-Trump election has not been significantly affected. We also examine the dynamic change in the impact of the shock on green bond issuance and find that green bond issuance is only negatively and transitorily affected, which is not sound. In the long run, green bond issuance of firms with high ownership of ESG blockholders goes up substantially after the election, relative to that of firms with low ownership of ESG blockholders. Our results imply that when facing passive climate policy, ESG blockholders place a higher emphasis on green action to avoid more exposure to environmental risks.

This study provides the first evidence of the impact of ESG blockholders on the green bond market. Our findings contribute to the green bond market literature (e.g., Tang and Zhang, 2020; Fatica *et al.*, 2021; Flammer, 2021) by adding evidence that blockholders, especially those who have ESG preference, encourage their firms to issue green bonds to actively

participate in green activities. We imply that the support of large responsible institutions is important for the development of corporate green bond markets. Moreover, this study contributes to the external financing literature by providing evidence that the issuance of green bonds is related to the cost of debt and equity financing in the coming years. The majority of previous research (e.g., Tang and Zhang, 2020; Flammer, 2021) studies the financing costs at the issuance date. They find a positive stock market reaction but no premium for green bonds based on bond-level yield at issue. Our study complements the body of literature by examining how the cost of debts and equity capital change following green bond issuance using a firm-level dataset. We find that the cost of debt and equity financing reduces with the issuance of green bonds in the short- or long-term. This is in line with prior studies that green bond issuance can be a signal of the commitment to environmental sustainability (Flammer, 2021). Furthermore, this study contributes to the institutional investor literature by adding evidence on the signalling role of institutional blockholders in the security market. We find that when the relation between green bond issuance and the cost of financing is significantly positive, institutional blockholders with ESG initiatives can effectively weaken or even alter that relationship. This indicates that the ESG reputation of these blockholders can send bond and stock markets a positive signal that under their responsible investing, their portfolio firms are more likely to be active in ESG and to suffer from lower environmental risks.

The rest of this study is organised as follows. Section 2 summarises the literature review on culture, blockholders, and CSR, followed by developing hypotheses. Section 3 describes the facts of the U.S. corporate green bond market. In Section 4, we demonstrate our sample and variables and describe our data. In Section 5, we show our multivariate model and present our empirical analysis. We conclude with our findings in Section 6.

2. Green bonds

To contribute to environmental sustainability, long-term and large-scale investments in green activities such as green innovation are imperatively demanded. In particular, since the Paris Climate Agreement, with an aim to strengthen the global ability to cope with the effects of climate change, was adopted in 2015, companies have been encouraged by governments to enact relevant policies to engage in green activities (Buchner *et al.*, 2019). These practices are striving to improve financial markets to provide appropriate financial flows, which are broadly referred to as green finance (Idfc, 2013). The recent UN Climate Change Conference of the Parties (COP26) in Glasgow brought governments, communities, businesses, and individuals together again. It aimed to accelerate green action, such as investments in renewables, towards ambitious environmentally friendly goals. Further green action places greater demands for green financing.

The green bond markets have become a crucial capital pool for green financing. A green bond, as defined by the World Bank (2015), is a debt security with specific use of proceeds—to finance climate-related or environmental projects. The issuance of green bonds has multiplied several times in the last decade and has become known as the "green bond boom" (Morgan Stanley, 2017). As the Climate Bonds Initiative (2020) reported, green bond issuance reached USD 257.7 billion in 2019, 51% higher than in 2018. The U.S. green bond market contributed USD 51.3 billion and was the top issuer based on the volume of global green bond issuance. Buchner *et al.* (2019) demonstrate that corporations are the largest source of private investments in climate-aligned and environmental activities. These corporations' bond issuance in 2019 almost doubled from 2018 and accounts for 23%, thereby becoming the largest green bond issuers (see Climate Bonds Initiative, 2020). For non-financial corporations, green bonds are issued to finance their own specified projects; meanwhile, financial institutions, such as

development banks, use green bonds to provide green loans and to invest in other firms' green activities (Tang and Zhang, 2020).

Despite the fact that the surge in green bonds has captured public interest, in fact we know little about the newly developing financial instrument and what factors affect the issuance of green bonds in a firm. The peculiar use of proceeds from green bonds restricts the issuers' use of funds and investment policies. Moreover, green bond issuers suffer from additional costs associated with external review. Although a third-party certification is a voluntary initiative (e.g., Climate Bonds Initiative, 2019), to label a bond as green, green bond issuance requires upfront administrative and compliance costs. Likewise, the issuers undergo a more rigorous review and approval process, more post-issuance monitoring, and more information disclosure (World Bank, 2015). In other words, there are many unobservable factors affecting the issuance of green bonds. Thus, we aim to provide more evidence for the green bond literature.

3. Literature review and hypotheses development

3.1 Key role of blockholders

A blockholder is distinguished from a minority shareholder by the size of their shareholding (Bar-Isaac and Shapiro, 2020). Blockholders are ubiquitous across firms (Laeven and Levine, 2008; Edmans, 2014; Edmans and Holderness, 2017), and their involvement is closely associated with their firms' strategic decisions, policies and performance (Cronqvist and Fahlenbrach, 2009; Mishra, 2011; Clifford and Lindsey, 2016; Alvarez *et al.*, 2018; Erhemjamts and Huang, 2019). First, large blocks of shares in firms give them incentives to intervene in firms' decision-making. To pursue the maximisation of their interests, the shareholders with block ownership are incentivised to eliminate conflicts of interests with the management. Second, their large blockholding leads them to have a propensity to afford costly monitoring

(Edmans, 2014) and having sufficient information and experience reduces the costs (Kang *et al.*, 2018). Third, their sizeable stake renders them influential in corporate governance (Adams *et al.*, 2010; Aiken and Lee, 2020; Bar-Isaac and Shapiro, 2020). Through either directly using voting power and disciplining firm management ('voice' or direct intervention) or indirectly threatening to trade their shares ('exit' or 'voting with their feet' or 'Wall Street Rule'), firms' decisions and policies are under blockholders' monitoring and influences (Burkart *et al.*, 1997; Nenova, 2003; Parrino *et al.*, 2003; Edmans and Manso, 2011; Bar-Isaac and Shapiro, 2020).

In consideration of the powerful control of institutional blockholders, scholars have shown a variety of impacts of these important investors on their portfolio firms' decision making, including capital structure (Cronqvist and Fahlenbrach, 2009; Harford *et al.*, 2018), risk-taking (Faccio *et al.*, 2011; Mishra, 2011; Pathan *et al.*, 2020), innovation (Bernile *et al.*, 2018), CEO turnover (Parrino *et al.*, 2003; Helwege *et al.*, 2012), managerial misbehaviours such as earnings management (Guthrie and Sokolowsky, 2010; Liu *et al.*, 2017; Jiang *et al.*, 2020; Ng *et al.*, 2021) and discretionary disclosure (Nagar and Schoenfeld, 2021), voluntary disclosure (Ge *et al.*, 2021), and executive compensation (Clifford and Lindsey, 2016). Alvarez *et al.* (2018) indicate that the presence of institutional blockholders reduces firms' financial constraints, which is consistent with the monitoring role of these blockholders and the intervention mechanism.

Although the concerns over ESG sustainability are increasing, empirical evidence on blockholders' financing choices for firms' ESG issues is still lacking. So, in this study, we timely fill this research gap by focusing on institutional blockholders' impacts on the growing green bond market.

3.2 ESG blockholders and issuance of green bonds

Due to their large ownership in the firm, institutional blockholders are exposed to risks from corporate externalities, which motivates these blockholders to minimise the potential costs and maximise the potential benefits of these externalities through exerting effects on decisions and policies (Dhillon and Rossetto, 2015; Azar *et al.*, 2021). Socially responsible investing (SRI) or ESG engagement, which creates both environmental benefits and economic profits while internalising the environmental externalities (Dimson *et al.*, 2015; Hoepner *et al.*, 2023), has aroused blockholders' interest and driven their positive action.[19]

We present several theoretical lenses to provide a link between ESG-conscious blockholders and firms' decisions to issue green bonds. The first theoretical lens relates to the "monitoring role" of blockholders. The existing body of literature provides a consistent view that institutional blockholders have the power to monitor firms' green decisions, policies, and practices through direct or indirect interventions. For instance, Gloßner (2019) suggests that, compared to small shareholders, institutional blockholders have more abilities and resources to analyse whether a green investment decision made by managers increases or decreases shareholder value; hence, they can lead firms to avoid agency problems through effective monitoring, thereby only focusing on value-enhancing environmental and social policies and practices (Shleifer and Vishny, 1986; Bebchuk and Stole, 1993; Edmans, 2014; Kang *et al.*, 2018). The influential institutional investors may even focus only on improving environmental and social issues that are financially material and attempt to reduce negative issues that are involved in regulatory penalties and lawsuits (Chen *et al.*, 2020).

[19] In practice, more than 3,800 investor across countries representing US$121 trillion as of 31 March 2021 have signed up the Principle of Responsible Investing (PRI) of Union Nation (Principles for Responsible Investments, 2021). As a signatory these active large investors pledge to engage in ESG collaboratively and use their influence to achieve sustainable outcomes based on effective stewardship activities.

The second theoretical lens relates to the blockholder "engagement" with the firm. Recent literature suggests that investors increasingly engage with ESG initiatives in environmentally friendly and socially responsible activities. For instance, Gutsche and Ziegler (2019) find that large investors who have environmental awareness and are keen on sustainable investment are more inclined to be involved in sustainable practices, such as paying for sustainable investment products, even regardless of whether they sacrifice returns. Likewise, Dimson *et al.* (2015) show that socially conscious institutional investors are significantly and positively related to firms' ESG engagement. Krueger *et al.* (2020) demonstrate that institutional investors, especially those with larger ownership and ESG orientation, are inclined to have active involvement in managing green issues. Heinkel *et al.* (2001) indicate that the fraction of green investors determines the possibility for green reforms in a polluting firm. Humphrey and Li (2021) find that pro-environmental institutional investors who sign the Principles for Responsible Investment (PRI) reduce greenhouse gas emissions in their portfolio firms. Considering that institutional blockholders often make decisions aligned with the interests of their closely connected stakeholders (Blackrock, 2016) and they are influential when they own a big stake in the investee firms, we argue that institutional blockholders with ESG initiatives exert greater influences on their portfolio firms' environmental and social policies and practices such as green bond issuance.

The third theoretical lens relates to "socially responsible investing (SRI)". SRI is an investment strategy that aims to consider both financial returns and positive changes in social/environmental impact practices; thus, within the SRI paradigm, investors not only pay attention to negative screening before investing but also place a high emphasis on responsible shareholder action and ESG engagement during investing (Global Sustainable Investment Alliance, 2021). Likewise, socially responsible mutual funds screen out the sin stocks such as

tobacco, alcohol, gambling, and weapons when making investments (Statman, 2019). In turn, investors' actions and interventions can also be a signal that the ESG performance of the firm needs improvement (Brav *et al.*, 2008; Klein and Zur, 2009). As such, ESG-conscious investors are more likely to not only reduce their portfolio firms' irresponsible investments that do not meet their SRI and ethical criteria but also encourage firms to undertake more climate-related and other environmental initiatives, including green bond issuance, than traditional shareholders (Bernstein *et al.*, 2019; Painter, 2020; Pankratz *et al.*, 2023).

Taken together, with the increasing number of shareholder proposals related to environmental issues and rising approval rates for these proposals over the last decade, ESG blockholders can be regarded as the pioneers of incorporating environmental and social concerns into the sustainable economic development of the business (Aguilera *et al.*, 2007; Flammer, 2013; Carroll and Buchholtz, 2014; Flammer, 2015). Given the increasingly growing attention of governments, society, and communities around the world to corporate green action, followed by the prevalence of the activism of ESG blockholders, our study contributes to the literature by investigating the role of ESG blockholders in green action and green financing.

With regard to climate-related and other environmental projects, long-term and large-scale funds are demanded. Consequently, bond markets become an increasingly important source of funding for sustainable projects (Ghisetti *et al.*, 2016; Wang and Zhi, 2016; G20, 2018). With the peculiar use of proceeds, green bonds capture investors' interests and thus allow issuers to reach external financing from a greater investor base and raise these companies' environmental credentials (World Bank, 2015). Jin *et al.* (2020) reveal that green bonds exert a superior hedge effect against carbon market risks. Also, Fatica and Panzica (2021) indicate that green bonds are an effective tool against climate change, which may attract the attention of shareholders who are concerned about environmental externalities, such as ESG blockholders.

Moreover, the issuance of green bonds is beneficial for the existing shareholders through positive stock returns, an increase in green investor ownership, and an improvement in post-environmental performance (World Bank, 2015; Tang and Zhang, 2020; Flammer, 2021). Therefore, given the fact that the green bond market can contribute to an important fund source for environmental sustainability and the significant role of ESG blockholders in environmental-related policies, we propose the following hypothesis:

H1. *Firms with ESG blockholders are more likely to issue green bonds.*

3.3 Post-issuance cost of financing

Compared with conventional bonds, green bonds, as the report of the Office of California State Treasurer (2017) shows, normally lack a supply. A growing number of market investors, especially those who give importance to SRI and sustainability, have a strong demand for green bonds (Risal *et al.*, 2023). Thus, facing the oversubscription and strong green credentials, there could be "greenium" if these green investors are willing to sacrifice returns to support green projects (Fama and French, 2007).[20] Despite prior anecdotal evidence suggesting the existence of greenium, whether there is a cheaper cost of debt delivered by green bond issuance is still a contentious issue. Extant academic studies have yet to provide conclusive evidence. Recent work further offers mixed evidence on the performance of corporate green bonds. The research by Larcker and Watts (2020), Tang and Zhang (2020), and Flammer (2021) shows that green bonds have almost zero price premiums over matched conventional bonds. Nevertheless, Zerbib (2019) suggests a significant and small negative premium. Díaz and Escribano (2021) indicate a sustainability premium in green energy company bonds. Fatica *et al.* (2021) show a premium for green bonds issued by non-financial corporations.

[20] Greenium was first proposed by the report of Climate Bonds Initiative (2017), referring to the price premium or the extra yields that bond investors pay for a new green bond comparing with a conventional bond.

Given the large volume of detailed information disclosed before, during and after issuance, the detailed explanation of the use of proceeds, third-party certification and increased media attention, green bonds are associated with a reduction in firm-level information asymmetry and environmental risks (El Ghoul *et al.*, 2016b; Gao *et al.*, 2019; Tang and Zhang, 2020). As such, green bonds not only attract investors who have a preference for ESG but also create a 'green halo effect' on investors' inclination towards other securities issued by the firm. In other words, green bond issuance attracts investors' attention, which is likely to enlarge and diversify the investor base, followed by an increase in stock liquidity (Tang and Zhang, 2020). As prior studies, such as Diamond and Verrecchia (1991), demonstrate that security liquidity is significantly related to the cost of equity capital, we would expect the cost of capital to reduce following green bond issuance.

Moreover, the issuance of green bonds positively signals firms' green commitments (Flammer, 2021). Flammer (2021) finds that significant improvement in environmental performance is indeed witnessed in green bond issuers. Accordingly, green bonds, as a proxy for firms to make changes in their ESG profiles and to be active in environmentally friendly investments (Tang and Zhang, 2020), can be viewed as an important financial instrument to internalise environmental externalities. Given environmental externalities increase the cost of financing (Chava, 2014), we argue that green bond issuance provides financing benefits for issuers through a reduction in the cost of equity capital.[21] Given the above discussion, we posit

[21] Previous research indicates that in the perception of market investors, socially irresponsible firms suffer from a variety of risks. They possibly face more lawsuits and regulatory penalties due to more pollution and more regulatory compliance violations (Chava, 2014). Hong and Kacperczyk (2009) also underline higher litigation risks of firms in "sin" industries (e.g., tobacco, alcohol, gambling). Their study provides an implication on the importance of ESG and SRI. Presumably, being responsible is a good tool to hedge the perceived risks and to lower the cost of equity (El Ghoul *et al.*, 2016a). Moreover, Heinkel *et al.* (2001) suggest that environmentally irresponsible firms face to higher cost of capital because of the smaller size of the investor base. Fewer investors are willing to invest in these pollution firms resulting in less risk diversification and ultimately lowering stock prices.

two additional hypotheses:

H2a. *Firms have a lower cost of debt following the issuance of green bonds.*

H3a. *Firms have a lower cost of equity following the issuance of green bonds.*

3.4 ESG blockholders and the cost of financing

Previous literature provides evidence on blockholders affecting the cost of debt and equity. Elyasiani *et al.* (2010) find that institutional ownership has a robust negative relation with the cost of debt. In contrast, Cremers *et al.* (2007) and Zhang and Zhou (2018) suggest that incentive conflicts between shareholders and bondholders result in a positive association between institutional blockholder power and both borrowing costs and bond covenants.

With regard to the cost of equity, Attig *et al.* (2008) show that blockholders' monitoring role in enhancing information quality and reducing agency problems results in lowering the implied cost of equity. Multiple blockholders can realise internal monitoring through either forming a coalition or competing for firm control rights (Bennedsen and Wolfenzon, 2000; Maury and Pajuste, 2005; Laeven and Levine, 2008), which is effective in alleviating information asymmetry between controlling shareholders and minority investors. As information quality affects the cost of capital (Easley and O'hara, 2004), it can be argued that institutional blockholders are associated with lower cost of equity. Additionally, multiple blockholders' monitoring role can mitigate excess control in firms, thereby possibly reducing the cost of equity (Guedhami and Mishra, 2009). Apart from their sizeable ownership, information advantage and experience render the blockholders more effective in monitoring (Kang *et al.*, 2018), and firms' decision-making; thus, the cost of capital tends to reduce further when there is the existence of blockholders.

ESG blockholders who commit to sustainability tend to have a positive impact on their

firms' social and environmental performance, which effectively reduces risks, including environmental risks, downside risks, and financial risks in that firm (Oikonomou *et al.*, 2012; Krueger *et al.*, 2020; Ilhan *et al.*, 2021; Hoepner *et al.*, 2023) and negative events (Kim *et al.*, 2014; Krüger, 2015). The improvement in risk management can lead the firm to avoid suffering from potential litigation or compliance costs (Sharfman and Fernando, 2008), thereby benefitting its reputation and creditworthiness. Their impact is also likely to decrease systematic risks and then increase firm value (Albuquerque *et al.*, 2019). In consideration of the signalling role of ESG blockholders in security markets, it is likely to enhance the green commitment of green bonds and to draw greater attention of market investors. Based on the above arguments, we suggest that ESG blockholders would amplify (lessen) the negative (positive) impacts of green bond issuance on the cost of financing, including debt and equity.

H2b. *ESG blockholders strengthen the negative relationship between green bond issuance and the cost of financing*.

H3b. *ESG blockholders weaken the positive relationship between green bond issuance and the cost of financing*.

4. Data, Sample, and Variables

4.1 Data

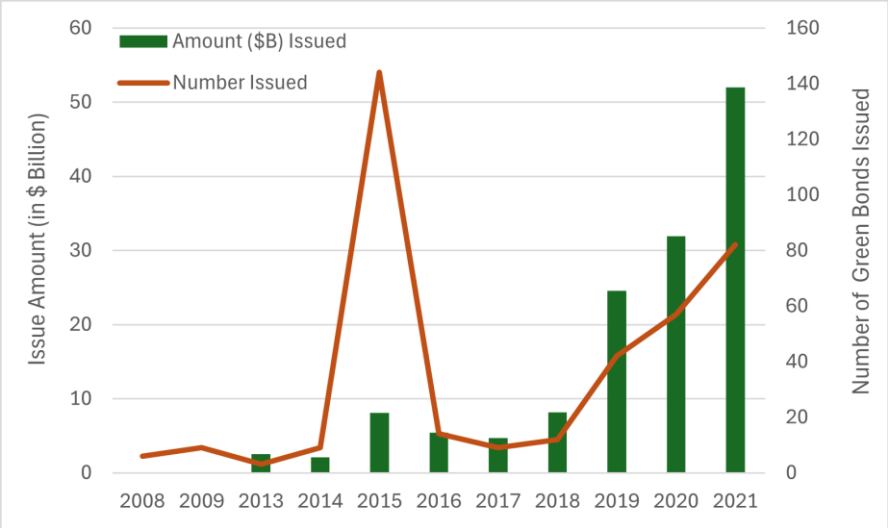
To construct a comprehensive U.S. green bond dataset, we extract all green-labelled corporate bonds whose issuers' country of incorporation is the U.S. from the Bloomberg's fixed income database.[22]

[22] At the green bond level, Bloomberg provides the announcement date, issue date, amount issued, yield at issuance, issue price, maturity, coupon, coupon type, and credit rating.

Figure B1 displays the issuance of green bonds in the U.S. market over time.[23] The first corporate green bond was issued in 2008, though the number and the amount of issuance had been low during the first five years. This is not surprising since the U.S. green bond market lagged behind and mainly consists of development banks and supranational organisation issuers. Since Solar Star Funding LLC issued a large number of green bonds in 2013, the growth of the U.S. green bond market has become rapid. Especially after the Paris Agreement was adopted in 2015, the market developed steadily, and bonds continued to increase in numbers, even during the COVID-19 pandemic period.

Figure B1 U.S. corporate green bond issuance over the years

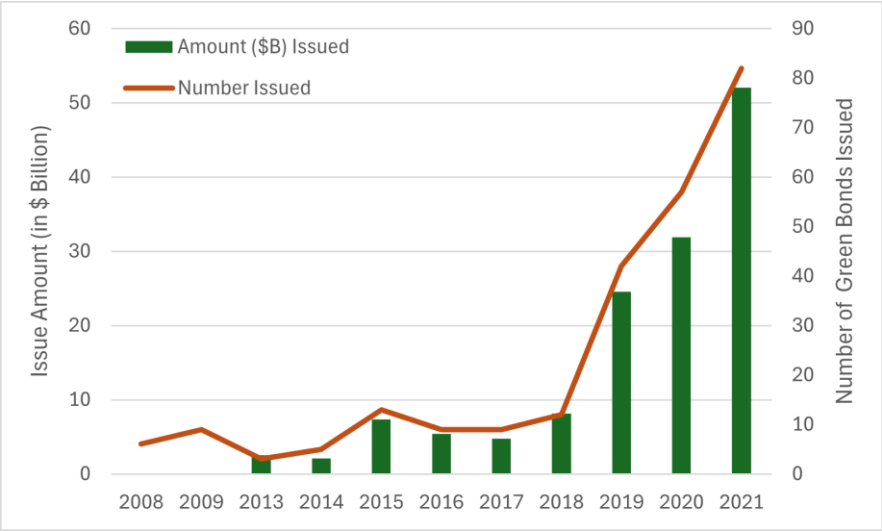
This figure shows the amount (in $billion) and the number of corporate green bonds issued in the U.S. from 2008 to 2021. We construct a U.S. corporate green bond dataset based on the Bloomberg Fixed Income Dataset.



[23] Note that Tesla issued 140 green bonds between 2014 and 2016, which explains why the number of bonds issued surged in 2015 as shown in Figure B1. We display the U.S. corporate green bond issuance, excluding Tesla, in Figure B2. The growth trend remains consistent,

Figure B2 U.S. corporate green bond (excludes Tesla) issuance over the years

This figure shows the amount (in $billion) and the number of corporate green bonds issued in the U.S. from 2008 to 2021, excluding bonds issued by Tesla. We construct a U.S. corporate green bond dataset based on the Bloomberg Fixed Income Dataset.



In Table B1, we present the total issuance amount (in $billion) and the number of corporate green bonds by industry, using all corporate green bonds listed in Bloomberg from 2008 to 2021. Industries are classified by BICS (Bloomberg Industry Classification System) Level 2 codes. We find that firms in the industries directly associated with the environment, including energy and utilities, are the key issuers of green bonds. Moreover, as important investors, financial institutions are also active in the green bond market. Basic summary information about all corporate green bonds over 2008-2021 is provided in panel A of Table B2. A total of 387 corporate green bonds correspond to 168 unique issuer-year observations and 112 unique issuers. The average issuance amount is large, around $360 million. The average maturity is around 10 years. Among these bonds, more than 91% are fixed-rate bonds with an average coupon rate of 3.3%. In panel B, we present the statistics on the subsample of green bonds issued by public firms. As shown, public issuers, on average, contribute to larger green bond issuance; they prefer to issue fixed-rate green bonds with shorter maturity.

Table B1: Corporate Green Bonds by Industry

This table reports the total issuance amount (in $billion) and the number of corporate green bonds by industry, using all corporate green bonds from 2008 to 2021. Industries are classified by Bloomberg's BICS (Bloomberg Industry Classification System) Level 2 codes.

Industry	Number of Green Bonds	Issue Amt ($ billion)
Financials		
Financial Services	4	0.607
Banks	4	1.400
Diversified Banks	12	11.396
Life Insurance	3	2.000
Consumer Finance	1	0.500
Real Estate	59	30.572
	83	46.475
Industrials		
Apparel & Textile Products	1	0.544
Auto Parts Manufacturing	1	0.400
Automobiles Manufacturing	5	6.635
Communications Equipment	4	4.711
Construction Materials Manufacturing	1	0.450
Consumer Services	2	0.250
Educational Services	2	0.451
Electrical Equipment Manufacturing	1	0.230
Food & Beverage	1	1.000
Health Care Facilities & Services	4	2.227
Machinery Manufacturing	2	1.000
Mass Merchants	1	2.000
Metals & Mining	4	2.736
Power Generation	27	16.070
Railroad	1	0.500
Renewable Energy	153	6.464
Semiconductors	2	1.400
Transportation & Logistics	1	0.300
Utilities	88	42.653
Wireless Telecommunications Services	3	3.000
	304	93.021
Total	387	139.496

Table B2: Summary at bond level

This table provides summary statistics for all corporate green bonds for corporate green bonds issued by public firms. Issuer-years refers to the number of unique years in which a given firm issues green bonds (summed across all firms). Number of issuers refers to the number of distinctive firms. Amount is the issuance amount (in $billion). Maturity is the maturity of the green bond (in years). Coupon type is a dummy variable which equals one if the bond has a fixed coupon payment. Coupon is the coupon rate for fixed-rate bonds only.

	N	Mean	Median	Std. Dev.
Panel A: All Green Bonds				
Number of green bonds	387			
Issuer-year observations	168			
Number of issuers	112			
Issued Amt (in $B)	387	0.360	0.300	0.408
Maturity (in year)	385	9.969	10.000	7.629
Coupon type	387	0.917	1.000	0.276
Coupon rate (for fixed-rate bonds)	355	3.255	3.100	1.503

	N	Mean	Median	Std. Dev.
Panel B: Green Bonds Issued by Public Firms				
Number of green bonds	354			
Issuer-year observations	141			
Number of issuers	84			
Issued Amt (in $B)	354	0.377	0.350	0.416
Maturity (in year)	352	9.693	10.000	7.473
Coupon type	354	0.935	1.000	0.247
Coupon rate (for fixed-rate bonds)	331	3.251	3.150	1.501

4.2 Variables

In this study, our analysis is based on the U.S. corporate green bond and blockholder sample. As the first corporate green bond of a publicly listed company in the U.S. market was issued in 2013, our dataset starts from 2013. We exclude financial institutions (SIC code 6000-6799). After selection, our final sample consists of 12,837 firm-year observations for 2,740 unique firms across 10 industry divisions.[24]

4.2.1 Dependent variables

Issuance of green bonds. We measure the issuance of green bonds using a dummy variable. The variable GREEN BOND equals one if a firm issues at least one green bond in that year.

Cost of debt. In line with prior empirical literature, we use yield spread as the proxy of the cost of debt (*COST OF DEBT*). At the bond level, the yield spread is defined as the yield to maturity of a corporate bond minus the yield of a Treasury bond matched by maturity. We use the constant maturity Treasury securities (H.15) obtained from the Federal Reserve Board as the Treasury securities. Then, the Treasury with the closest maturity to the corporate bond is paired for matching. At the firm-year level, we compute the weighted average yield spread if that firm has multiple bonds outstanding in that year. Following Duffee (1998) and Chen and King (2014), we use the amount outstanding as the weight.

[24] To avoid losing more firm-year observations in the limited green bond sample, we use linear interpolation to fill in missing values of control variables.

Cost of equity. We use expected return proxied by the implied cost of equity instead of realised return. To avoid the time-variant effects of the risk-free rate, we define the cost of equity (*COST OF EQUITY*) as the difference between the implied cost of equity and the risk-free rate of return. Following Gebhardt *et al.* (2001), the implied cost of equity is estimated by the internal rate of return based on analyst forecasts data from I/B/E/S for each firm. The risk-free rate is measured as the U.S. 10-Year Bond Yield.

4.2.2 Independent variable

ESG blockholder. Institutional blockholding information is obtained from both Schedule 13D and Schedule 13 G forms of SEC in the EDGAR system. Both forms are referred to as "beneficial ownership reports" and are used to report shareholder ownership of 5% or more of a voting class of a company's equity securities. SC 13G is a more abbreviated version of SC 13D. The beneficial owners are eligible to file the SC 13G form in lieu of the SC 13D form when they are certain institutions or passive investors, such as institutional investors with no intention of influencing corporate control and individuals whose position in the firm is below 20%, have not acquired equity security with the intent of influencing control over the firm.

