The Impact of Environmental, Social, and Governance Factors on the Financial Performance of S&P 500 Listed Firms

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Abstract

The Impact of Environmental, Social, and Governance Factors on the Financial Performance of S&P 500 Listed Firms

Xiaobo Mu

This study investigates the impact of environmental, social, and governance (ESG) factors on the financial performance of non-financial companies in the S&P 500 Index from 2017 to 2020. The study utilizes ESG data from MSCI IVA, Bloomberg, and KLD; financial data from COMPUSTAT; and clean revenue (CR) data from Corporate Knights. The study is divided into two parts: First, we analyze the relationship between ESG ratings and financial performance as measured by a firm's Tobin's Q and return on assets (ROA); next, we employ a mediation analysis to explore the effect of MSCI (IVA) data on the relationship between CR and Tobin's Q. Our study finds that MSCI IVA has a positive and significant association with Tobin's Q. Bloomberg ESG Disclosure score is positively and significantly associated with ROA but not with Tobin's Q. When breaking down the ESG components, CR shows a positive and significant association with Tobin's Q only. The Bloomberg Performance and KLD Environmental scores are significantly positively related to both Tobin's Q and ROA. We propose that the lack of a standardized ESG reporting framework for companies and the diverse measurement approaches employed by vendors contribute to the limited correlation among various sets of ESG scores. Furthermore, we observe a significant partial mediation effect, which suggests that MSCI IVA mediates the relationship between CR and Tobin's Q. To validate our findings, we also conduct a robustness check by replacing CR with the Bloomberg Performance Environmental score, and we find that the results remain consistent.

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Table of Contents

List of Tables

List of Acronyms

BbD	Bloomberg Disclosure Score
BbD_ESG	Bloomberg Disclosure ESG Score
BbD_E	Bloomberg Environmental Disclosure Score
BbD_S	Bloomberg Social Disclosure Score
BbD_G	Bloomberg Governance Disclosure Score
BbP	Bloomberg Performance Score
BbP_E	Bloomberg Environmental Performance Score
BbP_S	Bloomberg Social Performance Score
BbP_G	Bloomberg Governance Performance Score
CSR	Corporate Social Responsibility
CR	Clean revenue
EPEAT	Electronic Product Environmental Assessment Tool
ESG	Environmental, social, and governance
GICS	Global Industry Classification Standard
IVA	Intangible value assessment
KLD	Kinder, Lydenberg, Domini Inc.
KLD_ESG	KLD ESG Score
KLD_E	KLD Environmental Score
KLD_S	KLD Social Score
KLD_G	KLD Governance Score
MSCI	Morgan Stanley Capital International
ROA	Return on assets
ROE	Return on equity
SIC	Standard Industrial Classification

1. Introduction

The role of environmental, social, and governance (ESG) factors in shaping financial performance is becoming increasingly significant, particularly in light of growing demands for more accountability and transparency from stakeholders including investors, corporations, and policymakers. ESG comprises a trio of factors that measure an organization's environmental stewardship, social responsibility, and governance practices, all of which are key determinants of long-term financial sustainability. Through a careful assessment of ESG components, companies can pinpoint areas needing improvement and thereby develop more resilient and sustainable business models capable of adapting to a fast-paced global environment. In parallel, this detailed evaluation enables investors to make better-informed decisions, reducing risks and driving long-term growth and stability.

The interplay between ESG ratings, as provided by diverse vendors, and financial performance is well-documented (Alareeni & Hamdan, 2020; Chava, 2014; Ng & Rezaee, 2015; Velte, 2017). This study undertakes an analysis of ESG ratings sourced from a variety of vendors, namely Bloomberg Disclosure (BbD), Bloomberg Performance (BbP), Morgan Stanley Capital International's (MSCI) intangible value assessment (IVA), and Kinder, Lydenberg, Domini Inc. (KLD), forming the foundation for our comprehensive ESG scores. In addition, individual facets of ESG are evaluated via BbD, BbP, and KLD ratings.