We download all SC 13D and SC 13G forms and their amendments reported in the sample period (2012-2021) and then extract the details about the firms, the identity of blockholders, and the positions of blockholding. Further, we filter the institutional blockholders by whether or not to file Form 13F. We then calculate the size of institutional block ownership using the percentage of shares owned by institutional blockholders in the total shares.

To measure ESG blockholders, we match CSR Scores obtained from MSCI ESG KLD STATS with institutional blockholder information. An institutional blockholder can be regarded as an ESG one if their KLD CSR score is above the average score of the full sample in the last

year. We then calculate the total ESG institutional blockholder ownership (ESG BLOCK) as the sum of the ownership of blockholders that are classified as ESG.

4.2.3 Control variables

With regard to factors that control for firm characteristics, financial and accounting information comes from the CRSP-Compustat Merged database and CRSP database, separately, over the 2012-2021 period. Analyst information is obtained from I/B/E/S. *SIZE* is the natural log of total assets. It can be expected that larger firms are more capable of accessing financing and participating in environmental activities by issuing large green bonds. In addition to size, we include *ANALYST* as the proxy for the availability of information since greater analyst coverage tends to indicate stocks' faster response to market-relevant information (Gebhardt *et al.*, 2001); accordingly, a positive relation between the number of analysts and costs of financing can be expected. Analyst forecast-related characteristics, *FSD*, are also controlled. As indicated by Mansi *et al.* (2010), the information provided by these analyst forecast characteristics extends beyond other uncertainty measures, such as idiosyncratic risk and cash flow uncertainty, so analyst forecast dispersion is possibly one of the important determinants of cost of financing. *TOBINQ*, as a proxy of firm value, is calculated by dividing the market value of total assets by the book value of total assets. *ROA*, as a proxy of firm profitability, captures the performance. Higher firm value and better financial performance are expected to support firms in being active in environmental initiatives and reduce firms' financial constraints. For the proxy for financial distress, we employ measures including *LEV*, which is financial leverage measured by debt-to-asset ratio and RISK, which is firm risk measured by the Altman (1968) Z-score. Excessive leverage and high firm risk are likely to increase the cost of financing (Baxter, 1967). We also use *EVOL* to proxy for asset risks. *AGE* is firm age. *BLOCKNUM* is the number of institutional blockholders in that firm. VOL is volatility using the natural log of the standard deviation of

monthly returns measured during the fiscal year. BETA is market beta, controlling for stock market risk. A detailed description of the variables is listed in Appendix B. Given that U.S. firms in different industries face different environmental challenges, industry effects categorised by a 2-digit SIC Code are controlled for by using dummy variables.

In Table B3, we present the summary statistics of bond issuers distinguishing between green bond issuers and conventional bond issuers. As shown, there is higher ownership of ESG blockholders in green bond issuing firms. On average, the size of green bond issuing firms is larger than that of other public firms with more profitability. Whereas green bond issuers, on average, have higher financial distress, they tend to face lower probability and volatility of earnings loss, lower stock volatility, and lower market risks.

Table B3: Firm characteristics of public green bond issuers

This table presents the summary statistics of key variables for corporate green bond issuers. Green bond data is obtained from Bloomberg, and blockholder information is extracted from the SEC EDGAR database. Accounting and financial information are from the CRSP-Compustat Merged database and the CRSP database separately. After merging these datasets and dropping missing values, the sample consists of 501 green bond issuer-year observations over the period of 2013-2021.

		N	Std. Dev.	Mean	Min	Median	Max
BLOCK_NUM	Green Bond	496	1.447	2.879	0.000	3.000	13.000
	Convtn Bond	12,056	1.934	2.580	0.000	20.000	14.000
BLOCK_HOLD	Green Bond	496	13.09	22.514	0.000	21.465	100.000
	Convtn Bond	12,056	19.103	22.922	0.000	20.641	100.000
ESG BLOCK	Green Bond	496	3.892	7.300	0.000	7.200	20.400
	Convtn Bond	12,056	5.215	4.284	0.000	0.000	100.000
SIZE	Green Bond	501	1.557	9.979	3.565	10.403	11.716
	Convtn Bond	12,336	2.173	6.620	1.844	6.654	11.716
LEV	Green Bond	501	0.127	0.358	0.000	0.360	0.827
	Convtn Bond	12,336	0.232	0.258	0.000	0.219	0.981
ROA	Green Bond	501	0.105	0.023	-1.628	0.028	0.293
	Convtn Bond	12,336	0.315	-0.097	-1.628	0.011	0.293
TOBINQ	Green Bond	501	1.363	1.772	0.753	1.306	10.410
	Convtn Bond	12,322	1.794	2.363	0.570	1.779	10.410
BETA	Green Bond	501	0.659	0.714	-0.147	0.480	3.724
	Convtn Bond	12,336	0.689	1.266	-0.243	1.244	3.724

5. Empirical Analysis

5.1 Matching

To investigate how ESG blockholders influence the green bond market, we first examine their impacts on the issuance of a green bond. Then, we explore the evolution of the cost of external financing following the issuance. In our empirical analysis, we are firstly concerned about any potential problems arising from the much smaller size of the sample of green bonds relative to conventional bonds. Secondly, endogeneity issues are another major concern. We not only consider that ESG blockholders might be endogenous with respect to a decision on green bond issuance but also address a possibly spurious relationship between green bond issuance and the cost of financing. For example, the changes in financing costs are likely to bias our results if the cost of debt or capital has reduced in the year of green bond issuance or if the reduction is not a result of green bond issuance.

To alleviate the above concerns, we use a matching approach. Specifically, for each observation of green bond issuance, we match a control firm that has criteria similar to the one treated. There are several criteria used to restrict matching firms. First, we select control firms among conventional bond issuers. Second, we restrict green bond issuers and control firms from being in the same industry. Third, at the firm level, we consider public firms in the CRSP database according to size, profitability (*ROA*), leverage, firm value (*TOBINQ*), and market beta. For each firm characteristic, we measure the variable in the year preceding the green bond issuance (t-1). The highly similar firm characteristics ensure that control firms have the closest abilities, conditions, and opportunities to access the security market and to be green bond issuers.

Table B4: Matching

This table shows the descriptive statistics for green bond issuers and their matched firms. The matching characteristics are measured in the preceding year of green bond issuance (i.e., t-1). Panel A describes statistics for the variables of matching firm characteristics, and Panel B presents statistics for other key variables. The last two columns report the p-value of the difference-in-means and difference-in-medians test, respectively.

		N	Mean	Std. Dev.	Min	Median	Max	*p-value* (diff. in means)	*p-value* (diff. in medians)
Panel A: Matching Characteristics									
SIZE	Treated	84	10.213	1.392	6.648	10.548	11.733	0.575	0.624
	Control	84	10.252	1.338	4.847	10.658	11.733		
LEVERAGE	Treated	84	0.382	0.136	0.002	0.383	0.827	0.531	0.735
	Control	84	0.384	0.158	0.000	0.391	0.983		
ROA	Treated	84	0.026	0.058	-0.232	0.027	0.184	0.504	0.660
	Control	84	0.026	0.064	-0.298	0.027	0.274		
TOBINQ	Treated	84	1.832	1.560	0.632	1.329	10.834	0.228	0.260
	Control	84	1.660	1.424	0.486	1.268	10.834		
BETA	Treated	84	0.591	0.597	-0.032	0.379	3.060	0.819	0.141
	Control	84	0.674	0.579	-0.009	0.549	3.188		
Panel B: Other Characteristics									
BLOCK NUM	Treated	84	2.988	1.548	0.000	3.000	8.000	0.066	1.000
	Control	75	2.627	1.459	0.000	3.000	6.000		
BLOCK HOLD	Treated	84	24.526	13.150	0.000	24.690	62.750	0.204	0.272
	Control	75	22.568	16.177	0.000	21.280	88.637		
ESG BLOCK	Treated	84	7.321	3.983	0.000	7.650	18.800	0.106	0.091
	Control	75	6.436	4.816	0.000	6.600	18.700		

Finally, there are 84 treated firms and 84 matched control firms included in the matching dataset. We show the similarity of treated green bond issuers with matched control firms in Table B4. Panel A displays the statistics for the above five firm characteristics used for matching. For each variable, we report the standard deviation, median, and mean for matching pairs. To test the differences between the medians and means of treated firms and control firms, we further report the p-value of the difference-in-medians and difference-in-means test, respectively. As can be seen, treated firms are highly similar to matched control firms. Panel B provides descriptive statistics for some other key variables. Moreover, we can find higher ESG block ownership in treated firms than in matched ones.

5.2 ESG Blockholders and Green Bond Issuance

In our main regression, we aim to regress green bond issuance on ESG block ownership at the firm level using the probit model.

$$GREEN\ BOND_{i,t} = ESG\ BLOCK_{i,t-1} + CONTROLS_{X\,i,t-1} + \varepsilon_{i,t-1} \qquad (B1)$$

Where *GREEN BOND* is the dependent variable, green bond issuance, which is a dummy variable that equals 1 if the firm has issued at least one green bond as of that year and 0 otherwise. *ESG BLOCK* is the main explanatory variable, the total ownership of ESG blockholders in that firm in the year preceding the green bond issuance. *CONTROLS* is a vector of lagged controls, including a series of firm-specific variables, such as firm size (*SIZE*), financial leverage (*LEV*), firm profitability (*ROA*), firm value (*TOBINQ*), market beta (*BETA*), and firm age (*AGE*). We include industry effects (using a 2-digit SIC code) and year effects in the regression model since bond issuance might vary with industry sectors and years.

The result of the main regression model is reported in Panel A in Table B5. We find that higher ownership of ESG blockholders is significantly and positively related to green bond

issuance. We also present the results of the marginal effects of the main regression in Column (2), in which one unit change in the share percentage of ESG blockholders increases the probability of the firm issuing a green bond by around 0.7%. The main result is consistent with H1 and indicates that firms controlled by blockholders with ESG initiatives are more likely to issue green bonds. This is in line with the finding of Krueger *et al.* (2020), who show that institutional investors, especially those with larger ownership and ESG orientation, are inclined to be actively involved in managing green issues.

As an alternative measure to ESG blockholders, we identify the blockholders that are signatories to United Nations Principles for Responsible Investment (UN PRI) and calculate *UN PRI BLOCK,* which is the sum of ownership of the signatory blockholders. The results are presented in Panel B of Table B5. The coefficient of *UN PRI BLOCK* is also statistically significant and positive, reinforcing our main result that larger ESG ownership is associated with a higher probability of green bond issuance.

Table B5: Regression for Green Bond Issuance

This table reports probit regression results of the impacts of ESG blockholders on green bond issuance. The dependent variable, GREEN BOND ISSUE, is a dummy variable which equals 1 if the firm issues at least one green bond in that year. In Panel A, we include ESG BLOCK, which is the total ownership of ESG blockholders in that firm, as the main explanatory variable. In Panel B, UN PRI BLOCK is the total ownership of blockholders who signed the UN PRI in that firm. A set of control variables are also included in this regression model, namely firm size (SIZE), financial leverage (LEV), firm profitability (ROA), firm value (TOBINQ), and firm age (AGE). These explanatory variables are measured in the preceding year (t-1). All variables are defined in Appendix B. The model controls industry (2-digit SIC codes) effects and year effects. Robust standard errors are in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	GREEN BOND ISSUANCE	
	Main	Margin Effect
Panel A: ESG Blockholders and Green Bond Issuance		
ESG BLOCK	0.043**	0.007**
	(2.14)	(2.15)
SIZE	0.051	0.008
	(0.78)	(0.78)
LEV	0.255	0.042
	(0.47)	(0.47)
ROA	-0.989*	-0.161*
	(-1.79)	(-1.78)
TOBINQ	0.067	0.011

	GREEN BOND ISSUANCE	
	Main	Margin Effect
	(0.89)	(0.89)
BETA	-0.559***	-0.091***
	(-3.16)	(-3.13)
AGE	-0.198**	-0.032**
	(-2.18)	(-2.19)
Industry FE	YES	YES
Year FE	YES	YES
N	669	669
Panel B: Alternative measure using UN PRI signatories		
UN PRI BLOCK	0.034**	0.006**
	(2.47)	(2.47)
SIZE	0.115	0.019
	(1.52)	(1.51)
LEV	0.449	0.075
	(0.73)	(0.73)
ROA	-0.705	-0.118
	(-1.05)	(-1.05)
TOBINQ	0.100	0.017
	(1.23)	(1.22)
BETA	-0.632***	-0.106***
	(-3.09)	(-3.08)
AGE	-0.264**	-0.044**
	(-2.44)	(-2.47)
Industry FE	YES	YES
Year FE	YES	YES
N	566	566

5.3 Environmental Policy Shock and Green Bond Issuance

With the extremely unexpected outcome of Donald Trump's 2016 election, the expectations of financial markets and investors about U.S. climate policy were sharply reversed. Unlike the positive trend following the 2015 Paris Agreement, Donald Trump had a negative attitude toward climate-related regulations and policies. He even announced his decision to withdraw the U.S. from the Agreement. This largely affected the climate change action of the U.S. and other countries until Biden signed to rejoin the Agreement in January 2021. For blockholders, including those who have ESG initiatives, the shock might make it difficult to respond to market reaction and gauge future trends of climate-related regulations and policies. After the election,

Ilhan *et al.* (2021) show that the cost of protection against carbon tail risks for carbon-intense firms decreased; Sautner *et al.* (2023) show a lower risk premium on climate change exposure; and Ramelli *et al.* (2021) find that the markets reacted to the election and rewarded carbon-intensive firms as investors downshifted their expectations towards climate policy. Hence, to further explore the issuance of green bonds and address the endogeneity concerns, we conduct a difference-in-difference (DiD) analysis around the November 2016 Trump Election which provides an exogenous shock to environmental policy. In fact, despite a loosening of climate policy in the post-election period, the impacts of climate change and other environmental issues still exist. Sautner *et al.* (2023) suggest that due to the heterogeneity in firm competencies, these impacts are heterogeneous across firms, even within an industry, which further highlights the significance of the ability of a firm to be involved in green projects under the increased climate policy uncertainty and lower climate regulatory stringency. Existing evidence shows that ESG blockholders can enhance the firm's ability to address climate-related and other environmental risks (Blackrock, 2020; Krueger *et al.*, 2020; Azar *et al.*, 2021). In addition, ESG activism might lead ESG blockholders to be more confident of future climate policy, which was rewarded after the election (Ramelli *et al.*, 2021). As such, we expect that the importance of ESG blockholders to green bond issuance will be higher in the post-election period.

We first estimate a regression model to examine how green bond issuance is affected before and after the Trump election as follows.

$$GREEN\ BOND_{i,t} = ESG\ BLOCK_{i,t-1} * POST + ESG\ BLOCK_{i,t-1} + POST + CONTROLS_{X\,i,t-1} + \epsilon_{i,t-1} \quad (B2)$$

Where POST is a dummy variable that equals 1 after the Trump election and before the Biden election and 0 before the Trump election.

In Panel A of Table B6, we report the impact of the Trump government's passive climate

policy on U.S. green bond issuance. As the results are shown in Column (1), we can find that after the shock, the relation between ESG block ownership and green bond issuance remains positive. That is, overall, there is no significant impact of the Trump government's negative climate policy on U.S. green bond issuance. This is consistent with the general market trend that the amount of green bonds increases steadily in the U.S. market, as shown in Figure B1.

We then extend the model to analyse the dynamic change in the impact of the Trump election on green bond issuance. We use a set of dummies, namely POST1 (equals 1 if in the first year following the Trump election), POST2 (equals 1 if in the second year following the Trump election), and POST3 (equals 1 if in the subsequent years until the Biden election) in the regression model simultaneously. From the results reported in Column (2), we find that green bond issuance is only negatively affected in the first year following the Trump election; however, it is not statistically significant. After that, ESG block ownership is strongly and positively related to green bond issuance in subsequent years. Accordingly, following the climate policy shock of the Trump election, investors, especially the ESG blockholders inside companies, place a higher emphasis on green action to avoid exposure to environmental risks.

Table B6: Climate Policy Shock: 2016 Trump Election

This table reports probit regression results of the impacts of ESG blockholders on green bond issuance. The dependent variable, GREEN BOND ISSUE, is a dummy variable which equals 1 if the firm issues at least one green bond in that year. In panel A, we include ESG BLOCK, which is the total ownership of ESG blockholders in that firm, as the main explanatory variable. In panel B, we conduct difference-in-difference analysis by introducing a dummy variable, HIGH ESG BLOCK, which equals 1 if ESG BLOCK is above the median. POST is a dummy variable that equals to 1 if in the year after Trump election. We also estimate a set of dynamic POST variables, namely POST1 (equal to 1 if in the first year following the Trump election), POST2 (equal to 1 if in the second year following the Trump election), POST3 (equals to 1 if in the subsequent years until Biden election). A set of control variables are also included in this regression model, namely firm size (SIZE), financial leverage (LEV), firm profitability (ROA), firm value (TOBINQ), market beta (BETA), and firm age (AGE). These explanatory variables are measured in the preceding year (t-1). All variables are defined in Appendix B. Robust standard errors are in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	GREEN BOND ISSUANCE	
	(1)	(2)
Panel A: Green Bond Issuance Following Climate Policy Shock		
ESG BLOCK*POST	0.095**	
	(2.10)	
ESG BLOCK*POST1		-0.088

	GREEN BOND ISSUANCE	
	(1)	(2)
		(-1.16)
ESG BLOCK*POST2		0.142**
		(2.26)
ESG BLOCK*POST3		0.126**
		(2.34)
SIZE	0.096	0.102
	(1.23)	(1.24)
LEVERAGE	0.823	0.950
	(1.29)	(1.53)
ROA	-0.988*	-0.986*
	(-1.73)	(-1.69)
TOBINQ	0.203*	0.220*
	(1.73)	(1.88)
BETA	-0.560***	-0.605***
	(-2.69)	(-2.81)
AGE	-0.192*	-0.181*
	(-1.74)	(-1.66)
Constant	-3.879***	-3.983***
	(-3.12)	(-3.10)
Industry FE	YES	YES
Year FE	YES	YES
N	552	552
Panel B: DiD Analysis for Green Bond Issuance Following Climate Policy Shock		
HIGH ESG BLOCK*POST	0.915**	
	(2.18)	
HIGH ESG BLOCK*POST1		-0.092
		(-0.14)
HIGH ESG BLOCK*POST2		1.109*
		(1.67)
HIGH ESG BLOCK*POST3		1.117**
		(2.54)
SIZE	0.082	0.076
	(1.05)	(0.98)
LEVERAGE	0.901	0.969*
	(1.49)	(1.67)
ROA	-0.971*	-0.969*
	(-1.69)	(-1.68)
TOBINQ	0.191	0.195
	(1.59)	(1.64)
BETA	-0.554***	-0.586***
	(-2.66)	(-2.80)
AGE	-0.175	-0.185*
	(-1.63)	(-1.75)
Constant	-3.677***	-3.633***
	(-2.96)	(-2.96)
Industry FE	YES	YES
Year FE	YES	YES
N	552	552

Next, we employ a high ESG blockholding dummy (HIGH ESG BLOCK) to conduct the DiD analysis for environmental policy uncertainty's influence on green issuance. From the

results in Panel B of Table B6, we can see that the green bond issuance of firms with high ownership of ESG blockholders goes up substantially in the long run, increasing by around 1.109 in the second year and 1.117 in the subsequent years after the election, relative to that of firms with low ownership of ESG blockholders. This is consistent with the results in Panel A.

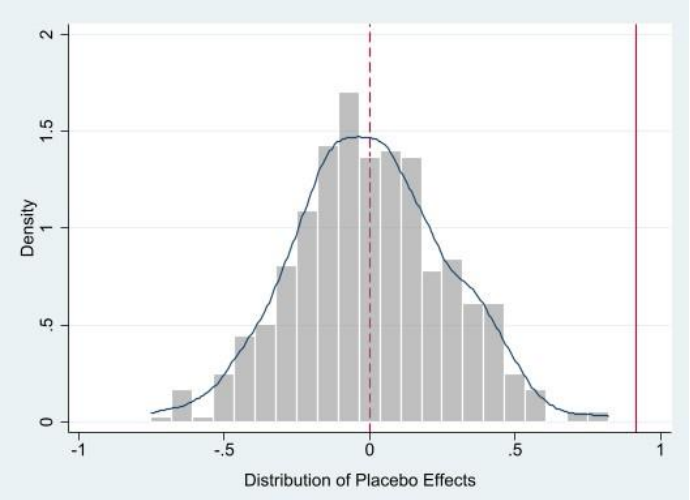
5.3.1 Placebo test

Although our findings suggest that ESG block ownership has positive influences on green bond issuance after the impacts of climate policy shock, these findings could have been due to cyclical trends, the persistence of prior exogenous variation, or spurious correlations. In addition, potential bias could arise from omitted variables coinciding with the ownership of ESG blockholders. To alleviate the concerns, we undertake a placebo test in Figure B3. Based on the random reassignment of treatment units and time, we re-estimate the model in Equation (B2). In support of the statistical model, we find in Figure B3 that the average effects with randomly assigned ESG block ownership are centred around 0. Moreover, two-sided and right-sided p-values, which are the frequencies that the absolute values of the placebo effects are greater than or equal to the absolute value of the estimated treatment effect, are smaller than 0.01. Therefore, it is unlikely that our findings are an outcome of spurious trends or correlations or driven by bias.[25]

[25] Alternatively, we re-estimate the regression model in Equation (B2) by using alternative dependent variable and main explanatory variable, respectively. To this end, we first replace dependent variable of green bond issuance with conventional bond issuance. Second, we replace the explanatory variable of ESG block ownership with all block ownership. The results show the DiD coefficients are insignificant, indicating that our findings are not driven by spurious correlations.

Figure B3 Placebo test

This figure reports distributions of point estimates of the effect of ESG block ownership and green bond issuance obtained by re-estimating Equation (B2) on randomised placebo datasets. Each histogram shows the distribution of the effects on green bond issuance for the randomisation scheme. The actual coefficient estimates are red vertical lines. P-values (test statistic) are calculated as the fraction of coefficients from randomised regressions that exceed the actual estimate.



5.4 SRI Shareholder Proposal: A Channel

If ESG blockholders make efforts to improve their portfolio firms' environmental performance and to spur fundraising for environmentally friendly projects, we expect to observe an increasing trend of SRI shareholder proposals. The use of "voice" or the threat of voting is a dominant mechanism for blockholders to influence firm environment-related decision-making and policies and can be publicly observable. Flammer *et al.* (2021) show that shareholders putting pressure through more environment-related proposals leads to more voluntary disclosures of climate change risks. Moreover, Flammer (2015) finds positive market responses to the adoption of close-call proposals that support environmentally friendly policies. In this section, we examine the potential channel through which ESG blockholders affect green bond issuance. Shareholder proposals and vote results are obtained from Institutional Shareholder Services (ISS), formerly known as RiskMetrics. The proposals are often withdrawn or do not come to a vote when the shareholders and the management have reached an agreement.

$$SRI\ Proposal_{i,t} = ESG\ BLOCK_{i,t-1} + CONTROLS_{X\,i,t-1} + \varepsilon_{i,t-1} \quad (B3)$$

Following Chen *et al.* (2020), we test the *SRI Proposal* using both the number and the probability of the SRI shareholder proposals and present the results of their relation with ESG block ownership in Panel A of Table B7. In Column 1, we display the results of the number of SRI shareholder proposals. Our result shows that ESG blockholders increase the number of SRI shareholder proposals. Column 2 reports the estimated marginal effects from a probit regression. We find that higher ownership of ESG blockholders is linked to a higher probability of SRI shareholder proposals. Put differently, ESG blockholders are positively associated with engagement in ES-related policies, such as green financing policies. Taken together, the findings are consistent with our expectations and reveal that ESG blockholders increase the probability of green bond issuance.

$$GREEN\ BOND_{i,t} = ESG\ BLOCK_{i,t-1} * SRI\ Proposal_{i,t-1} + CONTROLS_{X\,i,t-1} + \varepsilon_{i,t-1} \quad (B4)$$

Further, we verify the SRI proposal channel by introducing the probability of the SRI shareholder proposals into our baseline regression model. *SRI Proposal* is estimated from Equation (B3). The statistically significant coefficient of the interaction term in Panel B in Table B7 shows that a one-unit increase in the interaction between ESG block ownership and the probability of the SRI shareholder proposals predicts a 5.3% higher probability of firms' issuing a green bond, suggesting that when firms are owned by ESG blockholders, they are encouraged to issue green bonds by more SRI proposals. Thus, our findings provide evidence of the SRI shareholder proposal channel through which ESG blockholders influence their portfolio firms' green bond issuance.

Table B7: SRI Shareholder Proposal as a channel

The table in Panel A reports the result of ESG blockholders on the number of SRI shareholder proposals in Column 1 and the estimated marginal effects from probit regression on the probability of SRI proposals in Column 2. We include ESG BLOCK, which is the total ownership of ESG blockholders in that firm, as the main explanatory variable. The table in Panel B presents the results of a probit regression of the probability of SRI proposals as a channel through which ESG blockholders impact green bond issuance. A set of control variables are also included in this regression model, namely firm size (SIZE), financial leverage (LEV), firm profitability (ROA), firm value (TOBINQ), and firm age (AGE). These explanatory variables are measured in the preceding year (t-1). All variables are defined in Appendix B. The model controls industry (2-digit SIC codes) effects and year effects. Robust standard errors are in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Impacts of ESG blockholders on SRI shareholder proposals		
	(1)	(2)
	Number of SRI Proposals	Probability of SRI Proposals
ESG BLOCK	0.0301***	0.0204***
	(3.24)	(4.67)
SIZE	0.2748***	0.1403***
	(7.89)	(8.93)
LEV	0.1717	0.1367
	(0.64)	(1.14)
ROA	-1.1916***	-0.3973
	(-3.12)	(-1.46)
TOBINQ	0.1399***	0.0908***
	(3.24)	(4.65)
BETA	-0.1133*	-0.0673
	(-1.79)	(-1.43)
AGE	0.0629	0.0825***
	(1.33)	(3.43)
Industry FE	YES	YES
Year FE	YES	YES
N	754	713
Panel B: Interaction with Number of SRI Proposals		
	Main	Margin Effect
ESG BLOCK*SRI NUM	0.0896**	0.0145**
	(2.40)	(2.44)
SIZE	-0.0232	-0.0038
	(-0.35)	(-0.35)
LEV	0.0781	0.0127
	(0.14)	(0.14)
ROA	-0.6636	-0.1077
	(-1.20)	(-1.20)
TOBINQ	0.0089	0.0014
	(0.11)	(0.11)
BETA	-0.5008***	-0.0813***
	(-2.80)	(-2.77)
AGE	-0.2239**	-0.0363**
	(-2.29)	(-2.32)
Industry FE	YES	YES
Year FE	YES	YES
N	636	636

5.5 Cost of External Financing and the Role of Blockholders

We examine how the cost of debt and equity are affected following green bond issuance.

$$COST\ OF\ DEBT_{i,t+j} = GREEN\ BOND_{i,t} + CONTROLS_{A\,i,t} + \epsilon_{i,t} \qquad (B5)$$

$$COST\ OF\ EQUITY_{i,t+j} = GREEN\ BOND_{i,t} + CONTROLS_{B\,i,t} + \epsilon_{i,t} \qquad (B6)$$

Where *COST OF DEBT* (Equation B5) and *COST OF EQUITY* (Equation B6) are the dependent variables, measured in 1 to 3 years post green bond issuance, the remaining variables are defined in Equation (B1). The results are reported in Table B8. Equation (B5) controls for firm size (*SIZE*), financial leverage (*LEV*), firm risk (*RISK*), earnings volatility (*EVOL*), number of blockholders (*BLOCKNUM*), firm age (*AGE*), and stock volatility (*VOL*). In Equation (B6), we control for size (*SIZE*), financial leverage (*LEV*), firm profitability (*ROA*), stock volatility (*VOL*), and analyst-related characteristics (*ANALYST* and *FSD*). Both models include industry effects (using a 2-digit SIC code) and year effects in the regression model since the cost of financing might vary with industry sectors and time.

Columns (1) – (3) in Table B8 provide the regression results of 1 to 3 years after, respectively. We find that green bond issuance is negatively associated with the cost of debt in the first year following the issuance of green bonds (*+1Y*). The results are statistically significant. More specifically, green bond issuance will reduce the cost of bond financing by 0.21 (0.836*0.254), or 21 basis points. However, the significant influence of green bond issuance on lowering the cost of debt vanishes after the first year following the issuance. The results indicate that the issuance of green bonds is beneficial for reducing issuers' cost of debts in the short term. These findings are consistent with the signalling role of green bonds – the issuance tends to provide a positive signal to bond markets (Flammer, 2021). By issuing a green bond, firms signal a green commitment that their firm risks, including environmental risks,

could be low, which affects the cost of debt financing.

In columns (4) – (6) in Table 8, we find that green bond issuance is negatively associated with the cost of equity capital. However, the results are only significant three years after the issuance of green bonds. More specifically, the cost of bond financing will reduce with green bond issuance by 1.30 (5.1020*0.254), or 130 basis points in the third year. The results suggest that commitment to sustainability signalled by green bond issuance tends to be long-term. With the lower environmental risks led by progressive green investments following the issuance, investors tend to require lower returns.

Table B8: Regression for Cost of Financing Following Green Gond Issuance

This table reports the regression results of the influence of the issuance of green bonds on the cost of debts in the following years. Columns (1) - (3) provide the regression results of the 1-year-ahead, 2-year-ahead, and 3-year-ahead costs of debt. The dependent variable, COST OF DEBT, is proxied by a weighted average of bond yield spread. Columns (4) - (6) provide the regression results of the cost of capital of 1-year-ahead, 2-year-ahead, and 3-year-ahead, respectively. The dependent variable, COST OF CAPITAL, is measured by the implied cost of equity minus the risk-free rate. The main explanatory variable, GREEN BOND ISSUE, is a dummy variable and equals 1 if the firm issues at least one green bond in that year. For regression of cost of debt, we include a set of control variables, namely firm size (SIZE), financial leverage (LEV), firm risks (RISK), earnings volatility (EVOL), number of blockholder (BLOCKNUM), firm age (AGE), and stock volatility (VOL). For regression of cost of capital, we include firm size (SIZE), financial leverage (LEV), firm profitability (ROA), stock volatility (VOL), analyst forecast dispersion (FSD), and analyst following (ANALYST) as control variables. All variables are defined in Appendix B. The model controls industry (2-digit SIC codes) effects and year effects. Robust standard errors are in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) Cost of Debt (+1Y)	(2) Cost of Debt (+2Y)	(3) Cost of Debt (+3Y)	(4) Cost of Equity (+1Y)	(5) Cost of Equity (+2Y)	(6) Cost of Equity (+3Y)
GREEN BOND ISSUE	-0.836*	-0.216	0.061	2.0710	0.1780	-5.1020***
	(-1.79)	(-0.45)	(0.17)	(0.75)	(0.06)	(-2.70)
SIZE	-0.323	0.036	0.024	1.1415*	0.5519	1.1892*
	(-1.44)	(0.16)	(0.11)	(1.70)	(0.73)	(1.69)
LEV	0.257	0.438	1.822	0.9404	3.7655	-2.5719
	(0.18)	(0.29)	(1.36)	(0.12)	(0.35)	(-0.24)
RISK	-0.170	0.389**	0.655***			
	(-1.03)	(2.12)	(3.71)			
EVOL	-9.180***	-8.812***	-4.573**			
	(-3.13)	(-4.52)	(-2.29)			
BLOCKNUM	0.504***	0.502***	0.457***			
	(3.57)	(3.90)	(4.78)			
AGE	-0.404**	-0.650***	-0.609***			
	(-2.19)	(-3.72)	(-3.55)			
VOL	-0.032	-0.005	-0.013	0.2170**	0.1456*	0.2355**
	(-1.33)	(-0.18)	(-0.42)	(2.54)	(1.70)	(2.29)
ROA				-26.1695***	-8.4776	-0.0509
				(-2.62)	(-0.90)	(-0.00)
FSD				2.6214	3.0705	5.4636
				(1.16)	(0.90)	(1.05)
ANALYST				-0.5360	0.2091	0.7700
				(-0.67)	(0.25)	(0.96)

	(1) Cost of Debt (+1Y)	(2) Cost of Debt (+2Y)	(3) Cost of Debt (+3Y)	(4) Cost of Equity (+1Y)	(5) Cost of Equity (+2Y)	(6) Cost of Equity (+3Y)
Constant	7.036***	2.163	1.202	-10.1956	-4.9557	-13.4334
	(2.80)	(0.83)	(0.43)	(-1.13)	(-0.57)	(-1.63)
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	515	455	391	611	520	432
R-squared	0.285	0.290	0.270	0.2205	0.1421	0.1455

Blockholders not only exert effects on their portfolio firms' decision-making and policies but also have a mass of opportunities to deliver their value and their portfolio firms' value to the markets. The investment screening of ESG blockholders, to a certain extent, can endorse the green commitment of their portfolio firms. Stated another way, ESG blockholders might send a further positive signal to the bond and stock markets that their portfolio firms who issue a green bond generally have strong green credentials and commitments, hence leading to a positive reaction in the market where firms are expected to access external financing at lower costs. Given the standing of these institutional investors in the security market, we further examine whether ESG blockholders can moderate the relation between green bond issuance and cost of financing by adding an interaction term of high ESG block ownership dummy with green bond issuance. The results are reported in Table B9.

As the results in columns (1) – (3) in Table B9 show, the coefficient of the interaction term (*GREEN BOND ISSUE*HIGH ESG BLOCK*) in 3-years ahead of the cost of debt regression is significant and negative while the stand-alone coefficient of green bond is positive and significant in Model 3. The results are consistent with hypothesis H3b and suggest that although issuing green bonds does not lead to a lower cost of debt in the long run, the cost of debt decreases significantly in the 3-year post-green bond issuance when a large portion of blockholders are ESG-oriented. We indicate that ESG blockholders, to some extent, compensate for the inadequacy of the long-term effects of green bond issuance on issuers' financing costs in debt markets.

Table B9: Regression for Cost of Financing Following Green Bond Issuance in Firms with High ESG Block Ownership

This table reports the regression results of the influence of the issuance of green bonds on the cost of debts in the following years. Columns (1) - (3) provide the regression results of 1-year-ahead, 2-year-ahead, and 3-year-ahead cost of debt, respectively. The dependent variable, COST OF DEBT, is proxied by a weighted average of bond yield spread. Columns (4) - (6) provide the regression results of the cost of capital of 1-year-ahead, 2-year-ahead, and 3-year-ahead, respectively. The dependent variable, COST OF CAPITAL, is measured by the implied cost of equity minus the risk-free rate. The main explanatory variable, GREEN BOND ISSUE, is a dummy variable and equals 1 if the firm issues at least one green bond in that year. We also include the interaction term between GREEN BOND and HIGH ESG BLOCK, namely GREEN BOND* HIGH ESG BLOCK. For regression of cost of debt, we include a set of control variables, namely firm size (SIZE), financial leverage (LEV), firm risks (RISK), earnings volatility (EVOL), number of blockholder (BLOCKNUM), firm age (AGE), and stock volatility (VOL). For regression of cost of capital, we include firm size (SIZE), financial leverage (LEV), firm profitability (ROA), stock volatility (VOL), analyst forecast dispersion (FSD), and analyst following (ANALYST) as control variables. All variables are defined in Appendix B. The model controls industry (2-digit SIC codes) effects and year effects. Robust standard errors are in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) Cost of Debt (+1Y)	(2) Cost of Debt (+2Y)	(3) Cost of Debt (+3Y)	(4) Cost of Equity (+1Y)	(5) Cost of Equity (+2Y)	(6) Cost of Equity (+3Y)
GREEN BOND ISSUE	-0.435	0.412	0.723*	4.2407	-4.8557**	-6.1180**
	(0.640)	(0.428)	(0.386)	(0.79)	(-2.12)	(-2.09)
HIGH ESG BLOCK	0.182	0.540	0.551	-0.7663	-2.2006*	0.3770
	(0.319)	(0.355)	(0.368)	(-0.66)	(-1.94)	(0.25)
GREEN BOND ISSUE*HIGH ESG BLOCK	-0.770	-1.263	-1.731***	-3.7052	9.6569	3.4547
	(0.879)	(0.892)	(0.618)	(-0.56)	(1.60)	(0.84)
SIZE	-0.310	0.101	0.088	1.0038	0.3752	1.2588*
	(0.233)	(0.236)	(0.230)	(1.35)	(0.47)	(1.76)
LEV	0.254	0.509	1.846	1.0742	3.9769	-2.7485
	(1.461)	(1.528)	(1.355)	(0.14)	(0.37)	(-0.26)
RISK	-0.167	0.400**	0.666***			
	(0.165)	(0.184)	(0.176)			
EVOL	-9.119***	-8.939***	-4.764**			
	(2.970)	(1.987)	(2.059)			
BLOCKNUM	0.491***	0.452***	0.413***			
	(0.142)	(0.132)	(0.109)			
AGE	-0.416**	-0.724***	-0.696***			
	(0.192)	(0.189)	(0.184)			
VOL	-0.031	0.000	-0.008	0.2055**	0.1199	0.2397**
	(0.024)	(0.028)	(0.031)	(2.25)	(1.32)	(2.15)
ROA				-26.4675***	-9.6899	-0.1181

	(1) Cost of Debt (+1Y)	(2) Cost of Debt (+2Y)	(3) Cost of Debt (+3Y)	(4) Cost of Equity (+1Y)	(5) Cost of Equity (+2Y)	(6) Cost of Equity (+3Y)
				(-2.62)	(-1.03)	(-0.01)
FSD				2.2888	2.4339	5.6755
				(0.99)	(0.72)	(1.08)
ANALYST				-0.4560	0.3823	0.7396
				(-0.56)	(0.45)	(0.86)
Constant	6.873***	1.434	0.524	-8.2892	-1.8087	-14.3193
	(2.631)	(2.649)	(2.826)	(-0.82)	(-0.19)	(-1.57)
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	515	455	391	611	520	432
R-squared	0.287	0.295	0.276	0.2232	0.1514	0.1462

The results in columns (4) – (6) in Table B9 show that the coefficients of the interaction term (*GREEN BOND* HIGH ESG BLOCK*) are insignificant. However, the stand-alone coefficient of the green bond issue is negatively significant in Models 5 and 6, which suggests that if the cost of capital falls significantly with the issuance of green bonds, ESG blockholders will not exert excess influence. Taken together, our results reveal that blockholders with ESG initiatives create additional value for green bond issuers by offering them access to debt markets at lower costs and are also in line with the finding of Gloßner (2019), who indicates that the role of blockholders is effective in ensuring that firm decision-making and policies are in shareholders' interests.

6. Conclusion

In this part, we highlight the significant role of ESG blockholders in the green bond market. Based on a matching dataset of green bond issuers and conventional bond issuers, our results show that higher ownership of blockholders with ESG initiatives is positively associated with the issuance of corporate green bonds. We also indicate that they may exert significant influences on the issuance through SRI shareholder proposals. The findings also provide evidence for the extant blockholder literature by manifesting the engagement of blockholders in firms' environmentally friendly activities through the green bond market.

We then explore how the issuance of green bonds benefits the issuing firms over the years. We first examine the cost of debt financing in the years following the green bond issuance. The empirical result of the 1-year-ahead cost of debts shows that the issuance of green bonds is negatively related to issuers' cost of debts, suggesting that firms can benefit from issuing a green bond by accessing debt financing at a lower cost in the short term. Next, we examine how the cost of equity financing evolves in the years subsequent to green bond issuance. We find that green bond issuance has a negative relation with the cost of equity in the

third year following the issuance. Moreover, we find that ESG blockholders effectively weaken or even alter the positive relation between green bond issuance and the cost of debt financing. In other words, higher ownership of ESG blockholders is likely to compensate for the inadequacy of green issues in reducing future costs of financing. Overall, our findings are not only consistent with the previous blockholder literature that with sizeable ownership, blockholders exert important monitoring effects on environmental issues and financing policies but are also consistent with prior work stating that the issuance of green bonds plays a positive signalling role in firms' committing to governance and environmental performance. Moreover, we indicate that markets indeed reward potential ESG profiles led by green investment through green bond financing. Furthermore, this study suggests that as the pioneers of incorporating environmental and social concerns into the business, the existence of blockholders with ESG activism can send a credible signal that the firm is committed to lower financial and environmental risks, higher reputation, and more development opportunities, thus convincing investors to make investments.

Since the Paris Agreement was adopted by 196 parties in 2015, the green bond market boomed and has been developing steadily. However, when compared with other security markets, the number and amount of bond issuance are still small in green bond markets. This study implies that the increasing number of institutions paying attention to environmental and social issues is a key part of the development of green bond markets. With regard to the growth of green bond markets, governments are expected to overcome obstacles so that more institutions and companies can participate in ESG activities and green financing.

IV. Investor Demand for Corporate Bonds: Role of Analysts

1. Introduction

Great investor demand is an essential prerequisite not only for firms to access external finance but also for investors to diversify their portfolios. A high level of oversubscription in the orderbook for new bonds can provide firms with a stronger bargaining position in terms of setting the final terms of an offering (Miller and Puthenpurackal, 2002; Cornelli and Goldreich, 2003; Derrien, 2005). Existing literature also demonstrates that higher investor demand for corporate bonds lowers the cost of capital, which increases the value of firms, and shortens the timing of the next issuance, which also improves the strength of firms' access to capital; hence, issuers are concerned about attracting sufficient demand for their offerings (Derrien, 2005; Krebbers *et al.*, 2023). Likewise, for investors, considering the scarcity of opportunities to subscribe for bonds in the primary market, the attraction of new bond issuance is higher due to the diversification benefits, as it allows investors to adjust their portfolio actively and hence would demand new bond issuance by a company (Asquith *et al.*, 2013).

Existing literature argues that bond issuance has comparatively lower information asymmetry than equity issuance due to the large amount of information available in the bond prospectus, reducing adverse selection concerns (Cantillo and Wright, 2000; Krebbers *et al.*, 2023). However, new bond issuance still suffers from information asymmetry due to the illiquid

trading of bonds in secondary markets (Wang and Wu, 2023), as well as complex information disclosed in prospectuses (Li *et al.*, 2023).

Analysts, acting as a key intermediary between firms and markets, deliver a variety of information and signals about their covered firms to investors. Such information and signals can be valuable, as investors often lack sufficient value-relevant information. In this study, we investigate whether the activity of equity analysts significantly affects the demand for corporate bonds issued by a firm. These analysts influence the investment decisions of bond investors not only through their information flowing from stock markets to bond markets (Downing *et al.*, 2009) but also through their influence on stock prices, which may affect the demand and pricing of bonds in the secondary market (Merton, 1974). In addition, relative to bond analysts, equity analysts cover many more public firms, resulting in wider value-relevant information contained in the research outputs they provide for potential bond investors.

A large amount of literature provides plenty of evidence on the 'bright side view' of analyst activity in the firm's information environment. First, by playing a key informational role in security markets through the interpretation and discovery of information (Asquith *et al.*, 2005; Li, 2020; Lof and Van Bommel, 2023), analysts provide numerous future insights about their covered firms to capital markets (Chen *et al.*, 2010; Charitou *et al.*, 2019) that can stimulate more investor responses in the primary and secondary markets (Lehavy *et al.*, 2011). Second, as one of the most important external monitoring agents, analysts' activities may send the investors a positive signal of a firm's governance. Interaction with firm management and a transparent information environment contributed by analyst activities make it difficult for the management to engage in earnings management (Yu, 2008; Irani and Oesch, 2013), fraud (Dyck *et al.*, 2010; Yin *et al.*, 2020), and other value-destroying activities (Chen *et al.*, 2015). Third, firms are more visible in markets when analysts engage in market promotion (Merton, 1987),

which increases investor awareness and recognition. Analysts' coverage choice itself, to some extent, signals firms' prospects to capital markets (Bradshaw *et al.*, 2006). Consistent with the influence of analysts on reducing information asymmetry, improving monitoring effectiveness, and enhancing firm visibility, we argue that the demand for bonds issued by firms with more analyst activities is higher.

However, the 'dark side view' argues that analyst activities do not send credible signals of the real conditions of firms to market investors. For instance, analysts imposing excessive importance on the short-term financial performance of firms may induce myopic behaviours and earnings management (He and Tian, 2013; Irani and Oesch, 2016), which subsequently results in unexpectedly high accuracy of forecasts (i.e., smaller differences between analysts' estimates and firms' reported earnings) if analysts' estimates are based on the management's misleading earnings numbers (Louis *et al.*, 2013) instead of the real condition of the firms. Likewise, the literature also provides evidence that analysts' incentive to misinform markets may stem from tipping and close ties with firm management (Chung and Jo, 1996; Chen and Matsumoto, 2006; Bradley *et al.*, 2017). This may result in analysts being interpreted as an untrusted signal of a transparent information environment and firms' commitments to corporate governance and performance. Given that institutional investors are a principal component of bond markets, they are more sophisticated and more likely to possess the ability to distinguish credible signals of analysts from untrusted ones. In line with the 'dark side view', we argue that investors in bond markets are less likely to invest in firms with high levels of analyst activity.

In this study, we test the two competing views on the real role of analysts in bond markets by examining the relationship between analyst activities and investor demand for bonds of covered firms. We investigate the orderbook size of 8,563 fixed-coupon investment-grade corporate bonds issued by 1,279 public firms from 38 countries between the period from 2008

to 2022. We use three measures of analyst activities. To proxy the quality of analyst earnings forecasts, we follow Mansi *et al.* (2010) to measure both *Forecast Accuracy*, which is the negative absolute value of the analyst forecast error (i.e., the difference between the actual EPS and the average EPS forecast) scaled by the stock price at the end of each fiscal year, and *Forecast Dispersion*, which is the standard deviation of analyst earnings forecasts scaled by the stock price at the end of each fiscal year. We then measure analyst coverage (*Coverage*) based on the number of analysts covering a particular firm in a given year. Following Krebbers *et al.* (2023), we construct our dependent variable investor demand, denoted as *Oversubscription*, which is the ratio of orderbook size to the issue amount of that bond. Due to the lower liquidity of a corporate bond in its secondary market (Hotchkiss and Ronen, 2002; Asquith *et al.*, 2013), the level of oversubscription in the primary market reasonably and accurately measures investors' overall bond demand. [26]

After controlling for a range of firm, bond, and country characteristics, our baseline results show a significantly positive relation between analyst coverage and oversubscription. We also find that analyst forecast accuracy (dispersion) is significantly positively (negatively) associated with the level of oversubscription. The results are robust after addressing the endogeneity issue and using alternative measures of investor demand. The statistically and economically significant evidence supports the 'bright side view' that analysts play positive roles in mitigating information asymmetry by delivering credible information and signals of their covering firms to bond market investors.

Next, we investigate the bond heterogeneity by investigating the green bonds and debut bond offerings separately. We find that the investor demand is not significantly related to analyst

[26] Asquith *et al.* (2013) and Hotchkiss and Ronen (2002) indicates that bonds are most liquid at issue and are traded at very low level in secondary markets.

forecast accuracy (dispersion) and coverage of the green bond issuers and is only significantly associated with the coverage of non-green bond issuers, which is consistent with the notion that green bonds have lower information asymmetry and better signalling associated with firms' environment commitment (Flammer, 2021; Risal *et al.*, 2023). We then find that the analysts' impact on oversubscription for debut bond issuers is no greater than that for seasoned bond issuers, which is consistent with the finding of Cai *et al.* (2007), who suggest no significant information problem occurs with the debut of investment-grade bonds.

Given that analysts' activities are informative when the information asymmetry associated with a firm is higher, we also investigate the firm cross-sectional heterogeneity based on their information environment proxied using the firm's beta, stock return volatility and business risks (standard deviation of cash flow from operations). We find that the impacts of analysts are more pronounced in issuers with high beta, high stock return volatility and high levels of business risks, highlighting the positive role of the analysts as the information intermediary.

Likewise, we also argue that the information role of analysts would be important in firms with low ESG performance. Given the concerns that bondholders' claims are closely associated with ESG-related performance (Apergis *et al.*, 2022), we investigate firms' cross-sectional heterogeneity based on their ESG scores and carbon emissions. We find that the impacts of analysts are also more pronounced in issuers with low ESG scores and high carbon emissions. The results indicate that in spite of the intention to optimise the risk-return characteristics of their portfolio by investing in non-ESG firms, investors still demand more accurate information from more analysts to buffer themselves against risks (Kelly and Ljungqvist, 2012) arising from ESG-related liabilities. Altogether, our findings reveal that the value of analysts may extend beyond the risks in the markets and within the business itself (Mansi *et al.*, 2010; Loh and Stulz, 2018).

Our study contributes to the literature by adding evidence on the determinants that affect investor demand in bond markets. We shed light on the positive roles of analysts in the demand for bonds by showing that the level of oversubscription is strongly related to analyst activities, including their coverage decisions and the quality of their research outputs. Our results complement the empirical evidence of Krebbers *et al.* (2023), who demonstrate that credit risks and bond market presence are important factors in investor demand. Moreover, we contribute to the existing literature about market information asymmetry by showing that analysts are a key intermediary between firms and bond markets. Little existing research ascertains the relationship between analysts and information asymmetry in bond markets. Different from prior studies that focus on the cost of debt (Mansi *et al.*, 2010; Derrien *et al.*, 2016; Ferrer *et al.*, 2019), we provide a novel perspective on investors' real response to a certain bond or a certain issuer. Based on the level of oversubscription, our study implies that analysts' credible information and signals indeed mitigate information asymmetry and thus affirmatively stimulate investors' demands.

The rest of this study is organised as follows: Section 2 summarises the literature review on analysts' roles in security markets and develops hypotheses. Section 3 presents the sample and variables and describes the data. Section 4 presents the multivariate model and reports the results of empirical analysis. Section 6 concludes.

2. Related Literature and Hypotheses

2.1 Investor demand

The corporate bond market, as one of the largest financial markets all over the world, has its unique breakpoint of liquidity. A corporate bond's highest level of trading usually occurs in the primary market and quickly loses liquidity after the issuance (Lo *et al.*, 2004). So, investors'

demand for a bond or preference for an issuer is fully reflected in their subscription to a new bond at the 'bookbuilding' stage. For investors, due to the diversification benefits, a new bond's issuance is attractive as it allows them to adjust their portfolio actively. Thus, investors tend to have a demand for new bond issuance by their preferred firms (Asquith *et al.*, 2013). For bond issuers, bookbuilding is a procedure of extracting information from investors' bids; that is, a high level of oversubscription in the orderbook can provide them with a strong bargaining position in terms of setting the final terms of an offering (Miller and Puthenpurackal, 2002; Cornelli and Goldreich, 2003). Specifically, Derrien (2005) shows that large investors' demand is associated with higher IPO prices and initial returns. Krebbers *et al.* (2023) also demonstrate that higher investor demand for corporate bonds increases the value of firms and shortens the time to the next issuance, which further improves the strength of firms' access to capital. Hence, issuers are concerned about attracting sufficient demand for their offerings.

Moreover, offerings in the corporate bond market have lower information asymmetry compared to the equity market. Under the procedure of bond issuance, there is a large amount of information available in the bond prospectus, reducing adverse selection concerns to a certain extent (Cantillo and Wright, 2000; Krebbers *et al.*, 2023). However, new bond issuance still suffers from information asymmetry due to illiquid trading of bonds in secondary markets (Wang and Wu, 2023) and complex information disclosed in prospectuses (Li *et al.*, 2023). Miller and Puthenpurackal (2002) indicate that investors are willing to pay a higher price for bonds with more detailed information disclosure and a better investment environment. Likewise, Easley and O'hara (2004) argue that investors demand a higher return for the information asymmetry since a greater information problem induces greater losses for them. In line with the prior studies, we argue that the information environment can affect investor demand for new bond issuance. To have a bargaining position, bond issuers should highlight

the role of information, for example, increasing features such as analyst coverage (Easley and O'hara, 2004), to attract greater investor demand.

2.2 The 'bright side' of analyst activities

The literature that provides evidence on the 'bright side' generally argues that analysts' activities help reduce information asymmetry, have superior predictive abilities, enhance monitoring, and improve firm visibility. We argue that these factors can also improve the investor demand towards securities issued by the covered firms.

In relation to the information asymmetry and superior predictive abilities, the literature suggests that analysts derive their informational role from two main sources: the interpretation of public information and the discovery of new information (Ivković and Jegadeesh, 2004; Asquith *et al.*, 2005; Chen *et al.*, 2010). Analysts, being professionally trained with extensive knowledge and experience in the firm or industry, possess superior information processing abilities to interpret, analyse promptly, and forecast information (Chen *et al.*, 2010; Livnat and Zhang, 2012). Subsequently, they embed the interpretations and analyses in their reports, recommendations, or forecasts. Chen *et al.* (2010) demonstrate that analysts often discuss the impact of accounting methods, recompile financial statements for comparability over time and across peers, and infer implications of changes in firm strategy for future financial performance in their research following earnings announcements and information disclosures.

Prior studies have also investigated and recognised the value of analysts' roles in interpreting public information. Francis *et al.* (2002) and Frankel *et al.* (2006) examine the information content of analyst research, revealing that the informativeness of firm disclosures and analyst information outputs complement each other rather than acting as substitutes. Both studies indicate that analysts' interpretation plays a dominant role in mitigating information

asymmetry in security markets. In addition, Lehavy *et al.* (2011) document that the informativeness of analysts' reports and investor demand for analysts' assistance in interpreting increases when firms have less readable disclosures, such as 10-Ks. Yezegel (2015) also shows that analysts are more likely to increase information content after earnings announcements in response to heightened demand for advice from market participants and a high supply of information post-announcement, aiming to identify mispricing.

In addition to the superior expertise in information processing, analysts' forecasts rely on their privileged channels for information discovery, which may not be available to unsophisticated or uninformed investors who typically lack the knowledge, resources, and access to obtain private information and hard-to-detect public information (Ivković and Jegadeesh, 2004). Analysts acquire new information through their independent research or their access to firm management (Livnat and Zhang, 2012). In fact, analysts have opportunities to privately interact with firm management through conference calls and face-to-face meetings with CEOs and to investigate operations directly (Malloy, 2005).[27]

The value of the information discovery and interpretation depends on the quantity and quality of the information environment. The information discovery value is negatively associated with informativeness, as the demand for new information is lower when there is sufficient existing publicly disclosed information (Ivković and Jegadeesh, 2004; Chen *et al.*, 2010); while on the other side, information interpretation value is positively associated with the quantity and quality of the information environment, as the need for processing, interpreting,

[27] However, this type of private information has become scarcer in U.S. after the enaction of Regulation Fair Disclosure (Reg FD) in 2000 which requires management to disclose material information to all market participants, which curbs analysts' information advantage from selective access to privileged management information (Koch *et al.*, 2013). Despite the enaction of Reg FD, analysts access to senior management remain an important source of analysts' information advantage post Reg FD (Green *et al.*, 2014a). For example, exclusive broker-hosted investor conferences, as noted by Green *et al.* (2014b) and Bushee *et al.* (2011), enable analysts engage directly with management, acquiring valuable insights for analytical purposes.

and analysing the publicly available disclosures becomes greater in a rich information environment (Francis *et al.*, 2002; Frankel *et al.*, 2006; Livnat and Zhang, 2012). Thus, when information uncertainty is high, the effects of analyst coverage on reducing information asymmetry and increasing market efficiency are stronger (Li, 2020).

With regard to effective monitoring, it has been argued that analysts can serve as external monitors of firms for several reasons (Jensen and Meckling, 1976). First, extensive and in-depth industry knowledge, as well as their past experience, allows analysts to have superior abilities to monitor firms. They analyse financial information and evaluate strategies, decisions, and policies implemented by the management (Bradley *et al.*, 2017). In addition, communicating directly with management and raising questions in earnings announcement conference calls increase analysts' understanding of the firms (Bushee *et al.*, 2011; Green *et al.*, 2014a). Accordingly, analysts are more likely to identify firm riskiness and assess firm performance, which can restrain management from not acting in investors' best interests (Dyck *et al.*, 2010). In turn, management may reduce mismanagement and inefficient activities due to stringent inspection and scrutiny from sophisticated analysts (Irani and Oesch, 2013; Chen *et al.*, 2015).

Second, a transparent information environment due to analyst activities makes it difficult for a firm's management to engage in earnings management (Yu, 2008), fraud (Yin *et al.*, 2020), credit events (Derrien *et al.*, 2016) and other value-destroying activities (Chung and Jo, 1996; Lang *et al.*, 2004; Jung *et al.*, 2012; Adhikari, 2016).

Third, analysts can monitor indirectly by propagating their opinions and advice through earnings forecasts to investors, research reports to their clients, and their appearance in public media, including TV programmes, newspapers, and other financial press, to a broader audience (Miller, 2006). This information distribution not only helps market participants gauge firm

performance and detect managerial misbehaviours correctly but also helps the board of directors to trace and investigate management activities. Consistent with this view, Farrell and Whidbee (2002) show that the financial press and analysts' increased scrutiny of firms with poor performance increases forced CEO turnover. As such, analysts play an important governance role in monitoring management behaviours to decrease agency costs and reduce firm uncertainties and risks (Sun, 2009; To *et al.*, 2018).

With regard to firm visibility, existing literature argues that analyst activities increase the visibility of covered firms and broaden the investor base in financial markets. For example, analysts are incentivised to engage in the promotion of securities that are underwritten by their brokerage houses and investment banks (Hong and Kubik, 2003; Juergens and Lindsey, 2009; Niehaus and Zhang, 2010; Groysberg *et al.*, 2011). The findings of Mola *et al.* (2012) corroborate the findings demonstrating a reduced presence of institutional investors and the loss of analyst coverage. Likewise, Mehran and Peristiani (2010) find that firms losing analyst coverage are more likely to go private due to a failure to attract sufficient visibility. O'brien and Tan (2015) observe that less-visible firms often leverage analysts who can increase the visiting of covered firms, which further enhances investor awareness and attraction towards the firm. Furthermore, analysts may choose to cover firms based on their forecast of superior future performance (Bradshaw *et al.*, 2006). Consequently, higher analyst coverage signals greater potential for future performance, attracting investor attention and thereby increasing firm visibility.