Despite the frequently observed correlation between ESG and financial performance, some research finds an absence of significant correlation, or yields mixed results, between these variables. Quinn (2017) finds scant evidence supporting a relationship between Bloomberg ESG disclosure scores and stock valuation. Okafor et al. (2021) similarly find little evidence for a relationship between ESG and Tobin's Q. A study by Giannopoulos et al. (2022) reveals mixed results: ESG initiatives negatively impact ROA yet positively influence Tobin's Q. Analyzing over 2000 empirical studies, Friede et al. (2015) report that approximately 90% of these studies find a neutral or positive relationship between ESG and financial performance, with the positive ESG impact appearing consistent over time.

Beyond the environmental component of ESG, our primary focus, we also integrate clean revenue (CR) data from Corporate Knights, defined as revenue from sustainable or environmentally friendly products or services per the Corporate Knights Sustainable Economy

Taxonomy (Corporate Knights, 2021). This aligns with a study by Chava (2014) that suggests both stock investors and private lenders take a company's environmental considerations into account, resulting in increased cost of equity and debt capital for the firm. Ng and Rezaee (2015) similarly show a negative correlation between environmental performance and cost of equity. Kruse et al. (2020) utilize FTSE Russell Green Revenue data to explore the association between green revenue and a firm's profitability and market valuation. They find firms can achieve higher profit margins by targeting environmentally friendly markets, the automobile sector being the sole exception.

The environmental aspect of ESG has been demonstrated to significantly impact a company's financial performance. CR has also emerged as a critical factor in this domain. However, the body of literature examining the relationship between CR and financial performance is somewhat limited, possibly due to challenges in gathering and analyzing CR data. The challenges for our study stem from the lack of standardization and limited disclosure, leading to inconsistencies in reporting and to difficulties in obtaining comprehensive and reliable information. Additionally, issues such as data accessibility, quality, and the dynamic nature of CR further compound the obstacles faced by our research. Our study aims to enhance the existing literature by investigating the relationship between CR and a firm's financial performance, as measured by Tobin's Q, while also considering the potential mediating effect of ESG performance, utilizing MSCI IVA as a proxy.

Our research is predicated on data from 398 firm-year observations spanning the fiscal years 2017 to 2020. We scrutinize the correlation between total ESG scores and individual ESG component scores with Tobin's Q and ROA. Additionally, we apply mediation analysis to explore the potential mediating effect of MSCI IVA on the relationship between CR and Tobin's Q. To assess the significance of the mediation effect, we calculate the Sobel test statistic as suggested by Sobel (1982)[1] and later expanded by Baron and Kenny (1986). If Sobel test *z*-score is greater than 1.96, we could conclude that the mediation effect is significant. Baron and Kenny's four-step approach provides a straightforward and widely used framework for conducting mediation analysis, allowing us to explore potential mediation effects and understand the relationships among variables. Furthermore, we opted for the Sobel test to assess the significance of the indirect effect, as it is a

[1] Sobel test equation: $z = a*b/\sqrt{(b^2s_a^2 + a^2s_b^2)}$, a = raw regression coefficient for the association between independent variable and mediator; s_a = standard error of a, b = raw coefficient for the association between mediator and dependent variable, s_b = standard error of b.

traditional method that can provide valuable insights into the mediation process within the context of our research question and sample size.

The study's outcomes suggest that MSCI IVA has a positive and significant correlation with Tobin's Q across all three models. Simultaneously, BbD ESG exhibits a positive and significant relationship with ROA. In terms of ESG components, CR displays a positive and significant correlation with Tobin's Q, and BbP Environmental (BbP_E) is significantly and positively associated with ROA. BbD Environmental (BbD_E) becomes significant with ROA when industry or industry and year fixed effects are included. Interestingly, while the significance of BbP Social (BbP_S) with Tobin's Q diminishes when incorporating industry or industry and year fixed effects, it gains significance with ROA when these effects are integrated. Regarding the Governance component, KLD Governance (KLD_G) is positively and significantly related to Tobin's Q across all models but does not show a significant relationship with ROA.

Despite the limited research investigating the interrelation between ESG, CR, and financial performance, we draw inspiration from two recent studies. Avramov et al. (2022) probe into the uncertainty surrounding ESG ratings, underscoring concerns about inconsistent ESG information disclosure and disparate ratings offered by different agencies. Conversely, Wheeler (2019) provides a comprehensive theoretical framework interconnecting dependent, independent, and mediator variables, extending upon the mediation mechanism outlined by Baron and Kenny (1986). Our study strives to contribute to this body of literature by examining the dynamic between ESG scores, CR, and financial performance. The aim is to determine the extent to which ESG practices, particularly those related to environmentally friendly activities, influence a company's financial performance. Specifically, we seek to understand whether good ESG practices play a mediating role in the relationship between CR and financial performance.