Taken together, analysts' roles in improving the information environment, monitoring firm management effectively, and increasing covered firms' visibility can improve investors leaning towards the financial securities issued by the covered firms. Consistent with the investor recognition argument, extant literature provides considerable empirical evidence on the positive

impacts of analysts on security markets. For example, Irvine (2003) finds a positive relationship between analyst coverage and liquidity change, as well as the number, volume, return of stock transactions, and ownership of institutional investors. Mansi *et al.* (2010) document that analyst activities, including coverage, accuracy and lower dispersion forecasts, are negatively associated with bond yield spreads. Derrien *et al.* (2016) show that the loss of analysts increases the cost of debts. In addition, Galanti *et al.* (2022) demonstrate that firms' debt and share issuance benefit from the coverage of analysts, i.e., analyst coverage matters to firms' access to external finance. Given the above arguments, we make the following hypothesis:

H1a*: Analyst activities increase investor demand for bonds issued by the covered firms.*

2.3 The 'dark side' of analyst activities

In contrast to the positive roles in the information environment, monitoring, and visibility, several studies also provide evidence of the negative impacts of analyst activities. One main source of negative impact is the excessive pressure under which firm management is compelled to meet short-term earnings targets. Meeting analyst forecasts has become a more important threshold (Dechow *et al.*, 2003); after all, a short-run turmoil of equity and debt markets caused by a negative earnings surprise (i.e., missing analysts forecasts) can be costly (Skinner and Sloan, 2002). However, analyst forecasts may be overly optimistic (Dechow *et al.*, 2000; Hong and Kubik, 2003; Jackson, 2005; Kothari *et al.*, 2016), making it difficult for the management to meet such targets (Ertimur *et al.*, 2011). Graham *et al.* (2005) corroborate the importance of meeting analyst forecasts and find that senior management works to maintain predictability in earnings and to hit earnings targets even to the detriment of long-term firm value. In line with the findings, He and Tian (2013) examine the causal effects of analyst coverage and find that analysts' pressure impedes firms' investment in long-term innovation. Irani and Oesch (2016) also find that management uses real activity manipulation, such as stifling firm innovation, to

meet the short-term earnings expectations of analysts. Thus, analysts' excessive pressure on management may induce myopic behaviours (Graham *et al.*, 2005).

The second source of negative impacts is the exacerbation of information asymmetry. Analysts may deliver new or useful private information to a select group of market participants (Green *et al.*, 2014b), which could possibly exacerbate information asymmetry (Chung and Jo, 1996). Irvine *et al.* (2007) find that institutional trading volume is abnormally high before analysts' recommendations are publicly released, consistent with the tipping argument that these investors receive advance tips relevant to the contents of analysts' research reports. Juergens and Lindsey (2009) also document that analysts are rewarded for pre-releasing information.

The third source is the impaired monitoring resulting from the close ties between analysts and management. Although analysts' forecasts are more likely to be accurate when they receive more information from management (Chen and Matsumoto, 2006), close connections between analysts and management may potentially bias analysts' judgements, undermining their incentives to monitor management behaviours (Bradley *et al.*, 2017), and thus cause an increase in firm risks and a decrease in firm value.

The fourth source is conflicts of interest stemming from investment banking or brokerage affiliations. Some studies argue that analysts' incentives to generate investment bank business, earn trading commissions for brokerage houses, and gain access to management as a source of private information can compromise their integrity and objectiveness; for example, they are motivated to bias the forecasts and recommendations upwardly (Ertimur *et al.*, 2011; Guo *et al.*, 2020). Mola and Guidolin (2009) document that after their affiliated mutual funds invest in certain stocks, analysts tend to issue frequent and favourable ratings to upgrade the stock. Huyghebaert and Xu (2016) show that compared to unaffiliated analysts, affiliated

analysts especially further upwardly distort post-IPO earnings forecasts. Previous research, such as Irvine (2000) and Jackson (2005), documents that analysts provide optimistic reports to generate more trades for their brokerage house, bringing higher trading commissions. Consequently, analysts' compensation incentives may induce biases in their coverage decisions and information outputs, thereby affecting investors' views on the reliability and credibility of analysts.

Due to the dark side of analyst activities, higher information asymmetry costs are more likely to scale down the size of corporate bond investor order in analysts covering firms (Krebbers *et al.*, 2023). Moreover, inadequate governance and disappointing long-term firm performance resulting from management myopia and other misbehaviours due to excessive analyst pressure could reduce the attraction towards securities issued by such firms. Furthermore, biases in analysts' research outputs and coverage decisions not only exert negative effects on the credibility of analyst forecasts and market participants' reliability of analyst coverage but also cause investors to make decisions contrary to those of analysts (Drake *et al.*, 2011). Accordingly, market participants are less likely to invest in corporate bonds of firms with higher analyst coverage, higher accuracy, and lower dispersion. This leads to our competing hypothesis:

H1b*: Analyst activities decrease the investor demand for bonds issued by the covered firms.*

3. Data sources, Variables, and Descriptive Statistics

3.1 Data sources

We start with all corporate bonds that have information on orderbook size in Informa Global Markets (IGM) from 2008 to 2022. We only keep fixed coupon bonds that are categorised as investment grade. We exclude corporate bonds that have missing values, issue amounts, and

coupons. For each bond, we obtain the ISIN of the bond issuers (parent company) from the Standard & Poor (S&P) Capital IQ. We then obtain analyst information for the bond issuers from the Institutional Brokers Earnings Systems (I/B/E/S) database. Additionally, we collect firm-level data from the S&P Capital IQ, Datastream, and Refinitiv and country-level data from the Organization for Economic Cooperation and Development (OECD), the World Bank, and the International Monetary Fund (IMF). The final dataset contains 8,563 bonds issued by 1,279 firms from 38 counties for which we have complete information.

3.2 Main dependent variable: Investor demand

Investor demand for a bond, denoted by *Oversubscription*, is measured as the ratio of orderbook size to the issue amount of that bond (Krebbers *et al.*, 2023; Wang and Wu, 2023). As bond transactions mainly occur in the primary market (Asquith *et al.*, 2013), the level of investors' oversubscription in the primary market is a reasonably accurate measure of their overall bond demand.

We present the summary statistics for *Oversubscription* in Table C1. Panel A reports the summary of oversubscription across industries. Investors have the highest demand for a bond issued by a firm in Industrials (3.805), while the smallest demand is in Financials, including Banks (2.310). Panel B reports the oversubscription across countries and shows that investors, on average, have a greater demand for a bond issued in China (3.378) and the U.S. (3.602). The results of Panels C-G display a higher oversubscription ratio for lower-rated, smaller-issue, longer-maturity bonds issued by smaller firms with a medium level of financial leverage, which suggests that there is, on average, a greater demand by investors for bonds with a high-risk profile. Perhaps this is a result of investors' targets for high returns.

Table C1: Summary statistics by categories

The Table shows a brief summary of the oversubscription ratio by categories.

	No. of observations	No. of bonds	No. of firms	Mean	Median
Panel A: Oversubscription ratio: group by industry					
Banks	2,709	2,663	261	2.310	1.900
Financial Services	853	828	197	3.146	2.667
Insurance	170	168	65	3.378	2.900
Industrials	4,313	4,235	837	3.805	3.333
Utilities	1,142	1,114	148	3.590	3.067
Others	106	105	51	4.012	3.450
Panel B: Oversubscription ratio: group by country					
United States	2,972	2,902	556	3.602	3.200
United Kingdom	683	668	124	3.256	2.667
Germany	860	837	85	2.773	2.200
France	837	820	87	3.330	2.700
Netherlands	454	448	60	3.170	2.667
Italy	341	337	44	3.061	2.500
China	337	334	101	4.198	3.600
Japan	331	325	36	3.047	2.467
Others	2,478	2,444	476	3.005	2.400
Panel C: Oversubscription ratio: group by bond credit rating					
AAA	318	315	74	1.985	1.675
AA	662	656	92	3.033	2.475
A	2,971	2,923	449	3.290	2.800
BBB	3,667	3,589	815	3.645	3.167
BB	55	54	38	3.942	3.600
B	7	7	6	4.402	3.400
Below / NR	1,613	1,575	413	2.743	2.133
Panel D: Oversubscription ratio: group by issue size					
Large issue amount	3,097	3,084	508	2.781	2.400
Medium issue amount	3,098	3,090	871	3.285	2.800
Small issue amount	3,098	3,026	1,076	3.764	3.333
Panel E: Oversubscription ratio: group by maturity					
<= 5 years	1,606	1,593	587	2.865	2.357
5-10 years	4,101	4,056	1,044	3.175	2.600
10-30 years	2,886	2,864	931	3.527	3.000
> 30 years	700	686	327	3.790	3.333
Panel F: Oversubscription ratio: group by firm size					
Large firms	3,058	3,005	198	2.653	2.200
Medium firms	3,069	3,008	432	3.582	3.063
Small firms	3,064	2,999	1,015	3.617	3.167
Panel G: Oversubscription ratio: group by leverage					
High leverage	3,058	2,979	523	3.303	2.800
Medium leverage	3,061	3,008	603	3.337	2.800
Low leverage	3,060	3,018	608	3.219	2.667

3.3 Main independent variables: Analyst activities

Analyst information is obtained from the I/B/E/S annual consensus earnings forecast. Following Mansi *et al.* (2010), we construct *Forecast Accuracy* as the negative absolute value of the analyst forecast error, which is equal to the actual EPS minus the average EPS forecast scaled by the stock price at the end of each fiscal year. The higher value of *Forecast Accuracy* represents more accurate analyst earnings forecasts. We then construct *Forecast Dispersion*, which is defined as the standard deviation of analyst earnings forecasts scaled by the stock price at the end of each fiscal year. *Forecast Dispersion* increases with larger differences among analyst earnings forecasts. Finally, we measure *Coverage* as the natural log of the number of analysts covering the firm.

3.4 Bond, firm, and country-level controls

We control for a series of bond, firm, and country characteristics. First, we control for a range of bond-level variables, including the issue amount (*Ln (Issue Size)*), *Coupon*, S&P credit rating (*Bond Rating*), and the number of bookrunners (*Bookrunners*). We expect that more bookrunners lead to higher bond demand since bookrunners are likely to increase bond visibility and tend to maximise bond demand to be more flexible in negotiating prices, determining final bond allocation, and protecting the success of the bond issue under weak market conditions (Krebbers *et al.*, 2023; Risal *et al.*, 2023). Second, we also include firm size (*Ln (Total Assets)*), firm profitability (*ROA*), and financial leverage (*Leverage*), which have been shown to affect firms' access to debt financing, as the firm-level control variables. Specifically, firm size is often used to proxy a firm's information environment (Bharath *et al.*, 2009). Third, for country-specific characteristics, we include nominal GDP growth (*GDP Growth*) and control for the

effects of *Flight to Safety* and *Flight to Quality* (Costantini and Sousa, 2022), which may influence investors to participate in bond subscriptions (Risal *et al.*, 2023). Investors' subscription is related to bond yields, which varies with the interest rates (i.e., country's economic conditions). A detailed definition of the variables is listed in Appendix C.

We present the descriptive statistics for the full sample in Table C2. As shown, a firm, on average, has an oversubscription ratio of 3.312, which suggests that the investor's demand, on average, is 3.312 times the issue size. An average firm is covered by around 21 analysts with 0.024 forecast errors and 0.009 forecast standard deviation, which are consistent with the numbers reported by the international analysis of Boubakri *et al.* (2015). Regarding the other characteristics, the average book value of the total assets of the covered firms is around $7,234 million, which is consistent with the bond market findings that large firms are more likely to have access to external finance from bond markets (Hovakimian *et al.*, 2001). On average, one firm each year issues around $842 million bonds with a 2.416% coupon rate, which are averagely rated as BBB by the S&P rating agency. Average flight to safety and flight to quality are 0.650% and 0.237%, respectively. The average GDP and nominal GDP growth of the bond issuers' countries are around $8,961 billion and 2.6%, respectively.

Table C2: Summary statistics for all sample

The Table presents summary statistics for all samples.

	Number of observations	Mean	S.D.	25th Pct	Median	75th pct
Oversubscription (Times)	8,563	3.312	1.815	2.000	2.800	4.200
Forecast Accuracy	8,514	-0.024	0.088	-0.022	-0.008	-0.002
Forecast Dispersion	8,549	0.008	0.021	0.002	0.005	0.010
Number of Analysts	8,563	21.097	8.708	16.000	21.000	27.000
Coverage	8,563	2.985	0.505	2.833	3.091	3.332
Issue Size (US$ Mn)	8,563	841.541	479.016	500.000	738.072	1,027.957
Ln (Issue Size)	8,563	6.591	0.540	6.215	6.604	6.935
Coupon	8,563	2.316	1.538	1.000	2.125	3.375
Bond Rating	8,563	9.248	4.157	8.000	10.000	12.000
Bookrunners	8,563	4.786	2.488	3.000	4.000	5.000
Total Assets (US$ Mn)	8,541	7,234.282	33550.179	33.381	106.013	768.901
Ln (Total Assets)	8,560	18.022	2.170	16.931	18.048	19.451
ROA	8,371	4.762	5.002	1.000	3.690	6.700
Leverage	8,551	0.789	3.357	0.205	0.313	0.425
Volatility	8,332	21.098	6.438	16.080	20.060	25.210
Beta	8,544	1.048	0.459	0.731	1.032	1.357
Business Risks	8,476	0.014	0.019	0.002	0.007	0.018
Flight to Safety	8,552	0.650	0.850	0.012	0.463	1.139
Flight to Quality	8,552	0.237	1.731	-1.377	0.039	1.816
GDP (US$ Bn)	8,563	8,960.644	9,126.986	1,542.660	3,186.860	20,893.744
GDP Growth (Nominal)	8,513	0.026	0.070	-0.023	0.040	0.073

4. Empirical Analysis

4.1 Main results

The main aim of this study is to empirically examine how analyst forecast information and analyst coverage impact investor demand for bonds. Using a multivariate approach, we estimate the baseline regression by the following model:

$$\begin{aligned} Oversubsciption_{i,j,t} = {} & \beta_0 + \beta_1 \times Forecast\ Accuracy_{i,j,t-1} \\ & + \beta_2 \times Forecast\ Dispersion_{i,j,t-1} + \beta_3 \times Coverage_{i,j,t-1} \\ & + \beta_4 \times Bond\ Controls_{i,j,t} + \beta_5 \times Firm\ Controls_{i,t-1} \\ & + \beta_6 \times Country\ Controls_{i,t-1} + Country \times Industry\ FE \\ & + Year\ FE + Currency\ FE + Maturity\ Bucket\ FE + \varepsilon_{i,t-1} \quad (C1) \end{aligned}$$

Where $Oversubsciption_{ijt}$ is the dependent variable proxied for investor demand for bonds, measured by the ratio of orderbook size and issue size of bond *j* of firm *i* issued in year *t*. *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* are our main explanatory variables, which are proxied for the analyst information in the year preceding the bond tranche. *Control* variables are discussed in section 3.4. The model also controls for fixed effects, including country × industry effects, year effects, currency effects, and maturity bucket effects[28], to mitigate the possible concerns about unobservable heterogeneity that investor demand for a bond may vary with countries, industry sectors, markets, bond maturities, or change over time (Risal *et al.*, 2023; Wang and Wu, 2023).

The main result of baseline regression is reported in Table C3.[29] In Columns 1 and 2,

[28] We consider the maturity characteristics of bonds as value of bonds may vary in the maturities (Merton, 1974). Based on maturity at the issuance, bonds are bucketed into four categories. That is, an indicator takes value of one if maturity of a bond is less than or equal to 5 years; two for maturity from 5 to 10 years; three for maturity from 10 to 30 years; and four for maturity above 30 years.

[29] When robust standard errors are clustered at the firm level, the results are qualitatively consistent with the main results reported in Table C3.

the quality of analysts' earnings forecasts is captured by *Forecast Accuracy* and *Forecast Dispersion*, respectively, whereas analyst coverage is captured in Column 3. We find that the analyst forecast accuracy and analyst coverage are significantly positively related to oversubscription at a 1% level of significance, while analyst forecast dispersion is significantly negatively associated with oversubscription at a 5% level of significance. The results are consistent with H1a. Economically, we find that a one standard deviation increase in the *Forecast Accuracy* results in a 7.13% increase in oversubscription, whereas a one standard deviation increase in *Forecast Dispersion* results in a 6.37% decrease in oversubscription. Likewise, a one standard deviation increase in *Analyst Coverage* results in a 12.67% increase in the oversubscription ratio.

Table C3: Baseline regression

This table shows the results of the impact of analysts on investor demand for bonds. The dependent variable is Oversubscription. Models 1–3 provide the regression results of Forecast Accuracy, Forecast Dispersion, and Coverage, respectively. Model 4 includes the three proxies of analysts in regression simultaneously. We include a series of bond, firm, and country characteristics as controls. At the bond level, we control for issue amount (Ln (Issue Size)), Coupon, S&P credit rating (Bond Rating), and number of bookrunners (Bookrunners). At the firm level, we control for firm size (Ln (Total Assets)), firm profitability (ROA), and financial leverage (Leverage). At the country level, we control for nominal GDP growth (GDP Growth) and control for the effects of Flight to Safety and Flight to Quality. All variables are defined in Appendix C. All models also control Country x Industry effects, Year effects, Currency effects, and Maturity Bucket effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Forecast Accuracy	0.8107***			0.6188**
	(3.31)			(2.44)
Forecast Dispersion		-5.7905***		-4.1821**
		(-2.80)		(-1.98)
Coverage			0.1351**	0.1116*
			(2.31)	(1.84)
Ln (Issue Size)	-0.7690***	-0.7659***	-0.7921***	-0.7846***
	(-14.91)	(-14.78)	(-15.06)	(-14.80)
Coupon	0.0643**	0.0665**	0.0616**	0.0699***
	(2.51)	(2.58)	(2.41)	(2.71)
Bond Rating	0.0082	0.0069	0.0064	0.0060
	(1.45)	(1.22)	(1.13)	(1.06)
Bookrunners	0.0069	0.0069	0.0067	0.0065
	(0.58)	(0.59)	(0.57)	(0.55)
Total Assets	-0.0267*	-0.0236*	-0.0335**	-0.0330**
	(-1.91)	(-1.68)	(-2.29)	(-2.21)
ROA	0.0248***	0.0246***	0.0251***	0.0229***
	(3.58)	(3.54)	(3.66)	(3.30)
Leverage	-0.0012	-0.0007	-0.0010	-0.0004

	(-0.18)	(-0.11)	(-0.15)	(-0.06)
Flight to Safety	0.0666	0.0658	0.0538	0.0675
	(1.23)	(1.22)	(1.01)	(1.25)
Flight to Quality	0.0608	0.0619	0.0535	0.0618
	(1.32)	(1.34)	(1.16)	(1.34)
GDP Growth	-0.2555	-0.3561	-0.2464	-0.3009
	(-0.45)	(-0.63)	(-0.44)	(-0.53)
Constant	8.4750***	8.4332***	8.3569***	8.4019***
	(21.56)	(21.36)	(21.35)	(21.27)
Country x Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes	Yes
Maturity Bucket FE	Yes	Yes	Yes	Yes
Observations	8,248	8,248	8,296	8,248
Adjusted R2	0.2583	0.2581	0.2580	0.2590

Moreover, we include three proxies for analysts simultaneously. The result in Column 4 is similar to Columns 1-3. This finding suggests that investors are more likely to subscribe to bonds issued by firms with more analysts who provide a higher quality of forecasts due to a potentially better information environment, external monitoring, and visibility (Yu, 2008; Mehran and Peristiani, 2010; Derrien *et al.*, 2016; Ferrer *et al.*, 2019).

4.2 Robustness of main results

In this section, we test the robustness of our results. A major concern with our baseline regression estimation is the potential endogeneity problem of the quality of analysts' forecasts and the coverage of analysts. One may argue that the relationship between analysts and bond oversubscription could be driven by analysts' selection bias, i.e., analysts intentionally choosing to cover firms with better governance, information environment, or visibility. In addition, some unobserved measures of investor demand for bonds are likely to affect the analyst forecast quality and analyst coverage. Despite the fixed effect regression model that has controlled for the possibility that endogeneity arises from unobserved bond-level, firm-level, industry-level, country-level, and time-invariant factors that may simultaneously determine the quality of analysts' forecasts, coverage of analysts, and investor demand, to further mitigate the endogeneity concerns, we implement 2SLS estimations with instrumental variables for

Forecast Accuracy, *Forecast Dispersion*, and *Coverage*. Likewise, we also utilise two alternative measures of investor demand to redo the baseline regression analyses.

4.2.1 2SLS Instrumental variable approach

We first adopt an identification strategy using instrumental variables to address the endogeneity problem of analyst forecast quality and analyst coverage. For analyst forecast quality, we use the average forecast accuracy (*Average Accuracy*) and the average forecast dispersion (*Average Dispersion*) as the instrumental variables. Following Boubakri *et al.* (2015), we calculate the average values by taking an average over time for each firm.[30] In general, a financial analyst typically focuses on a specific industry sector for a period, which leads to some degree of persistence in the ability of this analyst (Chen *et al.*, 2017), but this is less likely to be related to the investor demand for a bond of a given covered firm. Additionally, the average values over time are less likely to be related to the regression residual in a given year, which reduces the potential concern about the autocorrelations in the quality of analyst forecasts. For analyst coverage, we apply an instrumental variable, "Expected Coverage", based on exogenous changes in the size of brokerage houses (in terms of the number of analysts employed by a brokerage house) following Yu (2008). The size of brokerage houses changes over time depending upon their revenue or profit, which can affect the coverage decision of a certain firm; however, this is unlikely to be influenced by the bond demand of their covering firms and is less susceptible to the selection problem. It is worth noting that brokerage houses have a choice in which firms to stop covering, whereas the measure of expected coverage uses the tendency towards the coverage before a broker decides which firm to keep covering, and thus avoids the

[30] We also redo the 2SLS IV regressions for average forecast quality by excluding firms that only issued one bond in our sample to further reduce the concern about a potential contemporaneous relation between oversubscription and analyst forecast quality. The results are similar to those reported. Moreover, we employ industry-average forecast accuracy and industry-average forecast dispersion as the instrumental variables and find the results still remain qualitatively similar.

potential selection bias problem. So, the instrument can capture the exogenous variations in analyst coverage.

Following Yu (2008), we use the equation below to calculate expected coverage:

$$Expected\ Coverage_{i,k,t} = (Broker\ Size_{k,t}/Broker\ Size_{k,0}) * Coverage_{i,k,0}$$
$$Expected\ Coverage_{i,t} = \sum_{k=1}^{n} Expected\ Coverage_{i,k,t} \quad (C2)$$

Where $Expected\ Coverage_{ikt}$ is the expected coverage of firm *i* covered by brokerage house *k* in year *t*. $Broker\ Size_{kt}$ and $Broker\ Size_{k0}$ are the number of analysts employed by the brokerage house *k* in year *t* and year 0 (i.e., benchmark year), respectively. $Coverage_{ik0}$ is the analyst coverage of firm *i* from brokerage house *k* in year 0. $Expected\ Coverage_{it}$ is the expected analyst coverage of firm *i* in year *t*.

In the spirit of Yu (2008), we use 2007 as the benchmark year and require that a firm be covered by at least one brokerage house in that year. We drop all observations of firms not covered in 2007 and exclude all observations in 2007 from the 2SLS regression analysis since the Expected Coverage is automatically set to one in the benchmark year by design.

In Table C4, we present the 2SLS regression results. Columns 1, 3, and 5 show the first-stage regression results using *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* as the dependent variable, respectively. The coefficients of *Average Accuracy*, *Average Dispersion*, and *Expected Coverage* are positive and significant at the 1% level, i.e., the instrumental variables are highly correlated with their corresponding main variables. Additionally, in untabulated results, we report that our instrumental variables are valid by rejecting the null hypothesis that the instrument is weakly identified. Columns 2, 4, and 6 display the results from the second-stage regressions, with the main variable replaced by the fitted values from the corresponding first-stage regressions. As can be seen, the coefficients of the main independent

variable in Columns 2, 4, and 6 of Table C4 have the same signs and similar significance levels, and they have a greater magnitude than those in Table C3. Therefore, controlling for endogeneity, the 2SLS IV model confirms our baseline finding that there is a significant and positive relation of high analyst forecast quality and high analyst coverage with great investor demand for bonds issued by the covering firms.

4.2.2 Alternative measures of investor demand

We conduct an additional robustness check by employing two alternative proxies of investor demand. The main dependent variable is defined as the ratio of orderbook size to the issue amount of that bond (i.e., the number of times). One alternative proxy is measured by the natural log of the orderbook size (*Ln (Book Size)*). We show the results of the baseline regression model replaced by this alternative dependent variable measure in Panel A in Table C5. As shown, the results are largely identical to those in Table C3. More specifically, the coefficients of the three analyst variables remain similar in signs and statistically significant in Columns 1-3.

Likewise, we use residual oversubscription as an alternative measure. To address the issue of investor portfolio diversification, i.e. that the more bonds a given firm issues, the lower investor demand for the firm's subsequent bonds is expected, we construct the variable of residual oversubscription ratio (*Resid Oversubscription*) following Risal *et al.* (2023) by regressing *Oversubscription* on the number of bonds issued by the firm prior to the bond issuance and the industry average oversubscription ratio. We use the alternative measure of the dependent variable to redo the baseline regression and report the results in Panel B in Table C5. We find that the coefficients of three analyst variables in Columns 1-3 of Panel B are also similar to those in Table C3, indicating that the positive impacts of high analyst quality and high analyst coverage on investor demand remain unchanged. Overall, the robustness checks support our main results.

Table C4: 2SLS IV Regression

The table shows the results of 2SLS IV regressions. In the first stage, the dependent variables are *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage*, respectively. We employ average analyst quality (i.e., *Average Accuracy* and *Average Dispersion*) and expected analyst coverage (i.e., *Expected Coverage*) as the instrumental variables. In the second stage, the dependent variable is *Oversubscription*. The main explanatory variables are the predicted value of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage*, respectively. In each model, we include a series of bond, firm, and country characteristics as controls. At the bond level, we control for issue amount (*Ln (Issue Size)*), *Coupon*, S&P credit rating (*Bond Rating*), and number of bookrunners (*Bookrunners*). At the firm level, we control for firm size (*Ln (Total Assets)*), firm profitability (*ROA*), and financial leverage (*Leverage*). At the country level, we control for nominal GDP growth (GDP Growth) and control for the effects of *Flight to Safety* and *Flight to Quality*. All variables are defined in Appendix C. All models also control Country x Industry effects, Year effects, Currency effects, and Maturity Bucket effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) First stage	(2) Second stage	(3) First stage	(4) Second stage	(5) First stage	(6) Second stage
Average Accuracy	0.797***					
	(0.236)					
Forecast Accuracy		2.308***				
		(0.740)				
Average Dispersion			0.968***			
			(0.042)			
Forecast Dispersion				-11.681***		
				(3.609)		
Expected Coverage					0.516***	
					(0.018)	
Coverage						0.371***
						(0.107)
Ln (Issue Size)	-0.001	-0.765***	0.000	-0.761***	0.060***	-0.865***
	(0.002)	(0.052)	(0.000)	(0.052)	(0.010)	(0.056)
Coupon	-0.002*	0.072***	0.000	0.073***	0.005	0.074***
	(0.001)	(0.026)	(0.000)	(0.026)	(0.005)	(0.027)
Bond Rating	-0.000	0.008	-0.000**	0.006	0.004***	0.002
	(0.000)	(0.006)	(0.000)	(0.006)	(0.001)	(0.006)
Bookrunners	0.000	0.007	0.000	0.007	-0.002	0.007
	(0.000)	(0.012)	(0.000)	(0.012)	(0.002)	(0.012)
Ln (Total Assets)	0.000	-0.028**	0.000	-0.021	0.024***	-0.049***
	(0.001)	(0.014)	(0.000)	(0.014)	(0.004)	(0.017)
ROA	0.001***	0.022***	-0.000***	0.023***	0.001	0.027***

	(1) First stage	(2) Second stage	(3) First stage	(4) Second stage	(5) First stage	(6) Second stage
	(0.000)	(0.007)	(0.000)	(0.007)	(0.002)	(0.007)
Leverage	-0.000	-0.000	0.000	0.000	-0.003	-0.002
	(0.000)	(0.006)	(0.000)	(0.006)	(0.002)	(0.007)
Flight to Safety	-0.004*	0.076	0.000	0.070	-0.005	-0.023
	(0.003)	(0.054)	(0.000)	(0.054)	(0.009)	(0.048)
Flight to Quality	-0.006***	0.069	0.001***	0.067	0.007	0.032
	(0.002)	(0.046)	(0.000)	(0.046)	(0.007)	(0.036)
GDP Growth	-0.011	-0.228	-0.016***	-0.443	-0.161	-0.141
	(0.025)	(0.567)	(0.004)	(0.566)	(0.122)	(0.597)
Observations	8248	8248	8248	8248	7743	7743
Weak Identification		11.401		522.616		860.308

Table C5: Alternative measures of investor demand

This table presents the results of the robustness check for the impact of analyst information on different measures of investor demand for bonds. Panel A and B demonstrate the results of regressions on *Ln (Book Size)* and *Residual Oversubscription*, respectively. Models 1–3 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage*, respectively. Model 4 includes the three proxies of analysts in regression simultaneously. In each model, we include a series of bond, firm, and country characteristics as controls. At the bond level, we control for issue amount (*Ln (Issue Size)*), *Coupon*, S&P credit rating (*Bond Rating*), and number of bookrunners (*Bookrunners*). At the firm level, we control for firm size (*Ln (Total Assets)*), firm profitability (*ROA*), and financial leverage (*Leverage*). At the country level, we control for nominal GDP growth (GDP Growth) and control for the effects of *Flight to Safety* and *Flight to Quality*. All variables are defined in Appendix C. All models also control Country x Industry effects, Year effects, Currency effects, and Maturity Bucket effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Panel A: Alternative measure of investor demands: Ln (Book Size)				
Forecast Accuracy	0.2611***			0.2135**
	(3.21)			(2.46)
Forecast Dispersion		-1.5410**		-0.9835
		(-2.38)		(-1.47)
Coverage			0.0425**	0.0360**
			(2.45)	(2.00)
Ln (Issue Size)	0.8008***	0.8015***	0.7940***	0.7955***
	(49.52)	(49.44)	(48.38)	(48.15)
Coupon	0.0262***	0.0265***	0.0249***	0.0277***
	(3.27)	(3.30)	(3.14)	(3.44)
Bond Rating	0.0049***	0.0045**	0.0042**	0.0042**
	(2.70)	(2.51)	(2.34)	(2.34)
Bookrunners	0.0058	0.0059	0.0057	0.0057
	(1.57)	(1.57)	(1.55)	(1.53)
Total Assets	-0.0088**	-0.0079*	-0.0110**	-0.0110**
	(-2.02)	(-1.82)	(-2.46)	(-2.42)
ROA	0.0066***	0.0067***	0.0068***	0.0061***
	(3.40)	(3.41)	(3.48)	(3.12)
Leverage	-0.0006	-0.0005	-0.0005	-0.0004
	(-0.31)	(-0.25)	(-0.27)	(-0.19)
Flight to Safety	0.0128	0.0123	0.0083	0.0129
	(0.78)	(0.74)	(0.51)	(0.78)
Flight to Quality	-0.0020	-0.0020	-0.0042	-0.0020
	(-0.14)	(-0.14)	(-0.29)	(-0.14)
GDP Growth	-0.0276	-0.0552	-0.0290	-0.0366
	(-0.15)	(-0.31)	(-0.16)	(-0.20)
Constant	2.3311***	2.3194***	2.2933***	2.3096***
	(19.28)	(19.14)	(19.00)	(19.00)
Country x Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes	Yes
Maturity Bucket FE	Yes	Yes	Yes	Yes
Observations	8,248	8,248	8,296	8,248
Adjusted R2	0.5318	0.5314	0.5331	0.5322
Panel B: Alternative measure of investor demands: Residual Oversubscription				
Forecast Accuracy	0.8152***			0.6325**
	(3.27)			(2.45)
Forecast Dispersion		-4.8017**		-3.2618
		(-2.27)		(-1.51)

	(1)	(2)	(3)	(4)
Coverage			0.2406***	0.2216***
			(3.95)	(3.51)
Ln (Issue Size)	-0.6803***	-0.6781***	-0.7213***	-0.7153***
	(-13.15)	(-13.05)	(-13.64)	(-13.43)
Coupon	0.0595**	0.0606**	0.0589**	0.0663**
	(2.31)	(2.34)	(2.30)	(2.56)
Bond Rating	0.0173***	0.0163***	0.0144**	0.0141**
	(3.06)	(2.87)	(2.55)	(2.49)
Bookrunners	0.0105	0.0106	0.0097	0.0096
	(0.91)	(0.91)	(0.84)	(0.83)
Total Assets	0.0383***	0.0410***	0.0236	0.0236
	(2.67)	(2.84)	(1.57)	(1.54)
ROA	0.0249***	0.0250***	0.0243***	0.0223***
	(3.57)	(3.57)	(3.50)	(3.18)
Leverage	0.0039	0.0042	0.0043	0.0048
	(0.63)	(0.68)	(0.65)	(0.74)
Flight to Safety	0.0927*	0.0912*	0.0787	0.0922*
	(1.69)	(1.65)	(1.45)	(1.67)
Flight to Quality	0.0121	0.0123	0.0030	0.0106
	(0.26)	(0.26)	(0.06)	(0.23)
GDP Growth	-0.2778	-0.3638	-0.2522	-0.2898
	(-0.49)	(-0.64)	(-0.44)	(-0.51)
Constant	3.3337***	3.2971***	3.1761***	3.2183***
	(8.43)	(8.30)	(8.07)	(8.10)
Country x Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes	Yes
Maturity Bucket FE	Yes	Yes	Yes	Yes
Observations	8,248	8,248	8,296	8,248
Adjusted R2	0.1479	0.1473	0.1493	0.1504

4.3 Bond-level heterogeneity

While our baseline findings indicate that analyst activities are related to bond oversubscription, there can be significant heterogeneity in the informativeness of bonds based on both their type and market presence. Specifically, the literature argues that green bonds signal firms' commitment towards the environment through their commitment towards green projects, third-party green certification, and continuous assessment of the use of proceeds (Flammer, 2021). Given the lower information asymmetry surrounding green bonds, we expect the analyst activities to be less important for green bond subscriptions.

Likewise, some studies on the bond market presence show that the information asymmetry for seasoned bond issuances is lower due to the firm's market presence, which

reduces bonds' adverse selection concerns (Cantillo and Wright, 2000). Krebbers *et al.* (2023) also find that information asymmetry is higher in debut bond issues. As such, it requires stronger attributes and disclosure of an extensive amount of information to reduce such information asymmetry. Nevertheless, Cai *et al.* (2007) argue that significant information problems do not occur with investment-grade bond IPOs. Due to our focus on the traches of investment-grade bonds, we argue that the relations of informative analyst activities with both debut bond issues and seasoned bond issues would be similar.

First, we investigate the shades of bonds. Columns 1-4 of Table C6 investigate the sub-sample of green bonds, and Columns 5-8 examine the sub-sample of non-green bonds. The coefficients of three analyst variables in Columns 1-4 are insignificant. Nevertheless, we find significant associations between the oversubscription ratio of non-green bonds and three analyst variables (i.e., *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage*) in Columns 5-7. More specifically, for non-green bonds, a one standard deviation increase in *Forecast Accuracy* and *Coverage* significantly increases *Oversubscription*'s standard deviation by 4.15% and 2.88%, respectively, though the significance of *Coverage* disappears when we include three analyst variables in the regression simultaneously. *Forecast Dispersion* results in a 3.61% reduction in *Oversubscription*'s standard deviation. It shows that the impact we see in our baseline results is largely driven by the influence of analyst activities on non-green bonds.

Second, we investigate the debut and seasoned bond offerings. The results are presented in Table C7. Columns 1-4 examine the sub-sample of debut bonds, and Columns 5-8 examine the sub-sample of seasoned bonds. We show that the coefficient of *Forecast Accuracy* in Column 1 is significant at the 1% level, while the coefficients of both *Forecast Dispersion* in Column 6 and *Coverage* in Column 7 are significant at the 5% level, which reveals that the influence of analysts on debut bond offerings is similar to that on seasoned bond offerings.

Table C6: Green bonds vs. non-green bonds

The table presents the comparative analysis results of analysts' impacts on green bonds and non-green bonds' demands. The dependent variable is Oversubscription. Models 1–4 provide the regression results of Forecast Accuracy, Forecast Dispersion, and Coverage on investor demand for green bonds. Models 5–8 provide the regression results of Forecast Accuracy, Forecast Dispersion, and Coverage on investor demand for non-green bonds. In each model, we include a series of bond, firm, and country characteristics as controls. At the bond level, we control for issue amount (Ln (Issue Size)), Coupon, S&P credit rating (Bond Rating), and number of bookrunners (Bookrunners). At the firm level, we control for firm size (Ln (Total Assets)), firm profitability (ROA), and financial leverage (Leverage). At the country level, we control for nominal GDP growth (GDP Growth) and control for the effects of Flight to Safety and Flight to Quality. All variables are defined in Appendix C. All models also control Country x Industry effects, Year effects, Currency effects, and Maturity Bucket effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Green Bonds				Non-green bonds			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forecast Accuracy	0.4377			0.1004	0.8357***			0.6533**
	(0.22)			(0.06)	(3.36)			(2.52)
Forecast Dispersion		-1.9572		-1.8971		-5.9533***		-4.2008*
		(-0.14)		(-0.14)		(-2.79)		(-1.91)
Coverage			0.2195	0.2466			0.1064*	0.0854
			(1.15)	(1.11)			(1.74)	(1.37)
Ln (Issue Size)	-0.5010**	-0.4990**	-0.5499**	-0.5209**	-0.7662***	-0.7629***	-0.7824***	-0.7775***
	(-2.20)	(-2.21)	(-2.41)	(-2.28)	(-14.58)	(-14.45)	(-14.57)	(-14.37)
Coupon	0.1336	0.1327	0.1429	0.1428	0.0611**	0.0634**	0.0576**	0.0663**
	(1.24)	(1.23)	(1.36)	(1.32)	(2.29)	(2.37)	(2.17)	(2.48)
Bond Rating	-0.0047	-0.0049	-0.0039	-0.0063	0.0109*	0.0095*	0.0089	0.0089
	(-0.18)	(-0.19)	(-0.16)	(-0.24)	(1.91)	(1.67)	(1.56)	(1.56)
Bookrunners	-0.0074	-0.0085	-0.0129	-0.0103	0.0073	0.0075	0.0074	0.0072
	(-0.16)	(-0.19)	(-0.29)	(-0.23)	(0.60)	(0.62)	(0.61)	(0.59)
Total Assets	-0.0748	-0.0732	-0.0661	-0.1039	-0.0274*	-0.0242*	-0.0321**	-0.0314**
	(-0.98)	(-0.96)	(-1.05)	(-1.36)	(-1.94)	(-1.71)	(-2.16)	(-2.11)
ROA	0.0190	0.0193	0.0200	0.0180	0.0249***	0.0247***	0.0257***	0.0233***
	(0.54)	(0.55)	(0.59)	(0.52)	(3.56)	(3.52)	(3.70)	(3.32)
Leverage	-0.0246***	-0.0243**	-0.0230***	-0.0252**	0.0013	0.0016	0.0013	0.0020
	(-2.94)	(-2.45)	(-2.89)	(-2.48)	(0.18)	(0.24)	(0.19)	(0.28)
Flight to Safety	0.5588**	0.5547**	0.5771**	0.5722**	0.0846	0.0840	0.0746	0.0862
	(2.27)	(2.25)	(2.32)	(2.29)	(1.53)	(1.51)	(1.36)	(1.55)
Flight to Quality	-0.2681	-0.2676	-0.2832	-0.2843	0.0672	0.0679	0.0602	0.0689
	(-1.27)	(-1.26)	(-1.34)	(-1.32)	(1.43)	(1.44)	(1.28)	(1.46)

	Green Bonds				Non-green bonds			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP Growth	1.5233	1.4911	1.4573	1.4889	-0.1887	-0.2958	-0.1879	-0.2363
	(0.80)	(0.76)	(0.77)	(0.75)	(-0.31)	(-0.49)	(-0.31)	(-0.39)
Constant	7.5255***	7.4986***	7.0149***	7.4936***	8.4187***	8.3753***	8.3007***	8.3516***
	(4.18)	(4.17)	(4.43)	(4.20)	(20.92)	(20.73)	(20.68)	(20.67)
Country x Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maturity Bucket FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	515	515	523	515	7,712	7,712	7,752	7,712
Adjusted R2	0.2580	0.2580	0.2612	0.2569	0.2674	0.2671	0.2667	0.2679

Table C7: Debut bonds vs. Seasoned bonds

The table presents the comparative analysis results of analysts' impacts on green bonds and non-green bonds' demands. The dependent variable is *Oversubscription.* Models 1–4 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* on investor demand for green bonds. Models 5–8 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* on investor demand for non-green bonds. In each model, we include a series of bond, firm, and country characteristics as controls. At the bond level, we control for issue amount (*Ln (Issue Size)*), *Coupon*, S&P credit rating (*Bond Rating*), and number of bookrunners (*Bookrunners*). At the firm level, we control for firm size (*Ln (Total Assets)*), firm profitability (*ROA*), and financial leverage (*Leverage*). At the country level, we control for nominal GDP growth (GDP Growth) and control for the effects of *Flight to Safety* and *Flight to Quality*. All variables are defined in Appendix C. All models also control Country x Industry effects, Year effects, Currency effects, and Maturity Bucket effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Debut bonds				Seasoned bonds			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forecast Accuracy	0.8106***			0.9476***	0.7462			0.4638
	(3.56)			(3.92)	(1.56)			(1.02)
Forecast Dispersion		-0.3376		5.0045		-5.8521**		-5.0042**
		(-0.06)		(0.93)		(-2.52)		(-2.04)
Coverage			0.0156	-0.0478			0.1499**	0.1499**
			(0.13)	(-0.40)			(2.26)	(2.17)
Ln (Issue Size)	-0.6843***	-0.6848***	-0.6920***	-0.6749***	-0.7636***	-0.7608***	-0.7839***	-0.7818***
	(-4.71)	(-4.71)	(-4.67)	(-4.50)	(-14.24)	(-14.14)	(-14.42)	(-14.27)
Coupon	-0.1670**	-0.1698**	-0.1683**	-0.1765**	0.0978***	0.0997***	0.0956***	0.1024***
	(-2.33)	(-2.33)	(-2.36)	(-2.41)	(3.65)	(3.72)	(3.59)	(3.81)
Bond Rating	0.0107	0.0106	0.0129	0.0132	0.0083	0.0071	0.0065	0.0059
	(0.62)	(0.61)	(0.75)	(0.75)	(1.43)	(1.22)	(1.11)	(1.01)
Bookrunners	0.0088	0.0099	0.0087	0.0085	0.0099	0.0099	0.0100	0.0096
	(0.26)	(0.29)	(0.27)	(0.25)	(0.83)	(0.83)	(0.85)	(0.81)
Total Assets	-0.0283	-0.0299	-0.0293	-0.0293	-0.0291*	-0.0259	-0.0371**	-0.0369**
	(-0.87)	(-0.91)	(-0.90)	(-0.87)	(-1.82)	(-1.62)	(-2.24)	(-2.19)
ROA	0.0016	0.0042	0.0042	0.0024	0.0287***	0.0279***	0.0286***	0.0263***
	(0.13)	(0.34)	(0.33)	(0.19)	(3.78)	(3.65)	(3.79)	(3.45)
Leverage	0.0133	0.0133	0.0132	0.0134	-0.0024	-0.0018	-0.0021	-0.0013
	(0.39)	(0.39)	(0.39)	(0.39)	(-0.43)	(-0.33)	(-0.36)	(-0.21)
Flight to Safety	-0.1777	-0.1831	-0.2041*	-0.1768	0.1262**	0.1281**	0.1230**	0.1304**
	(-1.49)	(-1.53)	(-1.73)	(-1.47)	(2.16)	(2.18)	(2.13)	(2.22)
Flight to Quality	0.0662	0.0599	0.0583	0.0677	0.0871*	0.0890*	0.0806	0.0905*
	(0.63)	(0.57)	(0.56)	(0.64)	(1.73)	(1.77)	(1.60)	(1.79)

	Debut bonds				Seasoned bonds			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP Growth	-1.3575	-1.4959	-1.8305	-1.3072	-0.5387	-0.6237	-0.4683	-0.5978
	(-0.93)	(-1.03)	(-1.25)	(-0.90)	(-0.90)	(-1.04)	(-0.79)	(-1.00)
Constant	9.3352***	9.3457***	9.3325***	9.3894***	8.2678***	8.2313***	8.0987***	8.1322***
	(10.02)	(9.94)	(10.08)	(10.00)	(19.14)	(18.99)	(18.83)	(18.66)
Country x Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maturity Bucket FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1131	1131	1149	1131	7084	7084	7115	7084
Adjusted R2	0.1658	0.1626	0.1654	0.1648	0.2603	0.2605	0.2613	0.2614

4.4 Firm-level heterogeneity

4.4.1 Information uncertainty

Our main results show significant associations between great investor demand with high analyst coverage and high analyst forecast quality, which are consistent with our prediction. In this section, we further investigate how analysts impact bond investors' demand when their covered firms face to high uncertainties. Prior studies suggest that the informational role, monitoring role, and visibility effects of analysts are more important for firms with poor performance (Dyck *et al.*, 2010; Chen *et al.*, 2017; To *et al.*, 2018). So, if the arguments for the positive roles of analysts hold, analysts' impacts on bond investors' oversubscription should be more pronounced when the issuers have high uncertainties. To test the conjecture, we use sub-sample analysis by splitting the full sample into a high-uncertainty group and a low-uncertainty group based on the median of uncertainty variables: systematic risks, stock return volatility, and business risks. We measure the proxies in the year before investors' bond subscriptions to reduce endogeneity concerns.

First, we use stock beta, defined in Appendix C, to proxy for firm uncertainty about systematic risks. Columns 1-4 of Table C8 present the results of the high Beta sub-group. The estimated coefficient of *Forecast Accuracy* in Column 1 is positive and significant at the 1% level. In Column 2, the coefficient of *Forecast Dispersion* is negative and significant at the 10% level. The economic significance shows that a one standard deviation increase in *Forecast Accuracy* leads to a 5.66% increase in the *Oversubscription*'s standard deviation, while a standard deviation increase in *Forecast Dispersion* is linked to a 3.17% decrease in the *Oversubscription*'s standard deviation. The coefficient of *Coverage* is significantly positive, showing that a one standard deviation increase in *Coverage* is associated with a 5.78% increase in *Oversubscription*'s standard deviation. When we include three variables in the regression

simultaneously, the results (in Column 4) remain similar, except for the coefficient of *Forecast Dispersion,* whose significance disappears. Conversely, the estimated coefficients of three analyst variables of the low Beta sub-group, as shown in Columns 5-8, are insignificant and lower in magnitude. In line with our results, Loh and Stulz (2018) find that analyst outputs become more valuable when firm uncertainty is high because investors find it harder to assess firms' prospects.

The second measure we use to proxy for firm uncertainty is stock volatility. We report the results of the sub-sample analysis in Table C9 and show that both *Forecast Accuracy* in Column 1 and *Coverage* in Column 3 are significantly and positively related to investor demand when firms suffer from high volatility. The estimated coefficients represent that a one standard deviation increase in *Forecast Accuracy* and *Coverage* is related to a 7.31% and 13.54% increase in *Oversubscription*, respectively (i.e., 4.10% and 7.60% increase in investors' oversubscription ratio' standard deviation, respectively). The relation between *Forecast Dispersion* and investors' oversubscription in Column 3 is insignificant. The result for the three analyst variables in Column 4 is consistent with Columns 1-3. In contrast, the estimated coefficients of all the analyst activities are insignificant for the low-volatility sub-sample.

Table C8: Bond demand and systematic risks

This table shows the results of analysts' impacts on the bond demand of firms divided into subsamples based on the firm's information environment proxied by market beta. The dependent variable is *Oversubscription*. Models 1–4 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* on investor demand for bonds issued by firms with high beta. Models 5–8 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* on investor demand for bonds issued by firms with low beta. In each model, we include a series of bond, firm, and country characteristics as controls. At the bond level, we control for issue amount (*Ln (Issue Size)*), *Coupon*, S&P credit rating (*Bond Rating*), and number of bookrunners (*Bookrunners*). At the firm level, we control for firm size (*Ln (Total Assets)*), firm profitability (*ROA*), and financial leverage (*Leverage*). At the country level, we control for nominal GDP growth (GDP Growth) and control for the effects of *Flight to Safety* and *Flight to Quality*. All variables are defined in Appendix C. All models also control Country x Industry effects, Year effects, Currency effects, and Maturity Bucket effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	High beta				Low beta			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forecast Accuracy	0.9930***			0.8625***	0.1546			0.0979
	(3.92)			(3.24)	(0.27)			(0.17)
Forecast Dispersion		-4.3222*		-1.6819		-3.0465		-2.8712
		(-1.90)		(-0.74)		(-0.44)		(-0.41)
Coverage			0.2268***	0.2081**			0.0928	0.0733
			(2.65)	(2.34)			(1.14)	(0.87)
Ln (Issue Size)	-0.7851***	-0.7851***	-0.8111***	-0.8126***	-0.7589***	-0.7565***	-0.7845***	-0.7709***
	(-11.01)	(-10.97)	(-11.13)	(-11.08)	(-9.79)	(-9.73)	(-9.91)	(-9.69)
Coupon	0.0321	0.0324	0.0311	0.0389	0.1274***	0.1288***	0.1292***	0.1310***
	(1.05)	(1.06)	(1.02)	(1.26)	(2.90)	(2.91)	(2.96)	(2.95)
Bond Rating	0.0054	0.0042	0.0026	0.0025	0.0144	0.0142	0.0130	0.0133
	(0.73)	(0.58)	(0.35)	(0.33)	(1.51)	(1.49)	(1.40)	(1.42)
Bookrunners	0.0176	0.0174	0.0173	0.0162	0.0070	0.0070	0.0064	0.0069
	(0.99)	(0.98)	(0.97)	(0.91)	(0.43)	(0.43)	(0.40)	(0.42)
Total Assets	-0.0436**	-0.0415**	-0.0574***	-0.0561***	-0.0081	-0.0073	-0.0092	-0.0128
	(-2.46)	(-2.33)	(-3.11)	(-3.02)	(-0.35)	(-0.31)	(-0.39)	(-0.52)
ROA	0.0228***	0.0236***	0.0234***	0.0212**	0.0230**	0.0226**	0.0222**	0.0215*
	(2.61)	(2.68)	(2.71)	(2.43)	(2.11)	(2.05)	(2.05)	(1.96)
Leverage	-0.0105	-0.0102	-0.0116	-0.0099	-0.0016	-0.0015	-0.0012	-0.0013
	(-0.88)	(-0.83)	(-0.95)	(-0.82)	(-0.21)	(-0.21)	(-0.16)	(-0.17)
Flight to Safety	0.1338*	0.1321*	0.1262*	0.1356*	0.0326	0.0335	0.0114	0.0322
	(1.83)	(1.79)	(1.71)	(1.84)	(0.40)	(0.41)	(0.14)	(0.39)
Flight to Quality	-0.0698	-0.0706	-0.0793	-0.0700	0.2121***	0.2130***	0.2047***	0.2121***

	High beta				Low beta			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(-1.11)	(-1.12)	(-1.26)	(-1.12)	(3.13)	(3.14)	(3.01)	(3.12)
GDP Growth	0.0771	-0.0077	0.0861	0.0611	-0.9939	-1.0185	-0.9674	-0.9976
	(0.12)	(-0.01)	(0.13)	(0.09)	(-0.92)	(-0.94)	(-0.89)	(-0.92)
Constant	8.8334***	8.8173***	8.5677***	8.6441***	7.9581***	7.9421***	7.8992***	7.9297***
	(15.98)	(15.89)	(15.53)	(15.55)	(13.16)	(13.10)	(13.14)	(13.04)
Country x Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maturity Bucket FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,234	4,234	4,249	4,234	3,985	3,985	4,011	3,985
Adjusted R2	0.3130	0.3120	0.3123	0.3144	0.2158	0.2158	0.2159	0.2157

Table C9: Bond demand and stock volatility

This table shows the results of analysts' impacts on the bond demand of firms divided into subsamples based on the firm's information environment proxied by stock volatility. The dependent variable is *Oversubscription.* Models 1–4 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* on investor demand for bonds issued by firms with high volatility. Models 5–8 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* on investor demand for bonds issued by firms with low volatility. In each model, we include a series of bond, firm, and country characteristics as controls. At the bond level, we control for issue amount (*Ln (Issue Size)*), *Coupon*, S&P credit rating (*Bond Rating*), and number of bookrunners (*Bookrunners*). At the firm level, we control for firm size (*Ln (Total Assets)*), firm profitability (*ROA*), and financial leverage (*Leverage*). At the country level, we control for nominal GDP growth (GDP Growth) and control for the effects of *Flight to Safety* and *Flight to Quality*. All variables are defined in Appendix C. All models also control Country x Industry effects, Year effects, Currency effects, and Maturity Bucket effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	High volatility				Low volatility			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forecast Accuracy	0.5942**			0.4685*	3.3134			2.6467
	(2.27)			(1.67)	(1.61)			(1.22)
Forecast Dispersion		-2.8851		-1.4046		-10.6203		-6.7890
		(-1.35)		(-0.63)		(-1.53)		(-0.99)
Coverage			0.2746***	0.2575***			0.0262	0.0192
			(3.71)	(3.29)			(0.27)	(0.19)
Ln (Issue Size)	-0.8707***	-0.8690***	-0.9098***	-0.9089***	-0.7169***	-0.7145***	-0.7244***	-0.7178***
	(-12.82)	(-12.79)	(-13.26)	(-13.17)	(-8.88)	(-8.76)	(-8.70)	(-8.65)
Coupon	-0.0084	-0.0083	-0.0083	0.0001	0.1545***	0.1529***	0.1497***	0.1560***
	(-0.26)	(-0.25)	(-0.26)	(0.00)	(3.74)	(3.69)	(3.61)	(3.78)
Bond Rating	0.0018	0.0007	-0.0014	-0.0023	0.0146	0.0138	0.0140	0.0142
	(0.23)	(0.09)	(-0.19)	(-0.29)	(1.64)	(1.55)	(1.57)	(1.59)
Bookrunners	0.0070	0.0076	0.0073	0.0068	0.0111	0.0099	0.0108	0.0101
	(0.46)	(0.49)	(0.48)	(0.44)	(0.56)	(0.49)	(0.55)	(0.50)
Total Assets	-0.0169	-0.0148	-0.0347**	-0.0324*	-0.0486*	-0.0450*	-0.0505*	-0.0469*
	(-0.99)	(-0.86)	(-1.96)	(-1.82)	(-1.85)	(-1.69)	(-1.89)	(-1.69)
ROA	0.0242***	0.0249***	0.0245***	0.0232***	0.0269**	0.0266**	0.0290**	0.0254**
	(2.93)	(3.03)	(3.00)	(2.83)	(2.23)	(2.14)	(2.41)	(2.06)
Leverage	-0.0122*	-0.0120*	-0.0130*	-0.0122*	0.0087	0.0084	0.0090	0.0085
	(-1.77)	(-1.72)	(-1.81)	(-1.69)	(0.75)	(0.73)	(0.78)	(0.73)
Flight to Safety	0.0578	0.0533	0.0412	0.0541	0.1427	0.1482	0.1474	0.1452
	(0.86)	(0.79)	(0.62)	(0.80)	(1.41)	(1.46)	(1.46)	(1.44)
Flight to Quality	-0.0011	-0.0003	-0.0101	-0.0067	0.1642**	0.1669**	0.1605**	0.1666**

	High volatility				Low volatility			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(-0.02)	(-0.00)	(-0.16)	(-0.10)	(2.31)	(2.33)	(2.25)	(2.33)
GDP Growth	-0.2437	-0.3486	-0.2542	-0.2218	-0.1487	-0.2327	-0.1361	-0.2062
	(-0.34)	(-0.49)	(-0.36)	(-0.31)	(-0.15)	(-0.24)	(-0.14)	(-0.21)
Constant	9.1950***	9.1638***	8.9588***	8.9772***	8.1995***	8.1469***	8.1758***	8.1536***
	(18.09)	(18.00)	(17.58)	(17.47)	(12.47)	(12.24)	(12.51)	(12.30)
Country x Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maturity Bucket FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,957	3,957	3,978	3,957	4,086	4,086	4,093	4,086
Adjusted R2	0.2972	0.2964	0.2984	0.2999	0.2346	0.2343	0.2336	0.2344

Table C10: Bond demand and business risks

This table shows the results of analysts' impacts on the bond demand of firms divided into subsamples based on the firm's information environment proxied by business risks. The dependent variable is *Oversubscription.* Models 1–4 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* on investor demand for bonds issued by firms with high business risks. Models 5–8 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* on investor demand for bonds issued by firms with low business risks. In each model, we include a series of bond, firm, and country characteristics as controls. At the bond level, we control for issue amount (*Ln (Issue Size)*), *Coupon*, S&P credit rating (*Bond Rating*), and number of bookrunners (*Bookrunners*). At the firm level, we control for firm size (*Ln (Total Assets)*), firm profitability (*ROA*), and financial leverage (*Leverage*). At the country level, we control for nominal GDP growth (GDP Growth) and control for the effects of *Flight to Safety* and *Flight to Quality*. All variables are defined in Appendix C. All models also control Country x Industry effects, Year effects, Currency effects, and Maturity Bucket effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	High business risks				Low business risks			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forecast Accuracy	1.1952***			1.0227***	-0.2313			-0.4774
	(5.19)			(4.45)	(-0.54)			(-1.28)
Forecast Dispersion		-6.7617		-2.9084		-3.6101		-4.2589*
		(-1.59)		(-0.70)		(-1.59)		(-1.76)
Coverage			0.3015***	0.2642***			-0.1268	-0.1423
			(3.38)	(2.92)			(-1.54)	(-1.64)
Ln (Issue Size)	-0.8916***	-0.8912***	-0.9304***	-0.9249***	-0.6949***	-0.6927***	-0.6636***	-0.6682***
	(-11.50)	(-11.40)	(-11.83)	(-11.68)	(-10.40)	(-10.37)	(-9.71)	(-9.74)
Coupon	0.0508	0.0523	0.0404	0.0558	0.0634**	0.0670**	0.0619**	0.0634**
	(1.21)	(1.22)	(0.97)	(1.31)	(1.98)	(2.10)	(1.97)	(2.00)
Bond Rating	-0.0069	-0.0096	-0.0113	-0.0117	0.0144**	0.0136**	0.0146**	0.0143**
	(-0.53)	(-0.73)	(-0.88)	(-0.90)	(2.50)	(2.37)	(2.56)	(2.50)
Bookrunners	0.0229	0.0228	0.0205	0.0225	-0.0041	-0.0042	-0.0012	-0.0031
	(1.35)	(1.34)	(1.21)	(1.31)	(-0.26)	(-0.27)	(-0.08)	(-0.20)
Total Assets	-0.0518*	-0.0452	-0.0723**	-0.0713**	-0.0111	-0.0095	0.0000	0.0026
	(-1.76)	(-1.53)	(-2.30)	(-2.24)	(-0.61)	(-0.52)	(0.00)	(0.14)
ROA	0.0212**	0.0214**	0.0215**	0.0184*	0.0395**	0.0375**	0.0414**	0.0411**
	(2.05)	(2.02)	(2.07)	(1.74)	(2.16)	(2.06)	(2.25)	(2.24)
Leverage	-0.1734	-0.2107	-0.2060	-0.1557	-0.1700	-0.1476	-0.2576	-0.2082
	(-0.64)	(-0.78)	(-0.76)	(-0.57)	(-0.76)	(-0.66)	(-1.14)	(-0.92)
Flight to Safety	-0.0011	-0.0028	-0.0019	-0.0104	0.1303*	0.1361**	0.1247*	0.1320**
	(-0.01)	(-0.03)	(-0.02)	(-0.12)	(1.96)	(2.04)	(1.90)	(1.98)
Flight to Quality	0.0871	0.0860	0.0814	0.0768	0.0020	0.0073	-0.0049	0.0042

	High business risks				Low business risks			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(1.28)	(1.26)	(1.19)	(1.12)	(0.03)	(0.12)	(-0.09)	(0.07)
GDP Growth	-1.4674	-1.5230	-1.4436	-1.3406	0.5194	0.4355	0.4961	0.4289
	(-1.19)	(-1.24)	(-1.17)	(-1.09)	(0.91)	(0.76)	(0.87)	(0.75)
Constant	10.2983***	10.2362***	10.0611***	10.1319***	7.3172***	7.3026***	7.2942***	7.3402***
	(15.86)	(15.59)	(15.48)	(15.43)	(13.83)	(13.79)	(13.79)	(13.81)
Country x Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maturity Bucket FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,145	4,145	4,157	4,145	4,012	4,012	4,040	4,012
Adjusted R2	0.1810	0.1789	0.1804	0.1837	0.3187	0.3191	0.3201	0.3198

Finally, we use business risk, measured as the standard deviation of operation cash flow, as another proxy of firm uncertainty. In addition to stock volatility, business risk is also a proxy for firm uncertainty about idiosyncratic risks. The results are reported in Table C10. *Forecast Accuracy* in Columns 1 and 4 and *Coverage* in Columns 3 and 4 in Table C10 are significantly positively associated with investors' *Oversubscription*, while *Forecast Dispersion* in Columns 2 and 4 are insignificant, similar to the results in Table C9. Moreover, the results of regressions for the low business risks sample show that the coefficients of three variables in Columns 5-7 are insignificantly negative, suggesting that impacts of analysts are less important in firms with low business risks, though the coefficient of *Forecast Dispersion* of all variable-included regressions in Column 8 is significant and negative. The results are consistent with the finding of Mansi *et al.* (2010), who indicate that analysts' impacts on the cost of debt are most pronounced when uncertainty about firm value (i.e., idiosyncratic risk) is highest. Thus, we find consistent results that the impact of analyst activities on oversubscription is pronounced in firms with high uncertainty risks.