The mediation analysis reveals a partial mediation effect when MSCI IVA is included in the Tobin's Q regression with CR. This result aligns with our hypothesis that MSCI IVA serves as a conduit through which CR contributes to firm value. To corroborate our findings, we conduct a robustness check, substituting CR with BbP_E, another measure of environmental performance. This test confirms a partial mediation effect of MSCI IVA on the relationship between BbP_E and Tobin's Q, which aligns with our original findings.

This study contributes to the understanding of environmental, social, and governance (ESG) impact by not only examining the total ESG scores as presented by platforms such as Bloomberg,

KLD, and MSCI IVA, but also scrutinizing the individual components of ESG - environmental (E), social (S), and governance (G) from Bloomberg Disclosure, Bloomberg Performance, and KLD datasets. This dual focus on total and individual component scores expands the depth and breadth of our analysis, enabling a more nuanced understanding of the varying impacts of ESG components on financial performance.

The study also engages with the issue of ESG rating uncertainty, a theme well-documented in the extant literature (Avramov et al., 2022; Brandon et al., 2021; Cao et al., 2022). To navigate this, we employ different ESG datasets, such as Bloomberg Disclosure ESG score and MSCI IVA rating, to conduct our analysis. Our findings corroborate the observed low correlation between different sets of ESG scores, a reflection, we hypothesize, of the absence of a standardized ESG reporting framework for companies and the varied measurement approaches utilized by different vendors. Furthermore, our research underscores the necessity of distinguishing between ESG performance and disclosure scores, a nuance often overlooked in prior literature (Wang & Sarkis, 2017; He et al., 2022; DasGupta, 2022). By testing both these scores, our study augments the understanding of ESG's influence on financial performance.

The remaining sections of this thesis are organized as follows: Chapter 2 delves into the literature concerning ESG and financial performance. Chapter 3 outlines the process of data collection and the variables used. Chapter 4 introduces the methodology employed in this study. Chapter 5 presents and discusses the results of the mediation analysis, while Chapter 6 details a robustness check. Finally, Chapter 7 concludes the study, summarizing the key findings and proposing directions for future research.

2. Literature Review

2.1 ESG investing theories

ESG investing originated as a joint initiative undertaken by major financial institutions under the umbrella of the United Nations (UN) Global Compact. The initiative was launched in January 2004, when then-UN Secretary General Kofi Annan invited more than 50 CEOs of the world's foremost financial institutions to explore ways to incorporate ESG into capital markets. The report titled "Who Cares Wins" (The UN Global Compact, 2004) was published a year later, and argues that incorporating environmental, social, and governance factors into capital markets is a sound business decision that results in more sustainable markets and better outcomes for societies (Maaloul et al., 2021).

The history of ESG investing has resulted in the emergence of various theories regarding its impact on financial performance. Given the numerous studies (Alareeni & Hamdan, 2020; Cao et al., 2022; DasGupta, 2022; Folger-Laronde et al., 2022; Friede et al., 2015; Giannopoulos et al., 2022; Gillan et al., 2021; He et al., 2022; Hong & Kacperczyk, 2009; Maaloul et al., 2021; Okafor et al., 2021; Starks et al., 2017) investigating the relationship between ESG and financial performance, it is necessary to establish a theoretical framework to better comprehend the underlying mechanisms.

Portfolio theory (Gasser et al., 2017; Pedersen et al., 2021), institutional theory (Li et al., 2021), agency theory (Daugaard & Ding, 2022; Siew Peng & Isa, 2020) , and stakeholder theory (Chen & Xie, 2022; Daugaard & Ding, 2022; Li et al., 2021; Siew Peng & Isa, 2020; Son & Kim, 2022) are among the most widely discussed theories in the literature. The study by Pedersen et al. (2021) contributes to the literature on ESG investing by providing a novel theoretical framework for incorporating ESG into portfolio selection. Under this framework, they identify an ESG-efficient frontier, representing the highest attainable Sharpe ratio for each ESG level. They also determine equilibrium asset prices by an ESG-adjusted capital asset pricing model, showing when ESG raises or lowers the required return. To test their theoretical predictions, they compute the empirical ESG-frontier and demonstrate the costs and benefits of responsible investing.