4.4.2 ESG and climate performance

Prior studies show that higher ESG performance captures the firms' higher commitment to stakeholders and is linked to better stakeholder engagement, which tends to limit the firms' myopic behaviours (Bénabou and Tirole, 2010; Eccles *et al.*, 2014), leading to lower agency and monitoring costs and higher market rewards (Banerjee *et al.*, 2022). Better ESG is also negatively associated with firm risks, as environmentally friendly and socially responsible firms are less likely to suffer from regulation, litigation, or reputation risks (Hong and Kacperczyk, 2009). Importantly, firms with higher ESG performance are more likely to provide more credible reports and publicly disclose their ESG strategies and practices (Dhaliwal *et al.*, 2011), which increases information transparency. Given that firms with poor ESG performance have

higher information asymmetry and are associated with higher risks, we expect the analyst activities to be more important in the sub-sample of firms with low ESG performance.

To examine our conjecture, we split the sample into a high ESG group and a low ESG group based on the median of firms' ESG scores. The results of the high ESG group and those of the low ESG are reported in Columns 1-4 and Columns 5-10 in Table C11 separately. We find that *Forecast Accuracy* is significantly and positively associated with *Oversubscription* in both the high ESG group (Column 1) and the low ESG group (Column 5). However, the economic magnitude of *Forecast Accuracy* is larger in the low ESG group (Column 5) compared to those in the high ESG counterpart (Column 1). A one standard deviation increase in *Forecast Accuracy* leads to an 8.93% increase in oversubscription in low ESG firms, whereas it only leads to a 7.76% increase in high ESG firms. In addition, the coefficient of *Coverage* (Column 7) is significant and positive in the low ESG group only. Accordingly, the impacts of analyst *Coverage* are stronger on investor demand in firms with lower ESG scores, which is consistent with our conjecture.

Next, we investigate the climate performance dimension of firms: carbon emissions. The literature argues that the higher the carbon emissions, the more complex the methods used to account for GHG emissions and the more uncertainty around the assumptions (Fan *et al.*, 2021). Higher carbon emissions exacerbate the information opaqueness and highlight the need for external assurance (Fan *et al.*, 2021). Cao *et al.* (2022) show that analysts pay close attention to carbon emissions; hence, their activities, such as coverage, accuracy, and dispersion, would be more important for firms with high carbon emissions.

To test our conjecture, we examine how analysts affect investor demand for the bonds

of firms with different carbon emissions.[31] We split the sample into a high-carbon emission group and a low-carbon emission group. We present the results of the high carbon emission group in Columns 1-4 and the low carbon emission group in Columns 5-10 in Table C12 separately. As shown in Columns 1-3, *Forecast Accuracy* and *Coverage* have a positive association with *Oversubscription* at the 10% and 1% significance levels, respectively. More specifically, the economic significance shows that a one standard deviation increase in *Forecast Accuracy* and *Coverage* results in a 7.91% and 19.43% increase in investor demand, respectively. We also find a significant and negative relationship between *Forecast Dispersion* and *Oversubscription* when the firms have high carbon emissions—a one standard deviation increase in *Forecast Dispersion* results in a 12.97% decrease in *Oversubscription*. When we include the three main explanatory variables in the regression model simultaneously, the results of the high carbon emission group (in Column 4) remain similar, except for the coefficient of *Forecast Accuracy* becoming insignificant.

By comparison, in the low carbon emission group, only *Coverage* has a significantly positive relation with *Oversubscription*; however, the magnitude of the coefficient (i.e., an 11.13% increase in the oversubscription ratio resulted by a one standard deviation increase in analyst coverage) is smaller relative to that (i.e., a 19.43% increase in oversubscription) in the high carbon emission group. Thus, we show that analysts play a more important and positive role in investor demand when their covering firms have more carbon emissions. The results are mostly consistent with our conjecture.

[31] We also use carbon intensity measured by total emission divided by sales to proxy carbon footprint. The untabulated results are qualitatively similar to those in Table C12.

Table C11: Bond demand and ESG performance

This table shows the results of analysts' impacts on the bond demand of firms divided into subsamples based on the firm environmental risks proxied by ESG performance. The dependent variable is *Oversubscription.* Models 1–4 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* on investor demand for bonds issued by firms with high ESG. Models 5–8 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* on investor demand for bonds issued by firms with low ESG. In each model, we include a series of bond, firm, and country characteristics as controls. At the bond level, we control for issue amount (*Ln (Issue Size)*), *Coupon*, S&P credit rating (*Bond Rating*), and number of bookrunners (*Bookrunners*). At the firm level, we control for firm size (*Ln (Total Assets)*), firm profitability (*ROA*), and financial leverage (*Leverage*). At the country level, we control for nominal GDP growth (GDP Growth) and control for the effects of *Flight to Safety* and *Flight to Quality*. All variables are defined in Appendix C. All models also control Country x Industry effects, Year effects, Currency effects, and Maturity Bucket effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	High ESG				Low ESG			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forecast Accuracy	1.6505**			1.4839**	0.8119***			0.7771***
	(2.58)			(2.24)	(4.01)			(3.95)
Forecast Dispersion		-5.8505		-2.3692		-2.4031		0.3481
		(-1.33)		(-0.52)		(-0.65)		(0.10)
Coverage			0.0015	0.0017			0.2178**	0.2008**
			(0.01)	(0.01)			(2.27)	(2.07)
Ln (Issue Size)	-0.6840***	-0.6863***	-0.6896***	-0.6832***	-0.7697***	-0.7708***	-0.7940***	-0.7896***
	(-7.91)	(-7.87)	(-7.93)	(-7.84)	(-9.97)	(-9.97)	(-10.31)	(-10.22)
Coupon	0.1972***	0.1953***	0.1933***	0.1977***	-0.0170	-0.0160	-0.0171	-0.0167
	(4.78)	(4.68)	(4.66)	(4.77)	(-0.42)	(-0.39)	(-0.42)	(-0.41)
Bond Rating	0.0068	0.0068	0.0084	0.0063	0.0160	0.0151	0.0157	0.0158
	(0.72)	(0.74)	(0.90)	(0.68)	(1.54)	(1.45)	(1.52)	(1.53)
Bookrunners	-0.0077	-0.0093	-0.0089	-0.0080	0.0278	0.0285	0.0261	0.0249
	(-0.41)	(-0.49)	(-0.48)	(-0.43)	(1.41)	(1.44)	(1.32)	(1.26)
Total Assets	-0.1907***	-0.1857***	-0.1931***	-0.1883***	-0.0145	-0.0107	-0.0470	-0.0463
	(-4.16)	(-4.03)	(-3.60)	(-3.51)	(-0.38)	(-0.28)	(-1.12)	(-1.09)
ROA	0.0148	0.0150	0.0172*	0.0142	0.0311***	0.0327***	0.0292***	0.0276**
	(1.48)	(1.47)	(1.66)	(1.34)	(2.87)	(3.02)	(2.73)	(2.56)
Leverage	-0.7959**	-0.8294**	-0.8340**	-0.7974**	0.0121	-0.0060	0.0103	0.0403
	(-2.34)	(-2.44)	(-2.45)	(-2.34)	(0.04)	(-0.02)	(0.04)	(0.15)
Flight to Safety	0.1085	0.1084	0.1017	0.1106	0.0336	0.0343	0.0208	0.0308
	(1.23)	(1.23)	(1.16)	(1.25)	(0.40)	(0.40)	(0.25)	(0.36)
Flight to Quality	0.0315	0.0331	0.0308	0.0324	0.1348**	0.1341**	0.1236*	0.1286*

	High ESG				Low ESG			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(0.42)	(0.44)	(0.41)	(0.43)	(2.02)	(2.01)	(1.85)	(1.94)
GDP Growth	-0.3171	-0.4606	-0.3528	-0.3636	-1.0938	-1.1719	-1.1325	-1.1057
	(-0.34)	(-0.49)	(-0.38)	(-0.38)	(-1.20)	(-1.28)	(-1.23)	(-1.20)
Constant	11.0863***	11.0406***	11.1340***	11.0526***	8.2871***	8.2273***	8.4107***	8.4279***
	(11.95)	(11.75)	(12.02)	(11.90)	(10.98)	(10.87)	(11.17)	(11.10)
Country x Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maturity Bucket FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,579	3,579	3,579	3,579	3,534	3,534	3,542	3,534
Adjusted R2	0.2722	0.2714	0.2709	0.2719	0.2373	0.2360	0.2373	0.2386

Table C12: Bond demand and carbon emission

This table shows the results of analysts' impacts on the bond demand of firms divided into subsamples based on the firm environmental risks proxied by carbon emission. The dependent variable is *Oversubscription.* Models 1–4 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* on investor demand for bonds issued by firms with high ESG. Models 5–8 provide the regression results of *Forecast Accuracy*, *Forecast Dispersion*, and *Coverage* on investor demand for bonds issued by firms with low ESG. In each model, we include a series of bond, firm, and country characteristics as controls. At the bond level, we control for issue amount (*Ln (Issue Size)*), *Coupon*, S&P credit rating (*Bond Rating*), and number of bookrunners (*Bookrunners*). At the firm level, we control for firm size (*Ln (Total Assets)*), firm profitability (*ROA*), and financial leverage (*Leverage*). At the country level, we control for nominal GDP growth (GDP Growth) and control for the effects of *Flight to Safety* and *Flight to Quality*. All variables are defined in Appendix C. All models also control Country x Industry effects, Year effects, Currency effects, and Maturity Bucket effects. Robust standard errors are in parentheses to obtain unbiased estimates of OLS coefficients under heteroscedasticity. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	High emission				Low emission			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forecast Accuracy	1.9768*			0.8155	1.1382			1.3027
	(1.80)			(0.86)	(1.40)			(1.46)
Forecast Dispersion		-16.2182***		-14.0937**		-0.3682		2.4463
		(-2.79)		(-2.45)		(-0.06)		(0.34)
Coverage			0.4821***	0.4787***			0.2906**	0.2761*
			(3.19)	(3.22)			(2.03)	(1.90)
Ln (Issue Size)	-0.9331***	-0.9265***	-0.9521***	-0.9468***	-0.6409***	-0.6481***	-0.6628***	-0.6526***
	(-10.02)	(-9.88)	(-10.24)	(-10.14)	(-6.37)	(-6.43)	(-6.50)	(-6.41)
Coupon	0.1282***	0.1412***	0.1201**	0.1390***	0.1593***	0.1539***	0.1563***	0.1610***
	(2.67)	(2.93)	(2.48)	(2.87)	(3.44)	(3.32)	(3.40)	(3.47)
Bond Rating	0.0143	0.0123	0.0138	0.0104	0.0142	0.0147	0.0145	0.0143
	(1.06)	(0.91)	(1.02)	(0.77)	(1.33)	(1.40)	(1.36)	(1.35)
Bookrunners	0.0088	0.0093	0.0097	0.0102	-0.0272	-0.0278	-0.0270	-0.0265
	(0.44)	(0.46)	(0.49)	(0.51)	(-1.24)	(-1.26)	(-1.21)	(-1.18)
Total Assets	-0.0864*	-0.0804*	-0.1691***	-0.1575***	-0.0751*	-0.0721*	-0.1166**	-0.1207**
	(-1.77)	(-1.66)	(-3.04)	(-2.84)	(-1.88)	(-1.76)	(-2.43)	(-2.48)
ROA	0.0243*	0.0220*	0.0149	0.0108	0.0328***	0.0348***	0.0313***	0.0297***
	(1.92)	(1.72)	(1.14)	(0.82)	(2.88)	(2.99)	(2.88)	(2.63)
Leverage	-0.3088	-0.3218	-0.2430	-0.2170	-0.7669**	-0.7652**	-0.7015**	-0.7062**
	(-0.79)	(-0.82)	(-0.62)	(-0.56)	(-2.16)	(-2.15)	(-2.00)	(-2.01)
Flight to Safety	0.0727	0.0846	0.0776	0.0807	0.5068***	0.5065***	0.5134***	0.5120***
	(0.64)	(0.75)	(0.69)	(0.72)	(3.30)	(3.30)	(3.35)	(3.33)
Flight to Quality	0.2646**	0.2725**	0.2650**	0.2803**	-0.0127	-0.0099	0.0041	-0.0023

	High emission				Low emission			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(2.23)	(2.29)	(2.20)	(2.35)	(-0.12)	(-0.09)	(0.04)	(-0.02)
GDP Growth	-0.4342	-0.6126	-0.3692	-0.6133	-1.9702*	-1.9437*	-1.9051*	-1.8927
	(-0.29)	(-0.41)	(-0.24)	(-0.41)	(-1.75)	(-1.70)	(-1.69)	(-1.64)
Constant	10.6200***	10.5437***	10.7851***	10.6609***	8.3691***	8.3368***	8.3664***	8.4311***
	(12.06)	(11.98)	(12.31)	(12.19)	(9.10)	(8.98)	(9.00)	(9.02)
Country x Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maturity Bucket FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,653	2,653	2,653	2,653	2,622	2,622	2,625	2,622
Adjusted R2	0.2187	0.2201	0.2224	0.2249	0.2902	0.2897	0.2915	0.2918

5. Conclusions

In this study, we explore the role of analysts in investor demand for corporate bonds. Using an extensive sample of worldwide public bond tranches, we show that firstly investors have greater demand for corporate bonds issued by firms with a higher quality of analyst forecasts (i.e., higher forecast accuracy or lower forecast dispersion). We also find that investor demand is positively related to the high coverage of analysts in the bond issuers. Our main results are consistent with the hypothesis that analysts play a positive role in reducing information asymmetry associated with bond issuers, supporting the bright side view. Prior studies suggest that analysts' coverage or characteristics are related to covering firms' access to external finance based on the costs of external financing (Mansi *et al.*, 2010; Derrien *et al.*, 2016; Luong *et al.*, 2021). We contribute to the literature by highlighting a more direct proxy of access to external finance: bond investors' oversubscription ratio is influenced by analysts. We address the endogeneity concerns by adopting a 2SLS IV approach and employing alternative measures of investor demand and find that the main results are robust.

Given the findings of the informative role of analyst activities in corporate bond issuance, we conjecture that the impact of analyst activities would be more pronounced in bonds and firms with higher information asymmetry. Accordingly, we investigate bond and firm-level heterogeneity.

For bond heterogeneity, first, we find that the impact of analysts is stronger in non-green bonds compared to green bonds, which is in line with the literature that argues green bonds lower information asymmetry as they signal the environmental commitment of firms. Second, we find that the impact of analysts on bonds issued for the first time is no greater than that on seasoned bond issuance, in line with the literature that shows that despite increased bond market presence possibly reducing information asymmetry, the debut of investment-grade bonds has

no significant association with information problem.

For firm-level heterogeneity, first, our findings shed light on the positive role of analysts by showing that analysts are more important for firms with higher uncertainties and risks. Specifically, we analyse the impacts of analyst forecast quality and analyst coverage in firms with varying degrees of systematic risks and idiosyncratic risks captured by stock beta, volatility risks and business operation risks. We find that such impacts on investor demand are more pronounced when firm uncertainties are higher.

Second, given the concern that the ESG and climate-related issues are closely associated with the bondholders' claims, we extend our analysis by examining how analysts impact the demand for bonds issued by firms challenged by ESG and climate performance. We show that analysts have stronger impacts on issuers with a low ESG score and higher carbon emissions. Our results suggest that despite investors' inclination to optimise the risk-return characteristics of their portfolio from investing in non-ESG firms, they still demand more accurate information from analysts to buffer themselves against risks arising from ESG-related liabilities. Altogether, our findings reveal that the value of analysts may extend beyond the uncertainties in the markets and within the business itself.

Overall, our findings support the view that the ability of analyst information production and distribution, monitoring, and signalling, as reflected by their coverage and forecast quality, can increase investors' demand for their covering firms' bonds. Our study contributes to the existing literature on the role of analysts in bond markets and on the firms' access to external finance. We also offer several implications for market participants and regulators. Investors may pay more attention to the information outputs of financial analysts before their investment decisions. The analysts' outputs could not only be informative to increase their knowledge about the target firms but also provide a signal of a relatively better governance environment. In

addition, for regulators, they should raise higher requirements for analysts. The high quality of analysts' research outputs can help market participants avoid a range of risks when they pursue high returns and thus contribute to market stability.

V. Conclusions and Recommendations for Future Research

In this final part of the thesis, I summarise the main findings, offer practical implications, and point out limitations and potential directions for future research.

1. Concluding Remarks and Implications

This thesis contributes to recent trends in the literature in the field of finance by three important empirical studies. In Part II, we make contributions by studying the impact of corporate culture on CSR. Using a quantified measure of four dimensions of corporate culture, we provide robust evidence that corporate culture matters. CSR involvement increases in firms that place a relatively higher emphasis on collaborative values (i.e., highlighting a harmonious work environment, relationships with stakeholders, and social and environmental issues), whereas it decreases in firms that give cultural importance to creation (i.e., emphasising innovation and breakthrough) or competition (i.e., focusing on market shares and economic growth). Moreover, we demonstrate that blockholders are a formal institution channel through which cultural impacts on CSR are moderated. Blockholders exert significant moderating effects on overall performance, strengths, or concerns to eliminate the negative impacts as well as reduce the excessive positive actions to support CSR.

The contributions made in this part of the CSR literature are important for understanding key determinants of CSR. We not only make an important managerial

implication that changing values, beliefs, and attitudes toward CSR is a critical step but also imply that large ownership of blockholders can enable managers to focus on value-enhancing CSR projects and avert those harmful to shareholders' interests.

In Part III, we contribute to the corporate green bond literature by studying the relationship between ESG blockholders and the issuance of corporate green bonds. We identify an ESG blockholder as a large institutional investor who has ESG initiatives and is actively involved in ESG issues. Based on a matching dataset of green bond issuers and conventional bond issuers, we find that higher ownership of ESG blockholders is positively associated with corporate green bond issuance. These blockholders may exert significant influences on the issuance through SRI shareholder proposals. After the issuance, they further effectively weaken or even alter the positive relation between green bond issuance and the cost of debt financing in the long term, compensating for the inadequacy of the long-term effects of green bond issuance on issuers' financing costs in the debt market. Overall, this study indicates that as the pioneers of incorporating environmental and social concerns into the business, the presence of blockholders with ESG initiatives can send a credible signal that the firm is committed to lower financial and environmental risks and more development opportunities, thus convincing investors to make investments.

This study makes an implication for the green bond markets that the growing focus of large financial institutions on environmental and social factors exerts a crucial influence on the evolution of green bond markets. This proposes that blockholders who actively engage in ESG can serve as pioneers in incorporating these environmental concerns into business operations. Regarding the growth of green bond markets, governments ought to remove hurdles to facilitate the participation of financial institutions in ESG activities and green financing. Moreover, this study implies that

markets indeed recognise and reward firms' potential ESG profiles driven by green investment through green bond financing.

In Part IV, we further make contributions to the corporate bond literature by studying the role of financial analysts in the investor demand for corporate bonds. Using an extensive sample of worldwide public bond tranches, we find that investors have greater demand for corporate bonds issued by firms with greater coverage of financial analysts and a higher quality of analyst forecasts. Analysts can play an informative role and serve as a credible signal of a good governance environment in the process of corporate bond issuance, which makes their impacts more pronounced in bonds and firms in which the information asymmetry is higher. In particular, the impacts of analysts are stronger in non-green bond issuance compared to green bond issuance, which provides a better information environment for outside investors by sending a signal of the environmental commitment of firms. Given investors' concern that the ESG and climate-related issues are closely associated with the bondholders' claims, analysts' impacts are stronger in issuers with a low ESG score and higher carbon emissions.

This study offers implications for corporate bond markets. Not only may investors pay attention to the information outputs of financial analysts before their investment decisions, but market regulators should raise higher requirements for analysts to control market risks. The high quality of analysts' research outputs can help market participants mitigate risks while seeking high returns, thereby contributing significantly to market stability.

2. Limitations and Recommendations for Future Research

In the context of presenting findings, contributions, and implications of the research, it

is appropriate to also point towards its limitations. All the work presented in the thesis is empirical in nature, and no new theoretical model has been built. Throughout the thesis, we rely on secondary data. Such empirical studies are often bound by certain limitations regarding data - issues of availability, quality, processing, and sample size are essential concerns. For example, the limitation of corporate green bond data in Part III mainly revolves around issues such as the relatively recent emergence of the corporate green bond market, which leads to a smaller and less comprehensive dataset compared to other more established financial instruments. In other words, this dataset is challenged by limited historical data due to a shorter history and by inconsistency in data reporting due to inconsistencies in the standards and criteria for certification of green labels across different countries and institutions. Accordingly, analysing the relationships in Part III in an international context and using different label institutions might be interesting and useful since different results could be obtained in different settings. Moreover, for the study in Part II, both classification and quantitative measures of corporate culture are the matter itself, as these are subjective. Although the culture measure has previously been validated in empirical studies (Fiordelisi *et al.*, 2019), we are less likely to say that it is perfect as the outcome of text analysis before constructing the measure does not capture the information about cultural values beyond annual 10-K reports and cannot identify all synonyms of four cultural dimensions. Furthermore, although we have conducted a battery of robustness checks for each chapter, it is difficult to completely rule out endogeneity issues that unobserved characteristics might potentially bias our findings.

Given the current limitations of green bond data, future research in this area may look further into the factors influencing green finance and the impacts of green finance as this emerging market develops. We first recommend examining long-term

determinants of green financing, the long-term environmental, social, and economic impacts of such financing, and how these outcomes align with broader goals of responsibility and sustainability. Another interesting avenue of future research we recommend would be conducting comparative studies to understand how green finance trends and practices vary in regions and the factors driving these differences. Additionally, in the area of culture research, we recommend future work to investigate cultural impacts on growing concerns about environmental and social issues using different cultural frameworks and measurements. Employing other more granular classifications might help scholars to conduct an in-depth analysis of cultural impacts. Finally, an interesting avenue of research about analysts and bond markets would be to look at how they incorporate ESG factors into equity and bond analysis, as well as how this incorporation impacts the corporate bond markets. We recommend that future research explore how the emphasis on ESG factors by analysts influences firm strategies in issuing bonds, including the decision to issue green or climate-related bonds.

References

Adams, R.B., Hermalin, B.E. & Weisbach, M.S. 2010. The Role of Boards of Directors in Corporate Governance: A Conceptual Framework and Survey. *Journal of Economic Literature,* 48**,** 58-107.

Adhikari, B.K. 2016. Causal effect of analyst following on corporate social responsibility. *Journal of Corporate Finance,* 41**,** 201-216.

Aguilera, R.V., Rupp, D.E., Williams, C.A. & Ganapathi, J. 2007. Putting the S Back in Corporate Social Responsibility: A Multilevel Theory of Social Change in Organizations. *The Academy of Management Review,* 32**,** 836-863.

Aiken, A.L. & Lee, C. 2020. Let's talk sooner rather than later: The strategic communication decisions of activist blockholders. *Journal of Corporate Finance,* 62.

Albuquerque, R., Koskinen, Y. & Zhang, C. 2019. Corporate Social Responsibility and Firm Risk: Theory and Empirical Evidence. *Management Science,* 65**,** 4451-4469.

Altman, E.I. 1968. Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *The Journal of Finance,* 23**,** 589-609.

Alvarez, R., Jara, M. & Pombo, C. 2018. Do institutional blockholders influence corporate investment? Evidence from emerging markets. *Journal of Corporate Finance,* 53**,** 38-64.

Amihud, Y. 2002. Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets,* 5**,** 31-56.

Amin, A., Chourou, L., Kamal, S., Malik, M. & Zhao, Y. 2020. It's who you know that counts: Board connectedness and CSR performance. *Journal of Corporate Finance,* 64.

Andreou, P.C., Fiordelisi, F., Harris, T. & Philip, D. 2022. Institutional Ownership and Firms' Thrust to Compete. *British Journal of Management.*

Apergis, N., Poufinas, T. & Antonopoulos, A. 2022. ESG scores and cost of debt. *Energy Economics,* 112.

Asquith, P., Au, A.S., Covert, T. & Pathak, P.A. 2013. The market for borrowing corporate bonds. *Journal of Financial Economics,* 107**,** 155-182.

Asquith, P., Mikhail, M.B. & Au, A.S. 2005. Information content of equity analyst reports. *Journal of Financial Economics,* 75**,** 245-282.

Attig, N., El Ghoul, S. & Guedhami, O. 2009. Do multiple large shareholders play a corporate governance role? Evidence from East Asia. *Journal of Financial Research,* 32**,** 395-422.

Attig, N., Guedhami, O. & Mishra, D. 2008. Multiple large shareholders, control contests, and implied cost of equity. *Journal of Corporate Finance,* 14**,** 721-737.

Azar, J., Duro, M., Kadach, I. & Ormazabal, G. 2021. The Big Three and corporate carbon emissions around the world. *Journal of Financial Economics,* 142**,** 674-696.

Banerjee, S., Homroy, S. & Slechten, A. 2022. Stakeholder preference and strategic corporate social responsibility. *Journal of Corporate Finance,* 77.

Bar-Isaac, H. & Shapiro, J. 2020. Blockholder voting. *Journal of Financial Economics,* 136**,** 695-717.

Barclay, M.J. & Holderness, C.G. 1989. Private benefits from control of public corporations. *Journal of Financial Economics,* 25**,** 371-395.

Barko, T., Cremers, M. & Renneboog, L. 2021. Shareholder Engagement on Environmental, Social, and Governance Performance. *Journal of Business Ethics*.

Basu, N., Paeglis, I. & Rahnamaei, M. 2016. Multiple blockholders, power, and firm value. *Journal of Banking & Finance,* 66**,** 66-78.

Baxter, N.D. 1967. Leverage, Risk of Ruin and the Cost of Capital. *The Journal of Finance,* 22**,** 395-403.

Bebchuk, L.A. & Stole, L.A. 1993. Do Short-Term Objectives Lead to Under- or Overinvestment in Long-Term Projects? *The Journal of Finance,* 48**,** 719-729.
Bénabou, R. & Tirole, J. 2010. Individual and Corporate Social Responsibility. *Economica,* 77**,** 1-19.
Bennedsen, M. & Wolfenzon, D. 2000. The balance of power in closely held corporations. *Journal of Financial Economics,* 58**,** 113-139.
Benson, B.W. & Davidson, W.N. 2010. The relation between stakeholder management, firm value, and CEO compensation: A test of enlightened value maximization. *Financial Management,* 39**,** 929-964.
Bernile, G., Bhagwat, V. & Yonker, S. 2018. Board diversity, firm risk, and corporate policies. *Journal of Financial Economics,* 127**,** 588-612.
Bernstein, A., Gustafson, M.T. & Lewis, R. 2019. Disaster on the horizon: The price effect of sea level rise. *Journal of Financial Economics,* 134**,** 253-272.
Bharath, S.T., Pasquariello, P. & Wu, G. 2009. Does Asymmetric Information Drive Capital Structure Decisions? *Review of Financial Studies,* 22**,** 3211-3243.
Blackrock 2016. Adapting portfolios to climate change: Implications and strategies for all investors. Blackrock Investment Institute.
Blackrock 2020. BlackRock Investment Stewardship's approach to engagement on climate risk. BlackRock Investment Stewardship.
Borgers, A., Derwall, J., Koedijk, K. & Ter Horst, J. 2015. Do social factors influence investment behavior and performance? Evidence from mutual fund holdings. *Journal of Banking & Finance,* 60**,** 112-126.
Boubakri, N., El Ghoul, S., Guedhami, O. & Samet, A. 2015. The Effects of Analyst Forecast Properties and Country-Level Institutions on the Cost of Debt. *Journal of Financial Research,* 38**,** 461-493.
Bradley, D., Gokkaya, S., Liu, X. & Xie, F. 2017. Are all analysts created equal? Industry expertise and monitoring effectiveness of financial analysts. *Journal of Accounting and Economics,* 63**,** 179-206.
Bradshaw, M.T., Richardson, S.A. & Sloan, R.G. 2006. The relation between corporate financing activities, analysts' forecasts and stock returns. *Journal of Accounting and Economics,* 42**,** 53-85.
Brav, A., Jiang, W., Partnoy, F. & Thomas, R. 2008. Hedge fund activism, corporate governance, and firm performance. *The Journal of Finance,* 63**,** 1729-1775.
Brown, W.O., Helland, E. & Smith, J.K. 2006. Corporate philanthropic practices. *Journal of Corporate Finance,* 12**,** 855-877.
Buchner, B., Clark, A., Falconer, A., Macquarie, R., Meattle, C., Tolentino, R. & Wetherbee, C. 2019. Global Landscape of Climate Finance 2019. Climate Policy Initiative.
Burkart, M., Gromb, D. & Panunzi, F. 1997. Large Shareholders, Monitoring, and the Value of the Firm*. *The Quarterly Journal of Economics,* 112**,** 693-728.
Bushee, B.J., Jung, M.J. & Miller, G.S. 2011. Conference Presentations and the Disclosure Milieu. *Journal of Accounting Research,* 49**,** 1163-1192.
Cai, N., Helwege, J. & Warga, A. 2007. Underpricing in the Corporate Bond Market. *Review of Financial Studies,* 20**,** 2021-2046.
Cameron, K.S. & Quinn, R.E. 2011. *Diagnosing and changing organizational culture: Based on the competing values framework*, John Wiley & Sons.
Cameron, K.S., Quinn, R.E., Degraff, J. & Thakor, A.V. 2014. *Competing values leadership,* Cheltenham, UK, Edward Elgar Publishing.
Cantillo, M. & Wright, J. 2000. How Do Firms Choose Their Lenders? An Empirical Investigation. *The Review of Financial Studies,* 13**,** 155-189.
Cao, J., Li, W. & Bilokha, A. 2022. Low-carbon city initiatives and analyst behaviour: A quasi-natural experiment. *Journal of Financial Stability,* 62.
Carroll, A.B. & Buchholtz, A.K. 2014. *Business and society: Ethics, sustainability, and stakeholder management*, Nelson Education.

Chang, S. & Mayers, D. 2012. Who Benefits in an Insider Negotiated Block Trade? *Financial Management,* 41**,** 703-731.
Charitou, A., Karamanou, I. & Lambertides, N. 2019. Analysts to the rescue? *Journal of Corporate Finance,* 56**,** 108-128.
Chava, S. 2014. Environmental Externalities and Cost of Capital. *Management Science,* 60**,** 2223-2247.
Chen, J. & King, T.-H.D. 2014. Corporate hedging and the cost of debt. *Journal of Corporate Finance,* 29**,** 221-245.
Chen, S. & Matsumoto, D.A. 2006. Favorable versus Unfavorable Recommendations: The Impact on Analyst Access to Management-Provided Information. *Journal of Accounting Research,* 44**,** 657-689.
Chen, T., Dong, H. & Lin, C. 2020. Institutional shareholders and corporate social responsibility. *Journal of Financial Economics,* 135**,** 483-504.
Chen, T., Harford, J. & Lin, C. 2015. Do analysts matter for governance? Evidence from natural experiments. *Journal of Financial Economics,* 115**,** 383-410.
Chen, T., Xie, L. & Zhang, Y. 2017. How does analysts' forecast quality relate to corporate investment efficiency? *Journal of Corporate Finance,* 43**,** 217-240.
Chen, X., Cheng, Q. & Lo, K. 2010. On the relationship between analyst reports and corporate disclosures: Exploring the roles of information discovery and interpretation. *Journal of Accounting and Economics,* 49**,** 206-226.
Cheng, C., Chu, Y., Deng, Z. & Huang, B. 2022. Venture capital and corporate social responsibility. *Journal of Corporate Finance*.
Cho, S.Y., Lee, C. & Pfeiffer, R.J. 2013. Corporate social responsibility performance and information asymmetry. *Journal of Accounting and Public Policy,* 32**,** 71-83.
Chung, K.H. & Jo, H. 1996. The Impact of Security Analysts' Monitoring and Marketing Functions on the Market Value of Firms. *The Journal of Financial and Quantitative Analysis,* 31**,** 493-512.
Clifford, C.P. & Lindsey, L. 2016. Blockholder Heterogeneity, CEO Compensation, and Firm Performance. *Journal of Financial and Quantitative Analysis,* 51**,** 1491-1520.
Climate Bonds Initiative 2017. Green Bond Pricing in the Primary Market: Q2 2017.
Climate Bonds Initiative 2019. Climate Bonds Standard V3.0. Climate Bonds Initiative.
Climate Bonds Initiative 2020. 2019 Green Bond Market Summary. Climate Bonds Initiative.
Cornelli, F. & Goldreich, D. 2003. Bookbuilding: How Informative Is the Order Book? *The Journal of Finance,* 58**,** 1415-1443.
Costantini, M. & Sousa, R.M. 2022. What uncertainty does to euro area sovereign bond markets: Flight to safety and flight to quality. *Journal of International Money and Finance,* 122.
Crane, A. 2000. Corporate Greening as Amoralization. *Organization Studies,* 21**,** 673-696.
Cremers, K.J.M., Nair, V.B. & Wei, C. 2007. Governance Mechanisms and Bond Prices. *The Review of Financial Studies,* 20**,** 1359-1388.
Cronqvist, H. & Fahlenbrach, R. 2009. Large Shareholders and Corporate Policies. *Review of Financial Studies,* 22**,** 3941-3976.
Cronqvist, H., Low, A. & Nilsson, M. 2007. Does Corporate Culture Matter for Firm Policies? *Fisher College of Business Working Paper,* 3.
Cronqvist, H. & Yu, F. 2017. Shaped by their daughters: Executives, female socialization, and corporate social responsibility. *Journal of Financial Economics,* 126**,** 543-562.
Davidson, R., Dey, A. & Smith, A. 2015. Executives' "off-the-job" behavior, corporate culture, and financial reporting risk. *Journal of Financial Economics,* 117**,** 5-28.
Dechow, P.M., Hutton, A.P. & Sloan, R.G. 2000. The Relation between Analysts' Forecasts of Long-Term Earnings Growth and Stock Price Performance Following Equity Offerings*. *Contemporary Accounting Research,* 17**,** 1-32.
Dechow, P.M., Richardson, S.A. & Tuna, I. 2003. Why Are Earnings Kinky? An Examination of the Earnings Management Explanation. *Review of Accounting Studies,* 8**,** 355-384.
Deng, X., Kang, J.-K. & Low, B.S. 2013. Corporate social responsibility and stakeholder value maximization: Evidence from mergers. *Journal of Financial Economics,* 110**,** 87-109.
Derrien, F. 2005. IPO Pricing in "Hot" Market Conditions: Who Leaves Money on the Table? *The*

Journal of Finance, 60**,** 487-521.
Derrien, F., Kecskés, A. & Mansi, S.A. 2016. Information asymmetry, the cost of debt, and credit events: Evidence from quasi-random analyst disappearances. *Journal of Corporate Finance,* 39**,** 295-311.
Dhaliwal, D.S., Li, O.Z., Tsang, A. & Yang, Y.G. 2011. Voluntary Nonfinancial Disclosure and the Cost of Equity Capital: The Initiation of Corporate Social Responsibility Reporting. *The Accounting Review,* 86**,** 59-100.
Dhillon, A. & Rossetto, S. 2015. Ownership Structure, Voting, and Risk. *Review of Financial Studies,* 28**,** 521-560.
Diamond, D.W. & Verrecchia, R.E. 1991. Disclosure, Liquidity, and the Cost of Capital. *The Journal of Finance,* 46**,** 1325-1359.
Díaz, A. & Escribano, A. 2021. Sustainability premium in energy bonds. *Energy Economics*.
Dimson, E., Karakaş, O. & Li, X. 2015. Active Ownership. *Review of Financial Studies,* 28**,** 3225-3268.
Downing, C., Underwood, S. & Xing, Y. 2009. The Relative Informational Efficiency of Stocks and Bonds: An Intraday Analysis. *Journal of Financial and Quantitative Analysis,* 44**,** 1081-1102.
Drake, M.S., Rees, L. & Swanson, E.P. 2011. Should Investors Follow the Prophets or the Bears? Evidence on the Use of Public Information by Analysts and Short Sellers. *The Accounting Review,* 86**,** 101-130.
Duffee, G.R. 1998. The Relation Between Treasury Yields and Corporate Bond Yield Spreads. *The Journal of Finance,* 53**,** 2225-2241.
Dwyer, S., Richard, O.C. & Chadwick, K. 2003. Gender diversity in management and firm performance: The influence of growth orientation and organizational culture. *Journal of Business Research,* 56**,** 1009-1019.
Dyck, A., Lins, K.V., Roth, L. & Wagner, H.F. 2019. Do institutional investors drive corporate social responsibility? International evidence. *Journal of Financial Economics,* 131**,** 693-714.
Dyck, A., Morse, A. & Zingales, L. 2010. Who Blows the Whistle on Corporate Fraud? *The Journal of Finance,* 65**,** 2213-2253.
Dyck, A. & Zingales, L. 2004. Private Benefits of Control: An International Comparison. *The Journal of Finance,* 59**,** 537-600.
Easley, D. & O'hara, M. 2004. Information and the Cost of Capital. *The Journal of Finance,* 59**,** 1553-1583.
Eccles, R.G., Ioannou, I. & Serafeim, G. 2014. The Impact of Corporate Sustainability on Organizational Processes and Performance. *Management Science,* 60(11)**,** 2835-2857.
Edmans, A. 2011. Does the stock market fully value intangibles? Employee satisfaction and equity prices. *Journal of Financial Economics,* 101**,** 621-640.
Edmans, A. 2014. Blockholders and Corporate Governance. *Annual Review of Financial Economics,* 6**,** 23-50.
Edmans, A., Fang, V.W. & Zur, E. 2013. The Effect of Liquidity on Governance. *Review of Financial Studies,* 26**,** 1443-1482.
Edmans, A. & Holderness, C.G. 2017. Chapter 8 - Blockholders: A Survey of Theory and Evidence. *In:* Hermalin, B.E. & Weisbach, M.S. (eds.) *The Handbook of the Economics of Corporate Governance.* North-Holland.
Edmans, A. & Manso, G. 2011. Governance Through Trading and Intervention: A Theory of Multiple Blockholders. *Review of Financial Studies,* 24**,** 2395-2428.
Eisend, M., Evanschitzky, H. & Gilliland, D.I. 2016. The influence of organizational and national culture on new product performance. *Journal of Product Innovation Management,* 33**,** 260-276.
El Ghoul, S., Guedhami, O., Kim, H. & Park, K. 2016a. Corporate Environmental Responsibility and the Cost of Capital: International Evidence. *Journal of Business Ethics,* 149**,** 335-361.
El Ghoul, S., Guedhami, O., Nash, R. & Patel, A. 2016b. New Evidence on the Role of the Media in Corporate Social Responsibility. *Journal of Business Ethics,* 154**,** 1051-1079.
Elyasiani, E., Jia, J. & Mao, C.X. 2010. Institutional ownership stability and the cost of debt. *Journal of Financial Markets,* 13**,** 475-500.
Erhemjamts, O. & Huang, K. 2019. Institutional ownership horizon, corporate social responsibility and

shareholder value. *Journal of Business Research,* 105**,** 61-79.
Ertimur, Y., Muslu, V. & Zhang, F. 2011. Why are recommendations optimistic? Evidence from analysts' coverage initiations. *Review of Accounting Studies,* 16**,** 679-718.
Faccio, M., Marchica, M.-T. & Mura, R. 2011. Large Shareholder Diversification and Corporate Risk-Taking. *The Review of Financial Studies,* 24**,** 3601-3641.
Fama, E.F. & French, K.R. 2007. Disagreement, tastes, and asset prices. *Journal of Financial Economics,* 83**,** 667-689.
Fan, H., Tang, Q. & Pan, L. 2021. An international study of carbon information asymmetry and independent carbon assurance. *The British Accounting Review,* 53.
Farrell, K.A. & Whidbee, D.A. 2002. Monitoring by the financial press and forced CEO turnover. *Journal of Banking & Finance,* 26**,** 2249-2276.
Fatica, S. & Panzica, R. 2021. Green bonds as a tool against climate change? *Business Strategy and the Environment,* 30**,** 2688-2701.
Fatica, S., Panzica, R. & Rancan, M. 2021. The pricing of green bonds: Are financial institutions special? *Journal of Financial Stability,* 54.
Fenwick, M.S., De Cieri, H.L. & Welch, D.E. 1999. Cultural and Bureaucratic Control in MNEs: The Role of Expatriate Performance Management. *MIR: Management International Review,* 39**,** 107-124.
Fernando, C.S., Sharfman, M.P. & Uysal, V.B. Does greenness matter? The effect of corporate environmental performance on ownership structure, analyst coverage and firm value. FMA European Conference, 2010 Hamburg, Germany.
Ferreira, M.A. & Matos, P. 2008. The colors of investors' money: The role of institutional investors around the world. *Journal of Financial Economics,* 88**,** 499-533.
Ferrell, A., Liang, H. & Renneboog, L. 2016. Socially Responsible Firms. *Journal of Financial Economics,* 122**,** 585-606.
Ferrer, E., Santamaría, R. & Suárez, N. 2019. Does analyst information influence the cost of debt? Some international evidence. *International Review of Economics & Finance,* 64**,** 323-342.
Fiordelisi, F., Renneboog, L., Ricci, O. & Lopes, S.S. 2019. Creative corporate culture and innovation. *Journal of International Financial Markets, Institutions and Money,* 63.
Fiordelisi, F. & Ricci, O. 2014. Corporate culture and CEO turnover. *Journal of Corporate Finance,* 28**,** 66-82.
Fiordelisi, F. & Ricci, O. 2021. Corrigendum to "Corporate culture and CEO turnover" [Journal of Corporate Finance, 28 (2014) 66–82]. *Journal of Corporate Finance,* 70.
Flammer, C. 2013. Corporate Social Responsibility and Shareholder Reaction: The Environmental Awareness of Investors. *Academy of Management Journal,* 56**,** 758-781.
Flammer, C. 2015. Does corporate social responsibility lead to superior financial performance? A regression discontinuity approach. *Management Science,* 61**,** 2549-2568.
Flammer, C. 2021. Corporate green bonds. *Journal of Financial Economics*.
Flammer, C., Toffel, M.W. & Viswanathan, K. 2021. Shareholder activism and firms' voluntary disclosure of climate change risks. *Strategic Management Journal,* 42**,** 1850-1879.
Francis, J., Schipper, K. & Vincent, L. 2002. Earnings announcements and competing information. *Journal of Accounting and Economics,* 33**,** 313-342.
Frankel, R., Kothari, S.P. & Weber, J. 2006. Determinants of the informativeness of analyst research. *Journal of Accounting and Economics,* 41**,** 29-54.
Friedman, M. 1970. The social responsibility of business is to increase its profits. *New York Times Magazine.*
Fu, X., Tang, T. & Yan, X. 2019. Why do institutions like corporate social responsibility investments? evidence from horizon heterogeneity. *Journal of Empirical Finance,* 51**,** 44-63.
G20 2018. G20 Sustainable Finance Synthesis Report.
Galanti, S., Leroy, A. & Vaubourg, A.-G. 2022. Investment and access to external finance in Europe: Does analyst coverage matter? *International Review of Financial Analysis,* 81.
Galbreath, J. 2010. Drivers of Corporate Social Responsibility: the Role of Formal Strategic Planning and Firm Culture. *British Journal of Management,* 21**,** 511-525.

Gao, S., Lu, R. & Ni, C. 2019. Institutional investors' cognitive constraints during initial public offerings. *Journal of Banking & Finance,* 108.
García-Granero, E.M., Piedra-Muñoz, L. & Galdeano-Gómez, E. 2020. Measuring eco-innovation dimensions: The role of environmental corporate culture and commercial orientation. *Research Policy,* 49.
García, C.J., Herrero, B., Miralles-Quirós, J.L. & Del Mar Miralllles-Quirós, M. 2023. Exploring the determinants of corporate green bond issuance and its environmental implication: The role of corporate board. *Technological Forecasting and Social Change,* 189.
Ge, X., Bilinski, P. & Kraft, A. 2021. Institutional Blockholders and Voluntary Disclosure. *European Accounting Review,* 30**,** 1013-1042.
Gebhardt, W.R., Lee, C.M.C. & Swaminathan, B. 2001. Toward an Implied Cost of Capital. *Journal of Accounting Research,* 39**,** 135-176.
Ghisetti, C., Mancinelli, S., Mazzanti, M. & Zoli, M. 2016. Financial barriers and environmental innovations: evidence from EU manufacturing firms. *Climate Policy,* 17**,** S131-S147.
Global Sustainable Investment Alliance 2021. Global Sustainable Investment Review 2020. Global Sustainable Investment Alliance.
Gloßner, S. 2019. Investor horizons, long-term blockholders, and corporate social responsibility. *Journal of Banking & Finance,* 103**,** 78-97.
Gottesman, A. & Morey, M. 2012. Mutual fund corporate culture and performance. *Review of Financial Economics,* 21**,** 69-81.
Graafland, J. & Noorderhaven, N. 2020. Culture and institutions: How economic freedom and long-term orientation interactively influence corporate social responsibility. *Journal of International Business Studies,* 51**,** 1034-1043.
Graham, J.R., Grennan, J., Harvey, C.R. & Rajgopal, S. 2022. Corporate culture: Evidence from the field. *Journal of Financial Economics,* 146**,** 552-593.
Graham, J.R., Harvey, C.R. & Rajgopal, S. 2005. The economic implications of corporate financial reporting. *Journal of Accounting and Economics,* 40**,** 3-73.
Graves, S.B. & Waddock, S.A. 1994. Institutional Owners and Corporate Social Performance. *The Academy of Management Journal,* 37**,** 1034-1046.
Green, T.C., Jame, R., Markov, S. & Subasi, M. 2014a. Access to management and the informativeness of analyst research. *Journal of Financial Economics,* 114**,** 239-255.
Green, T.C., Jame, R., Markov, S. & Subasi, M. 2014b. Broker-hosted investor conferences. *Journal of Accounting and Economics,* 58**,** 142-166.
Griffiths, A. & Petrick, J.A. 2001. Corporate architectures for sustainability. *International Journal of Operations & Production Management,* 21**,** 1573-1585.
Groysberg, B., Healy, P.M. & Maber, D.A. 2011. What Drives Sell-Side Analyst Compensation at High-Status Investment Banks? *Journal of Accounting Research,* 49**,** 969-1000.
Groysberg, B., Lee, J., Price, J. & Cheng, J. 2018. The leader's guide to corporate culture. *Harvard Business Review,* 96**,** 44-52.
Guedhami, O. & Mishra, D. 2009. Excess Control, Corporate Governance and Implied Cost of Equity: International Evidence. *Financial Review,* 44**,** 489-524.
Guiso, L., Sapienza, P. & Zingales, L. 2015. Corporate Culture, Societal Culture, and Institutions. *American Economic Review,* 105**,** 336-339.
Guo, L., Li, F.W. & John Wei, K.C. 2020. Security analysts and capital market anomalies. *Journal of Financial Economics,* 137**,** 204-230.
Guthrie, K. & Sokolowsky, J. 2010. Large shareholders and the pressure to manage earnings. *Journal of Corporate Finance,* 16**,** 302-319.
Gutsche, G. & Ziegler, A. 2019. Which private investors are willing to pay for sustainable investments? Empirical evidence from stated choice experiments. *Journal of Banking & Finance,* 102**,** 193-214.
Hainmueller, J. 2012. Entropy Balancing for Causal Effects: A Multivariate Reweighting Method to Produce Balanced Samples in Observational Studies. *Political Analysis,* 20**,** 25-46.
Han, Y. & Zheng, E. 2016. Why Firms Perform Differently in Corporate Social Responsibility? Firm

Ownership and the Persistence of Organizational Imprints. *Management and Organization Review,* 12**,** 605-629.
Harford, J., Kecskés, A. & Mansi, S. 2018. Do long-term investors improve corporate decision making? *Journal of Corporate Finance,* 50**,** 424-452.
Hart, S. & Milstein, M. 1999. Global Sustainability and the Creative Destruction of Industries. *Sloan Management Review,* 41.
He, J. & Tian, X. 2013. The dark side of analyst coverage: The case of innovation. *Journal of Financial Economics,* 109**,** 856-878.
Heinkel, R., Kraus, A. & Zechner, J. 2001. The Effect of Green Investment on Corporate Behavior. *The Journal of Financial and Quantitative Analysis,* 36**,** 431-449.
Helwege, J., Intintoli, V.J. & Zhang, A. 2012. Voting with their feet or activism? Institutional investors' impact on CEO turnover. *Journal of Corporate Finance,* 18**,** 22-37.
Hitka, M., Vetráková, M., Balážová, Ž. & Danihelová, Z. 2015. Corporate Culture as a Tool for Competitiveness Improvement. *Procedia Economics and Finance,* 34**,** 27-34.
Hoepner, A.G.F., Oikonomou, I., Sautner, Z., Starks, L.T. & Zhou, X.Y. 2023. ESG Shareholder Engagement and Downside Risk. *Review of Finance*.
Hoffman, A.J. 1996. A strategic response to investor activism. *Sloan Management Review,* 37**,** 51-64.
Hong, H. & Kacperczyk, M. 2009. The price of sin: The effects of social norms on markets. *Journal of Financial Economics,* 93**,** 15-36.
Hong, H. & Kubik, J.D. 2003. Analyzing the Analysts: Career Concerns and Biased Earnings Forecasts. *The Journal of Finance,* 58**,** 313-351.
Hong, H., Kubik, J.D. & Scheinkman, J.A. 2012. Financial constraints on corporate goodness. National Bureau of Economic Research.
Hotchkiss, E.S. & Ronen, T. 2002. The Informational Efficiency of the Corporate Bond Market: An Intraday Analysis. *The Review of Financial Studies,* 15**,** 1325-1354.
Hovakimian, A., Opler, T. & Titman, S. 2001. The Debt-Equity Choice. *The Journal of Financial and Quantitative Analysis,* 36.
Howard‐Grenville, J. & Bertels, S. 2012. Organizational culture and environmental action. *The Oxford handbook of business and the natural environment.*
Humphrey, J.E. & Li, Y. 2021. Who goes green: Reducing mutual fund emissions and its consequences. *Journal of Banking & Finance*.
Husted, B.W. 2005. Culture and Ecology: A Cross-National Study of the Determinants of Environmental Sustainability. *MIR: Management International Review,* 45**,** 349-371.
Huyghebaert, N. & Xu, W. 2016. Bias in the post-IPO earnings forecasts of affiliated analysts: Evidence from a Chinese natural experiment. *Journal of Accounting and Economics,* 61**,** 486-505.
Idfc 2013. Mapping of green finance delivered by IDFC members in 2012. International Development Finance Club.
Idris, S.a.M., Wahab, R.A. & Jaapar, A. 2015. Corporate Cultures Integration and Organizational Performance: A Conceptual Model on the Performance of Acquiring Companies. *Procedia - Social and Behavioral Sciences,* 172**,** 591-595.
Ilhan, E., Sautner, Z., Vilkov, G. & Koijen, R. 2021. Carbon Tail Risk. *The Review of Financial Studies,* 34**,** 1540-1571.
Ioannou, I. & Serafeim, G. 2015. The impact of corporate social responsibility on investment recommendations: Analysts' perceptions and shifting institutional logics. *Strategic Management Journal,* 36**,** 1053-1081.
Irani, R.M. & Oesch, D. 2013. Monitoring and corporate disclosure: Evidence from a natural experiment. *Journal of Financial Economics,* 109**,** 398-418.
Irani, R.M. & Oesch, D. 2016. Analyst Coverage and Real Earnings Management: Quasi-Experimental Evidence. *Journal of Financial & Quantitative Analysis,* 51**,** 589-627.
Irvine, P., Lipson, M. & Puckett, A. 2007. Tipping. *Review of Financial Studies,* 20**,** 741-768.
Irvine, P.J. 2003. The incremental impact of analyst initiation of coverage. *Journal of Corporate Finance,* 9**,** 431-451.

Irvine, P.J.A. 2000. Do analysts generate trade for their firms? Evidence from the Toronto stock exchange. *Journal of Accounting and Economics,* 30**,** 209-226.
Ivković, Z. & Jegadeesh, N. 2004. The timing and value of forecast and recommendation revisions. *Journal of Financial Economics,* 73**,** 433-463.
Jackson, A.R. 2005. Trade Generation, Reputation, and Sell-Side Analysts. *The Journal of Finance,* 60**,** 673-717.
Jensen, M.C. & Meckling, W.H. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics,* 3**,** 305-360.
Jiang, F., Kim, K.A., Ma, Y., Nofsinger, J.R. & Shi, B. 2017. Corporate Culture and Investment–Cash Flow Sensitivity. *Journal of Business Ethics,* 154**,** 425-439.
Jiang, F., Ma, Y. & Wang, X. 2020. Multiple blockholders and earnings management. *Journal of Corporate Finance,* 64.
Jin, J., Han, L., Wu, L. & Zeng, H. 2020. The hedging effect of green bonds on carbon market risk. *International Review of Financial Analysis,* 71.
Jo, H. & Harjoto, M.A. 2011. Corporate Governance and Firm Value: The Impact of Corporate Social Responsibility. *Journal of Business Ethics,* 103**,** 351-383.
Juergens, J.L. & Lindsey, L. 2009. Getting Out Early: An Analysis of Market Making Activity at the Recommending Analyst's Firm. *The Journal of Finance,* 64**,** 2327-2359.
Jung, B., Sun, K.J. & Yang, Y.S. 2012. Do Financial Analysts Add Value by Facilitating More Effective Monitoring of Firms' Activities? *Journal of Accounting, Auditing & Finance,* 27**,** 61-99.
Kang, J.-K., Luo, J. & Na, H.S. 2018. Are institutional investors with multiple blockholdings effective monitors? *Journal of Financial Economics,* 128**,** 576-602.
Kashefi‐Pour, E., Amini, S., Uddin, M. & Duxbury, D. 2020. Does Cultural Difference Affect Investment–Cash Flow Sensitivity? Evidence from OECD Countries. *British Journal of Management,* 31**,** 636-658.
Kedia, S., Rajgopal, S. & Zhou, X. 2017. Large shareholders and credit ratings. *Journal of Financial Economics,* 124**,** 632-653.
Kelly, B. & Ljungqvist, A. 2012. Testing Asymmetric-Information Asset Pricing Models. *Review of Financial Studies,* 25**,** 1366-1413.
Kim, Y., Li, H. & Li, S. 2014. Corporate social responsibility and stock price crash risk. *Journal of Banking & Finance,* 43**,** 1-13.
Klein, A. & Zur, E. 2009. Entrepreneurial Shareholder Activism: Hedge Funds and Other Private Investors. *The Journal of Finance,* 64**,** 187-229.
Koch, A.S., Lefanowicz, C.E. & Robinson, J.R. 2013. Regulation FD: A review and synthesis of the academic literature. *Accounting Horizons,* 27**,** 619-646.
Konijn, S.J.J., Kräussl, R. & Lucas, A. 2011. Blockholder dispersion and firm value. *Journal of Corporate Finance,* 17**,** 1330-1339.
Kothari, S.P., So, E. & Verdi, R. 2016. Analysts' Forecasts and Asset Pricing: A Survey. *Annual Review of Financial Economics,* 8**,** 197-219.
Kotler, P. & Lee, N. 2008. *Corporate social responsibility: Doing the most good for your company and your cause*, John Wiley & Sons.
Krebbers, A., Marshall, A., Mccolgan, P. & Neupane, B. 2023. Orderbook demand for corporate bonds. *European Financial Management,* 29**,** 247-287.
Krueger, P., Sautner, Z., Starks, L.T. & Karolyi, A. 2020. The Importance of Climate Risks for Institutional Investors. *The Review of Financial Studies,* 33**,** 1067-1111.
Krüger, P. 2015. Corporate goodness and shareholder wealth. *Journal of Financial Economics,* 115**,** 304-329.
Laeven, L. & Levine, R. 2008. Complex Ownership Structures and Corporate Valuations. *Review of Financial Studies,* 21**,** 579-604.
Lang, M.H., Lins, K.V. & Miller, D.P. 2004. Concentrated Control, Analyst Following, and Valuation: Do Analysts Matter Most When Investors Are Protected Least? *Journal of Accounting Research,* 42**,** 589-623.