In terms of institutional theory, Li et al. (2021) review and summarize the ESG research in top international journals, and conclude that ESG research examines the role of corporate legitimacy

behavior in promoting sustainable development within a company through the lens of institutional theory. According to Campbell (2007), the institutional theory of corporate social responsibility provides a set of propositions that outline the circumstances in which corporations are expected to behave in socially responsible ways. This theory posits that institutional conditions play a mediating role between fundamental economic conditions and corporate behavior.

While institutional theory emphasizes the role of social norms and institutional pressures in shaping corporate behavior, agency theory focuses on the alignment of interests between shareholders and management (Jensen, 1976). On the other hand, stakeholder theory emphasizes the importance of considering the interests of all stakeholders in the corporate decision (Freeman, 1994). Siew Peng and Isa (2020), in their study investigating whether ESG practices should be considered an agency or stakeholder issue, find evidence supporting stakeholder theory, which posits that companies with strong ESG practices benefit from enhanced performance. This result aligns with stakeholder theory by emphasizing the importance of good management practices. However, no evidence is found to support agency theory.

2.2 ESG total and individual component scores

Argument 1: Considering total ESG scores as well as their individual component scores leads to an enhanced analysis of the relationship between ESG components and financial performance.

The body of literature scrutinizing the link between ESG ratings, as provided by various vendors, and financial performance is expanding. Alareeni and Hamdan (2020) discover that a positive correlation exists between Bloomberg ESG disclosures and the financial health of a firm - as evident in key metrics such as return on assets (ROA), return on equity (ROE), and market performance (Tobin's Q). In a similar vein, Wang and Sarkis (2017) find that corporations boasting robust Bloomberg ESG disclosures tend to exhibit superior financial performance relative to their counterparts with less comprehensive ESG practices.

Kim et al. (2013) investigate the influence of MSCI IVA ESG ratings on the financial performance of Korean companies, finding a positive correlation between higher ESG ratings and contemporaneous stock returns, as well as elevated Tobin's Q ratios. Similarly, Fatemi et al. (2018) leverage KLD data as a stand-in for corporate ESG performance, concluding that strengths in KLD ESG metrics positively influence firm value. On a divergent note, Hong and Kacperczyk (2009) discover that institutional investors tend to de-emphasize so-called "sin stocks" - those in industries

like tobacco, alcohol, and gaming - due to negative social perceptions. This results in these firms experiencing a higher cost of capital and correspondingly lower valuations.

While several studies underscore a positive correlation between high ESG ratings and firm financial performance, some research indicates a contrasting relationship. Di Giuli and Kostovetsky (2014) argue that there is a negative association between KLD strengths and future stock returns as well as changes in ROA.

Ng and Rezaee (2015) investigate the impact of sustainability performance across ESG components on the cost of equity. Their findings indicate a significant negative relationship between environmental and governance sustainability performance and the cost of equity. However, they did not observe a significant relationship with social sustainability performance.

In our study, by employing BbD, BbP, MSCI IVA, and KLD, we provide a valuable addition to the current body of literature on ESG total and individual component scores.

2.3 ESG ratings

Argument 2: The presence of uncertainty in ESG ratings raises significant concerns for investors and policymakers, as it can influence the effectiveness and reliability of sustainable investment strategies.

The demand for ESG information has multiplied in recent years as investors and stakeholders increasingly recognize the importance of sustainability and social responsibility, leading to the emergence of ESG rating vendors. The ESG rating vendors provide ESG ratings and assessments for companies including Bloomberg, MSCI KLD, MSCI IVA, Thomson Reuter ASSET4, Sustainalytics, and RobecoSAM (Avramov et al., 2022). Mixed evidence suggests that there is a lack of consistency and standardization in the way ESG is measured and reported by different vendors (Avramov et al., 2022; Brandon et al., 2021; Cao et al., 2022; Dor, 2015).