Larcker, D.F. & Watts, E.M. 2020. Where's the greenium? *Journal of Accounting and Economics*.
Lawrence, E.R., Raithatha, M. & Rodriguez, I. 2021. The effect of cultural and institutional factors on initiation, completion, and duration of cross-border acquisitions. *Journal of Corporate Finance,* 68.
Lehavy, R., Li, F. & Merkley, K. 2011. The Effect of Annual Report Readability on Analyst Following and the Properties of Their Earnings Forecasts. *The Accounting Review,* 86**,** 1087-1115.
Li, F., Yang, M. & Zhang, T. 2023. Does prospectus readability matter for bond issuance pricing? Evidence from China. *Pacific-Basin Finance Journal,* 80.
Li, K. 2020. Does Information Asymmetry Impede Market Efficiency? Evidence from Analyst Coverage. *Journal of Banking & Finance,* 118.
Liao, Z. 2018. Corporate culture, environmental innovation and financial performance. *Business Strategy and the Environment,* 27**,** 1368-1375.
Linnenluecke, M.K. & Griffiths, A. 2010. Corporate sustainability and organizational culture. *Journal of World Business,* 45**,** 357-366.
Linnenluecke, M.K., Russell, S.V. & Griffiths, A. 2009. Subcultures and sustainability practices: the impact on understanding corporate sustainability. *Business Strategy and the Environment,* 18**,** 432-452.
Lins, K.V., Servaes, H. & Tamayo, A.N.E. 2017. Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis. *The Journal of Finance,* 72**,** 1785-1824.
Liu, C., Chung, C.Y., Sul, H.K. & Wang, K. 2017. Does hometown advantage matter? The case of institutional blockholder monitoring on earnings management in Korea. *Journal of International Business Studies,* 49**,** 196-221.
Livnat, J. & Zhang, Y. 2012. Information interpretation or information discovery: which role of analysts do investors value more? *Review of Accounting Studies,* 17**,** 612-641.
Lo, A., Xa, W, Mamaysky, H. & Wang, J. 2004. Asset Prices and Trading Volume under Fixed Transactions Costs. *Journal of Political Economy,* 112**,** 1054-1090.
Lof, M. & Van Bommel, J. 2023. Asymmetric information and the distribution of trading volume. *Journal of Corporate Finance,* 82.
Loh, R.K. & Stulz, R.M. 2018. Is Sell‐Side Research More Valuable in Bad Times? *The Journal of Finance,* 73**,** 959-1013.
Louis, H., Sun, A.X. & Urcan, O. 2013. Do Analysts Sacrifice Forecast Accuracy for Informativeness? *Management Science,* 59**,** 1688-1708.
Lumpkin, G.T. & Dess, G.G. 1996. Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review,* 21**,** 135-172.
Luong, T.S., Qiu, B. & Wu, Y. 2021. Does it pay to be socially connected with wall street brokerages? Evidence from cost of equity. *Journal of Corporate Finance,* 68.
Malloy, C.J. 2005. The Geography of Equity Analysis. *The Journal of Finance,* 60**,** 719-755.
Mănescu, C. 2011. Stock returns in relation to environmental, social and governance performance: Mispricing or compensation for risk? *Sustainable development,* 19**,** 95-118.
Mangena, M., Priego, A.M. & Manzaneque, M. 2020. Bank power, block ownership, boards and financial distress likelihood: An investigation of Spanish listed firms. *Journal of Corporate Finance,* 64.
Mansi, S.A., Maxwell, W.F. & Miller, D.P. 2010. Analyst forecast characteristics and the cost of debt. *Review of Accounting Studies,* 16**,** 116-142.
Margolis, J.D. & Walsh, J.P. 2003. Misery loves companies: Rethinking social initiatives by business. *Administrative science quarterly,* 48**,** 268-305.
Masulis, R.W. & Reza, S.W. 2015. Agency Problems of Corporate Philanthropy. *Review of Financial Studies,* 28**,** 592-636.
Maury, B. & Pajuste, A. 2005. Multiple large shareholders and firm value. *Journal of Banking & Finance,* 29**,** 1813-1834.
Mehran, H. & Peristiani, S. 2010. Financial Visibility and the Decision to Go Private. *Review of*

Financial Studies, 23**,** 519-547.
Merton, R.C. 1974. On the Pricing of Corporate Debt: The Risk Structure of Interest Rates. *The Journal of Finance,* 29**,** 449-470.
Merton, R.C. 1987. A Simple Model of Capital Market Equilibrium with Incomplete Information. *The Journal of Finance,* 42**,** 483-510.
Miller, D.P. & Puthenpurackal, J.J. 2002. The Costs, Wealth Effects, and Determinants of International Capital Raising: Evidence from Public Yankee Bonds. *Journal of Financial Intermediation,* 11**,** 455-485.
Miller, G.S. 2006. The Press as a Watchdog for Accounting Fraud. *Journal of Accounting Research,* 44**,** 1001-1033.
Mishra, D.R. 2011. Multiple Large Shareholders and Corporate Risk Taking: Evidence from East Asia. *Corporate Governance: An International Review,* 19**,** 507-528.
Miska, C., Szőcs, I. & Schiffinger, M. 2018. Culture's effects on corporate sustainability practices: A multi-domain and multi-level view. *Journal of World Business,* 53**,** 263-279.
Mithani, M.A. 2017. Innovation and CSR — Do They Go Well Together? *Long Range Planning,* 50**,** 699-711.
Mola, S. & Guidolin, M. 2009. Affiliated mutual funds and analyst optimism. *Journal of Financial Economics,* 93**,** 108-137.
Mola, S., Rau, P.R. & Khorana, A. 2012. Is There Life after the Complete Loss of Analyst Coverage? *The Accounting Review,* 88**,** 667-705.
Morgan Stanley 2017. Behind the green bond boom. Morgan Stanley.
Mulherin, J.H. & Poulsen, A.B. 1998. Proxy contests and corporate change: implications for shareholder wealth. *Journal of Financial Economics,* 47**,** 279-313.
Nagar, V. & Schoenfeld, J. 2021. Shareholder monitoring and discretionary disclosure*. *Journal of Accounting and Economics*.
Nenova, T. 2003. The value of corporate voting rights and control: A cross-country analysis. *Journal of Financial Economics,* 68**,** 325-351.
Neubaum, D.O. & Zahra, S.A. 2006. Institutional Ownership and Corporate Social Performance: The Moderating Effects of Investment Horizon, Activism, and Coordination. *Journal of Management,* 32**,** 108-131.
Newton, T. & Harte, G. 1997. Green Business: Technicist Kitsch? *Journal of Management Studies,* 34**,** 75-98.
Ng, J., Wu, H., Zhai, W. & Zhao, J. 2021. The effect of shareholder activism on earnings management: Evidence from shareholder proposals. *Journal of Corporate Finance*.
Niehaus, G. & Zhang, D. 2010. The impact of sell-side analyst research coverage on an affiliated broker's market share of trading volume. *Journal of Banking & Finance,* 34**,** 776-787.
Nofsinger, J.R., Sulaeman, J. & Varma, A. 2019. Institutional investors and corporate social responsibility. *Journal of Corporate Finance,* 58**,** 700-725.
North, D.C. 1991. Institutions. *Journal of economic perspectives,* 5**,** 97-112.
O'brien, P.C. & Tan, H. 2015. Geographic proximity and analyst coverage decisions: Evidence from IPOs. *Journal of Accounting and Economics,* 59**,** 41-59.
Office of California State Treasurer 2017. Growing the U.S. Green Bond Market | Volume 1: The Barriers and Challenges. California State Treasurer's Office.
Oikonomou, I., Brooks, C. & Pavelin, S. 2012. The Impact of Corporate Social Performance on Financial Risk and Utility: A Longitudinal Analysis. *Financial Management,* 41**,** 483-515.
Omar, N., Johari, Z.A. & Hasnan, S. 2015. Corporate Culture and the Occurrence of Financial Statement Fraud: A Review of Literature. *Procedia Economics and Finance,* 31**,** 367-372.
Pacelli, J. 2019. Corporate culture and analyst catering. *Journal of Accounting and Economics,* 67**,** 120-143.
Padgett, R.C. & Galan, J.I. 2010. The Effect of R&D Intensity on Corporate Social Responsibility. *Journal of Business Ethics,* 93**,** 407-418.
Painter, M. 2020. An inconvenient cost: The effects of climate change on municipal bonds. *Journal of Financial Economics,* 135**,** 468-482.

Pankratz, N., Bauer, R. & Derwall, J. 2023. Climate Change, Firm Performance, and Investor Surprises. *Management Science*.
Parr, A. 2009. *Hijacking Sustainability*, The MIT Press.
Parrino, R., Sias, R.W. & Starks, L.T. 2003. Voting with their feet: institutional ownership changes around forced CEO turnover. *Journal of Financial Economics,* 68**,** 3-46.
Pasricha, P., Singh, B. & Verma, P. 2018. Ethical Leadership, Organic Organizational Cultures and Corporate Social Responsibility: An Empirical Study in Social Enterprises. *Journal of Business Ethics,* 151**,** 941-958.
Pathan, S., Haq, M., Faff, R. & Seymour, T. 2020. Institutional investor horizon and bank risk-taking. *Journal of Corporate Finance*.
Principles for Responsible Investments 2021. Annual Report 2021. Principles for Responsible Investments.
Quinn, R.E. & Cameron, K. 1983. Organizational Life Cycles and Shifting Criteria of Effectiveness: Some Preliminary Evidence. *Management Science,* 29**,** 33-51.
Quinn, R.E. & Kimberly, J.R. 1984. Paradox, Planning, and Perseverance: Guidelines for Managerial Practice. *In:* Kimberly, J.R. & Quinn, R.E. (eds.) *Managing organizational translations.* Homewood, IL: Dow Jones-Irwin.
Quinn, R.E. & Rohrbaugh, J. 1983. A Spatial Model of Effectiveness Criteria: Towards a Competing Values Approach to Organizational Analysis. *Management science,* 29**,** 363-377.
Ramelli, S., Wagner, A.F., Zeckhauser, R.J., Ziegler, A. & Ellul, A. 2021. Investor Rewards to Climate Responsibility: Stock-Price Responses to the Opposite Shocks of the 2016 and 2020 U.S. Elections. *The Review of Corporate Finance Studies,* 10**,** 748-787.
Riedl, A. & Smeets, P. 2017. Why Do Investors Hold Socially Responsible Mutual Funds? *The Journal of Finance,* 72**,** 2505-2550.
Risal, H.G., Thapa, C., Marshall, A.P., Neupane, B. & Krebbers, A. 2023. The Demand for Green Bonds. Unpublished working paper.
Ruiz-Mallorquí, M.V. & Santana-Martín, D.J. 2009. Ultimate Institutional Owner and Takeover Defenses in the Controlling versus Minority Shareholders Context. *Corporate Governance: An International Review,* 17**,** 238-254.
Sangiorgi, I. & Schopohl, L. 2021. Explaining Green Bond Issuance using Survey Evidence: Beyond the Greenium. *The British Accounting Review*.
Sautner, Z., Van Lent, L., Vilkov, G. & Zhang, R. 2023. Firm-Level Climate Change Exposure. *The Journal of Finance,* 78**,** 1449-1498.
Schein, E.H. & Schein, P.A. 2016. *Organizational Culture and Leadership (5th ed.),* San Francisco, CA, Jossey-Bass.
Scott, W.R. & Davis, G.F. 2015. *Organizations and organizing: Rational, natural and open systems perspectives*, Routledge.
Senge, P.M., Carstedt, G. & Porter, P.L. 2001. Next industrial revolution. *MIT Sloan management review,* 42**,** 24-38.
Servaes, H. & Tamayo, A. 2013. The impact of corporate social responsibility on firm value: The role of customer awareness. *Management science,* 59**,** 1045-1061.
Sharfman, M.P. & Fernando, C.S. 2008. Environmental risk management and the cost of capital. *Strategic Management Journal,* 29**,** 569-592.
Sheehy, B. 2014. Defining CSR: Problems and Solutions. *Journal of Business Ethics,* 131**,** 625-648.
Shleifer, A. & Vishny, R.W. 1986. Large Shareholders and Corporate Control. *Journal of Political Economy,* 94**,** 461-488.
Skinner, D.J. & Sloan, R.G. 2002. Earnings Surprises, Growth Expectations, and Stock Returns or Don't Let an Earnings Torpedo Sink Your Portfolio. *Review of Accounting Studies,* 7**,** 289-312.
Sørensen, J.B. 2002. The strength of corporate culture and the reliability of firm performance. *Administrative science quarterly,* 47**,** 70-91.
Statman, M. 2019. Socially Responsible Mutual Funds (corrected). *Financial Analysts Journal,* 56**,** 30-39.

Stead, W.E. & Stead, J.G. 1996. *Management for a Small Planet: Strategic Decision Making and the Environment,* Newberry Park, CA, SAGE.
Stock, J. & Yogo, M. 2005. Testing for Weak Instruments in Linear IV Regression. *In:* Donald, W.K.A. (ed.) *Identification and Inference for Econometric Models.* New York: Cambridge University Press.
Strese, S., Adams, D.R., Flatten, T.C. & Brettel, M. 2016. Corporate culture and absorptive capacity: The moderating role of national culture dimensions on innovation management. *International Business Review,* 25**,** 1149-1168.
Sun, J. 2009. Governance Role of Analyst Coverage and Investor Protection. *Financial Analysts Journal,* 65**,** 52-64.
Surroca, J. & Tribó, J.A. 2008. Managerial Entrenchment and Corporate Social Performance. *Journal of Business Finance & Accounting,* 35**,** 748-789.
Tang, D.Y. & Zhang, Y. 2020. Do shareholders benefit from green bonds? *Journal of Corporate Finance,* 61**,** 101427.
Tcfd 2017. Final Report: Recommendations of the Task Force on Climate related Financial Disclosures. Task Force on Climate-related Financial Disclosures.
To, T.Y., Navone, M. & Wu, E. 2018. Analyst coverage and the quality of corporate investment decisions. *Journal of Corporate Finance,* 51**,** 164-181.
Upadhaya, B., Munir, R., Blount, Y. & Su, S. 2018. Does organizational culture mediate the CSR – strategy relationship? Evidence from a developing country, Nepal. *Journal of Business Research,* 91**,** 108-122.
Waldman, D.A., Sully De Luque, M., Washburn, N., House, R.J., Adetoun, B., Barrasa, A., Bobina, M., Bodur, M., Chen, Y.-J., Debbarma, S., Dorfman, P., Dzuvichu, R.R., Evcimen, I., Fu, P., Grachev, M., Gonzalez Duarte, R., Gupta, V., Den Hartog, D.N., De Hoogh, A.H.B., Howell, J., Jone, K.-Y., Kabasakal, H., Konrad, E., Koopman, P.L., Lang, R., Lin, C.-C., Liu, J., Martinez, B., Munley, A.E., Papalexandris, N., Peng, T.K., Prieto, L., Quigley, N., Rajasekar, J., Rodríguez, F.G., Steyrer, J., Tanure, B., Thierry, H., Thomas, V.M., Van Den Berg, P.T. & Wilderom, C.P.M. 2006. Cultural and leadership predictors of corporate social responsibility values of top management: a GLOBE study of 15 countries. *Journal of International Business Studies,* 37**,** 823-837.
Wang, H., Tong, L., Takeuchi, R. & George, G. 2016. Corporate Social Responsibility: An Overview and New Research Directions. *Academy of Management Journal,* 59**,** 534-544.
Wang, L. & Wu, J. 2023. Deciphering Greenium: the Role of Investor Demand. Unpublished working paper.
Wang, Y., Farag, H. & Ahmad, W. 2021. Corporate Culture and Innovation: A Tale from an Emerging Market. *British Journal of Management*.
Wang, Y. & Zhi, Q. 2016. The Role of Green Finance in Environmental Protection: Two Aspects of Market Mechanism and Policies. *Energy Procedia,* 104**,** 311-316.
Wei, Y., Samiee, S. & Lee, R.P. 2014. The influence of organic organizational cultures, market responsiveness, and product strategy on firm performance in an emerging market. *Journal of the Academy of Marketing Science,* 42**,** 49-70.
Welford, R. 1995. *Environmental Strategy and Sustainable Development: The Corporate Challenge for the Twenty-first Century,* London, Routledge.
Williams, C. & Triest, S.V. 2009. The impact of corporate and national cultures on decentralization in multinational corporations. *International Business Review,* 18**,** 156-167.
Wood, D.J. 1991. Corporate social performance revisited. *Academy of management review,* 16**,** 691-718.
World Bank 2015. what are green bonds? The World Bank.
Yezegel, A. 2015. Why do analysts revise their stock recommendations after earnings announcements? *Journal of Accounting and Economics,* 59**,** 163-181.
Yin, C., Cheng, X., Yang, Y. & Palmon, D. 2020. Do Corporate Frauds Distort Suppliers' Investment Decisions? *Journal of Business Ethics,* 172**,** 115-132.
Yu, F. 2008. Analyst coverage and earnings management. *Journal of Financial Economics,* 88**,** 245-271.
Zammuto, R.F., Gifford, B. & Goodman, E.A. 2000. Managerial ideologies, organization culture and

the outcomes of innovation: A competing values perspective. *In:* Ashkanasy, N.M., Wilderom, C. & Peterson, M.F. (eds.) *Handbook of organizational culture & climate.* Thousand Oaks, CA: Sage.

Zerbib, O.D. 2019. The effect of pro-environmental preferences on bond prices: Evidence from green bonds. *Journal of Banking & Finance,* 98**,** 39-60.

Zhang, X. & Zhou, S. 2018. Bond covenants and institutional blockholding. *Journal of Banking & Finance,* 96**,** 136-152.

Appendices

Appendix A. Variable Definitions of Part II

Notations	Variable Names	Descriptions
Panel A: Dependent variables:		
Scaled CSR_total	Scaled total CSR scores using KLD ESG dataset	Scaling strength (concerns) for each criterion by dividing the number of strengths (concerns) by maximum possible number of strength (concern) indicators for that criterion and then taking the sum of scaled strengths net of the sum of scaled concerns to obtain the scaled total CSR scores
Scaled CSR_strengths	Scaled CSR strength scores using KLD ESG dataset	Sum of scaled strengths
Scaled CSR_concerns	Scaled CSR concern scores using KLD ESG dataset	Sum of scaled concerns
Panel B: Main explanatory variables:		
BLOCKHOLD	Blockholding ownership	Percentage of total shares of blockholders in that firm
CRE	Creative firm	An indicator variable takes value of 1 if the average of second, third, and fourth lag of CRE_SCORE is above the industry median in that year
CON	Controlled firm	An indicator variable takes value of 1 if the average of second, third, and fourth lag of CON_SCORE is above the industry median in that year
COM	Competitive firm	An indicator variable takes value of 1 if the average of second, third, and fourth lag of COM_SCORE is above the industry median in that year
COL	Collaborative firm	An indicator variable takes value of 1 if the average of second, third, and fourth lag of COL_SCORE is above the industry median in that year
Panel C: Other control variables:		

Notations	Variable Names	Descriptions
SIZE	Firm size	The natural log of total assets
AGE	Firm age	The natural log of number of years since the first appeared in the CRSP database
LEV	Debt-to-asset ratio	Total debts / total assets
TAN	Asset tangibility	Net plant, property, and equipment / total assets
ROA	Return on assets	Earnings before extraordinary items / total assets
VOLA	Volatility	The natural log of standard deviation of monthly returns measure during the fiscal year
LIQ	Current ratio	Current assets / current liabilities
MB	Market-to-book ratio	Market capitalization / book value of common equity
AMIHUD	Amihud illiquidity	Annual average of | holding period return |$\times 10^6$ / (price × share volume)
Panel D: Alternative measure variables:		
Adjusted-CSR total	Adjusted total CSR scores using KLD ESG dataset	Adjusting the Scaled-CSR total based on 2-digit SIC code
Adjusted-CSR strengths	Adjusted CSR strength scores using KLD ESG dataset	Adjusting the Scaled-CSR strengths based on 2-digit SIC code
Adjusted-CSR concerns	Adjusted CSR concern scores using KLD ESG dataset	Adjusting the Scaled-CSR concerns based on 2-digit SIC code
Raw-CSR total	Raw total CSR scores using KLD ESG dataset	Net of sum of strengths and sum of concerns
Raw-CSR strengths	Raw CSR strength scores using KLD ESG dataset	Sum of strength scores
Raw-CSR concerns	Raw CSR concern scores using KLD ESG dataset	Sum of concern scores
CRE_SCORE	Score of relative emphasis (intensity) that a firm places on creation-orientated culture	The number of words describing creative values / total number of words for the four CVF dimensions
CON_SCORE	Score of relative emphasis (intensity) that a firm places on control-orientated culture	The number of words describing controlled values / total number of words for the four CVF dimensions
COM_SCORE	Score of relative emphasis (intensity) that a firm places on competition-orientated culture	The number of words describing competitive values / total number of words for the four CVF dimensions
COL_SCORE	Score of relative emphasis (intensity) that a firm places on collaboration-orientated culture	The number of words describing collaborative values / total number of words for the four CVF dimensions
CRE_DECI	Relative emphasis (intensity) that a firm places on creation-orientated culture	Decile ranked value of CRE_SCORE across that industry in that year
CON_DECI	Relative emphasis (intensity) that a firm places	Decile ranked value of CON_SCORE across that industry in that year

Notations	Variable Names	Descriptions
	on control-orientated culture	
COM_DECI	Relative emphasis (intensity) that a firm places on competition-orientated culture	Decile ranked value of COM_SCORE across that industry in that year
COL_DECI	Relative emphasis (intensity) that a firm places on collaboration-orientated culture	Decile ranked value of COL_SCORE across that industry in that year
BLOCKWEIGHT	Weighted blockholding ownership	Weighting the BLOCKHOLD based on number of blockholders in that firm
Panel E: Instrumental variables:		
CRE_AVG	Industry-year average of creation-orientated culture intensity	Averaging its second, third, and fourth lag of CRE_SCORE within an industry based on 2-digit SIC code
CON_AVG	Industry-year average of control-orientated culture intensity	Averaging its second, third, and fourth lag of CON_SCORE within an industry based on 2-digit SIC code
COM_AVG	Industry-year average of competition-orientated culture intensity	Averaging its second, third, and fourth lag of COM_SCORE within an industry based on 2-digit SIC code
COL_AVG	Industry-year average of collaboration-orientated culture intensity	Averaging its second, third, and fourth lag of COL_SCORE within an industry based on 2-digit SIC code

Appendix B. Variable Definitions of Part III

Notations	Variable Names	Descriptions
Panel A: Dependent variable at Firm level		
GREEN BOND ISSUE	Issuance of green bond	Dummy variable = 1 if a corporate issues at least one green bond in that year; 0 otherwise
COST OF DEBT	Cost of debts	Cost of debt is measured as weighted average of bond yield spread based on the amount outstanding.
COST OF EQUITY	Implied cost of equity	Cost of equity is measured as implied cost of equity which is estimated by internal rate of return minus risk-free rate.
Panel B: Explanatory variables at Firm level		
ESG BLOCK	ESG block ownership	ESG block ownership = percentage of total shares owned by ESG-oriented institutional blockholders which measured by KLD CSR scores
UN PRI BLOCK	PRI signatory ownership	PRI signatory ownership = percentage of total shares owned by institutional blockholders who have signed UN PRI
SIZE	Firm size	Size = natural log of total assets
AGE	Firm age	Age = natural log of firm age
ROA	Return on assets	Profitability = Net income / total assets
TOBINQ	Tobin's Q	Firm value = (book value of total assets plus market value of equity minus book value of equity) / book value of total assets
LEV	Leverage	Financial leverage = total debts / total assets
VOL	Volatility	Volatility = natural log of standard deviation of monthly returns measure during the fiscal year
BETA	Market beta	Beta is estimated for each firm-year observation by regressing monthly returns on the Fama French Excess Return on the Market. Sixty (with a minimum of 24) monthly observations before the month at which the cost of capital is computed are used in the regression.
RISK	Firm risk	Firm risk is proxied by Altman's Z-score = 1.2 × (Working Capital/Total Assets) + 1.4 × (Retained Earnings/Total Assets) + 3.3 × (EBIT/Total Assets) + 0.6 × (Market Value of Equity/Total Liabilities) + 0.999 × (Sales/Total Assets)
EVOL	Earning volatility	Earning volatility = standard deviation of the first difference in EBITDA scaled by book value of assets over the past 3 years
FSD	Analyst forecast dispersion	Dispersion = standard deviation of analyst forecasts for EPS estimates

Notations	Variable Names	Descriptions
ANALYST	Analyst following	Analyst following = natural log of number of analysts
BLOCKNUM	Number of blockholders	No. of blocks = total number of institutional blockholders

Appendix C. Variable Definitions of Part IV

Notations	Variable Names	Descriptions
Panel A: Dependent variables:		
Oversubscription	Ratio of bond oversubscription	Orderbook size/issue size.
Ln (Book Size)	Orderbook size	Natural log of the size of the orderbook in amount ($).
Panel B: Main explanatory variables:		
Forecast Accuracy	Accuracy of analyst forecasts	Negative absolute value of the difference between actual earnings per share and the average earnings forecast, scaled by the year-end stock price.
Forecast Dispersion	Dispersion of analyst forecasts	Standard deviation of analyst forecasts, scaled by the year-end stock price.
Coverage	Analyst coverage	Natural log of one plus number of analysts.
Panel C: Other explanatory variables:		
Beta	Stock beta	Beta is obtained from Datastream which estimates for each corporate-year observation by regressing monthly returns using market model. In the normal case, the sample used is in the normal case 60 months of monthly returns.
Volatility	Price Volatility	Volatility is obtained from Datastream and is a measure of a stock's average annual price movement to a high and low from a mean price for each year.
Business Risk	Business risks	Standard deviation of cash flow from operations.
Carbon	Carbon intensity	Total CO2 emissions.
ESG	ESG scores	Refinitiv ESG scores.
D (Green)	Green bond	A dummy variable equals to 1 if the bond is green and 0 otherwise.
D (First)	First time issuer	A dummy variable equals to 1 if the bond is the debut for that firm and 0 otherwise.
Panel D: Bond-level control variables:		
Ln (Issue Size)	Bond issue size	Natural log of the size of the bond issued.
Coupon	Fixed coupon rate	Plain vanilla fixed coupon rates offered for each bond.
Bond Rating	S&P Credit Rating	The numerical value is assigned to S&P Credit Rating for each tranche. The highest is 17 for AAA and 16 for AA+, and so on.
Bookrunners	Number of bookrunners	Total number of bookrunners.
Maturity Bucket	Maturity class	An indicator variable equals to 1 if a bond’s maturity is less than or equal to 5 years; 2 for maturity from 5 to 10 years; 3 for maturity from 10 to30 years bonds; and 4 for maturity above 30 years.

Notations	Variable Names	Descriptions
Panel E: Corporate-level control variables:		
Ln (Total Assets)	Firm size	The natural log of total assets.
Leverage	Debt-to-asset ratio	Total debts / total assets.
ROA	Return on assets	Operating income before depreciation / book value of total assets.
Panel F: Country-level control variables:		
Flight to Safety	Flight to safety	Difference between the long-term government bond rate and the short-term rate of the bond issuer country.
Flight to Quality	Flight to quality	Difference between long-term (i.e., 10-year) government bond rates of bond issued country and the benchmark long-term government bond rates. We use USA's long-term government bond rate as a benchmark for non-USA corporates and Germany's long-term government bond rate as a benchmark for USA corporates. The proxies for "safehaven" (benchmark) can be the long-term interest rate of the USA, Japan, or Germany, depending upon the relevance of the studies.
GDP Growth	Nominal GDP growth rate	The annual growth rate of the country's nominal gross domestic product (GDP).
Panel G: Alternative measure variables:		
Subscription	Bond subscription	The natural log of orderbook size.
Residual oversubscription	Residual oversubscription	Residuals are obtained from regression of oversubscription on the nature log of the number of bonds issued before that issuance and the industry average orderbook size.
Panel H: Instrumental variable:		
Average Accuracy	Industry-average accuracy of analyst forecasts	An average of analyst forecasts accuracy based on industry class.
Average Dispersion	Industry-average dispersion of analyst forecasts	An average of analyst forecasts dispersion based on industry class.
Expected Coverage	Expected analyst coverage	Firm-level expected analyst coverage is the sum of all brokers' expected coverage in that firm, which is calculated by coverage of broker k multiplies by the ratio of its brokerage size in year t to its brokerage size in year 0.