A study by Avramov et al. (2022) highlights the importance of establishing clear and standardized ESG performance criteria for portfolio choice and asset pricing. Their findings suggest that the uncertainty surrounding ESG ratings can significantly affect investment decisions and performance outcomes. To address this issue, they call for policymakers to create a unified and transparent taxonomy of ESG performance and establish standardized disclosure standards for sustainability reporting.

In our study, we discover a relatively low correlation between the two sets of ESG scores BbD_ESG and MSCI IVA. The correlation between the two ESG ratings is 0.2, which indicates a weak positive correlation. Such a low correlation is consistent with Brandon et al. (2021), who find that correlations of ESG scores from different vendors are low. Moreover, similar evidence shows that the correlation between the Thomson Reuter ASSET4 ESG scores and the MSCI KLD ESG scores is relatively low as shown in Cao et al. (2022).

Our study is valuable in understanding the challenges and limitations associated with ESG measurements and assessments. ESG data can be complex and subject to various interpretations, leading to uncertainties in the reliability and accuracy of reported ESG performance. By studying ESG uncertainty, our research can shed light on the potential biases and limitations in ESG data, which can inform policymakers' efforts to improve the quality and reliability of ESG information.

2.4 ESG performance and disclosure scores

Argument 3: The confusion between ESG performance and disclosure scores undermines the accurate evaluation of companies' sustainability initiatives and may lead to misinformed decisions regarding their ESG practices.

ESG performance and disclosure are related but are distinct concepts (Broadstock et al., 2021). ESG performance evaluates the environmental, social, and governance practices of an organization, and measures how effectively they are being implemented. ESG disclosure, on the other hand, refers to how transparent a company is about its ESG practices, including the information it provides to investors and other stakeholders.

Although an increasing amount of research is dedicated to exploring the relationship between ESG and financial performance, the majority of studies have focused on ESG disclosure (Alareeni & Hamdan, 2020; Arora & Sharma, 2022; Chauhan & Kumar, 2018; Chen & Xie, 2022; Fatemi et al., 2018; Giannopoulos et al., 2022; Li et al., 2022) rather than ESG performance. Only a handful of studies have explored the direct impact of ESG performance on financial outcomes (Dalal & Thaker, 2019; Egorova et al., 2022; He et al., 2022). The focus on ESG disclosure rather than ESG performance can be attributed to data availability and accessibility, regulatory requirements, and lack of standardized metrics. ESG performance data often requires detailed company-level information, and the quality and comparability of ESG data can vary across companies and

industries. In light of these issues as well as regulatory initiatives and investor demands, companies are more likely to provide ESG disclosure information to comply with regulations and meet investor expectations.

Dalal and Thaker (2019) conduct a study using the NSE100 ESG Index database annual ESG data to explore the connection between ESG and financial performance. Their findings suggest that companies with good ESG performance tend to experience improved financial performance. In another study, DasGupta (2022) explores whether firms are motivated to adopt enhanced ESG practices in response to financial performance shortfalls, potentially to maintain their future legitimacy. The study also aims to investigate whether ESG controversies mediate firms ESG decisions in such scenarios. The study concludes that financial performance shortfalls have a significant positive impact on the ESG performance of a company.

Comprehensive and reliable data on both ESG performance and disclosure can be challenging to obtain. As a result, only a limited number of studies examine the correlation between ESG performance and disclosure and how they affect financial performance. These studies offer valuable insights into how companies can enhance their sustainability efforts by improving their ESG performance and disclosure. Maaloul et al. (2021) examine the effect of both ESG performance and disclosure on the cost of debt and find that companies with good ESG performance and disclosure positively impact their reputation, reducing the cost of debt financing.

Our study makes a valuable contribution to the existing literature on ESG performance and disclosure. By utilizing ESG performance and disclosure scores sourced from Bloomberg Terminal, we gain access to a reliable and widely used data source, enhancing the credibility and robustness of our findings. Moreover, because Bloomberg Terminal provides us access to ESG performance metrics, we are able to shine additional light on the previously understudied ESG and financial performance relationship.

3. Data

Our research employs primary data obtained from Bloomberg and Corporate Knights. We amalgamate CR data from Corporate Knights with financial data from the S&P 500, alongside other variable data sourced from Bloomberg Terminal and COMPUSTAT. This yields 398 firm-year observations spanning fiscal years 2017 to 2020. A breakdown of our sample by year (Sample A) and by industry (Sample B) is presented in Table 1.

**********Insert Table 1 here**********

3.1 Data and sample selection

The data employed to evaluate ESG practices, financial performance, and CR is gathered from various sources. In particular, we procure MSCI IVA from the Bloomberg Terminal, which is also accessible via the MSCI website. Furthermore, Bloomberg Terminal provides us with BbP and BbD ESG scores, whereas KLD data is sourced from MSCI STATS. To measure financial performance, we utilize two well-accepted metrics, return on assets (ROA) and Tobin's Q, which are obtained from COMPUSTAT. Additional control variables such as total assets, leverage ratio, and liquidity level are also sourced from the Bloomberg Terminal. Lastly, we use CR data from Corporate Knights, which quantifies the proportion of revenue derived from environmentally friendly or sustainable products/services.

3.2 Variable measurements

3.2.1 Dependent variable: ROA and Tobin's Q

Return on assets (ROA) and Tobin's Q are both insightful measures of a company's financial performance, though they serve distinct purposes. ROA is an accounting metric often used to gauge a company's profitability and efficiency. Conversely, Tobin's Q is a market-based measure employed to evaluate a company's overall value and growth potential.

ROA is indicative of a company's efficiency in utilizing its assets to generate profits. Consistent with Flammer (2015), we define ROA as the ratio of operating income before depreciation to the book value of total assets. Prior literature has typically calculated ROA in ESG and financial performance research by dividing a company's net income by its total assets (Alareeni & Hamdan, 2020; Buallay, 2019; Egorova et al., 2022; Giannopoulos et al., 2022;

Nguyen et al., 2022; Seifert et al., 2013; Tan & Zhu, 2022). Additionally, alternative methodologies have been employed, with Xie et al. (2019) calculating ROA as the ratio of earnings before interest and taxes, interest expenditure, and tax expenditure to total assets.

Tobin's Q is frequently used to assess a company's overall value and growth potential. It is derived by dividing a company's market value by the replacement value of its assets (Tobin, 1969). Tobin's Q is widely used in finance and investment research to pinpoint potentially overvalued or undervalued companies and measure market efficiency.

The myriad of methods for calculating Tobin's Q can result in significant variations in the outcomes (Alareeni & Hamdan, 2020; Buallay, 2019; Flammer, 2015; Giannopoulos et al., 2022; Nguyen et al., 2022; Xie et al., 2019). The fundamental formula for Tobin's Q is the market value of a firm's assets divided by the replacement cost of these assets (Lindenberg & Ross, 1981; McConnell & Servaes, 1990). In Platikanova's (2016) study, Tobin's Q is employed to investigate the relationship between revisions in cash holdings and the market valuation of S&P 500 firms' investment opportunities. This study calculated Tobin's Q as the market value of assets divided by the book value of assets (Egorova et al., 2022). Similarly, Kaplan and Zingales (1997) measured Tobin's Q as the market value of assets divided by the book value of assets.

In alignment with prior literature, our study adopts the commonly used methodology for calculating Tobin's Q, which involves dividing the market value of total assets by the book value of total assets. Within the context of COMPUSTAT, the numerator consists of the sum of market equity - defined as the total number of common shares outstanding multiplied by the closing price of the company's common stock at the end of the fiscal year (CSHO*PRCC_F) - and firm debt, defined as the total assets of a firm minus common equity (AT-CEQ). The denominator is the book value of total assets (AT) (Aparicio & Kim, 2023; Cahan et al., 2016; Conyon & He, 2017; Giannopoulos et al., 2022; Liu & Wu, 2016).

3.2.2 Independent variable: ESG ratings and clean revenue (CR)

This study uses the ESG and financial data from MSCI IVA, Bloomberg Terminal, KLD STATS and COMPUSTAT.

3.2.2.1 MSCI IVA

We use MSCI IVA as one of our ESG ratings. MSCI provides ratings for the key issues of each

company, and the overall rating IVA are defined by the weighted average of these key-issue ratings (Cai et al., 2016). The companies rated by MSCI are categorized into seven groups, ranging from CCC up to AAA. ESG leaders are those that receive a rating of AAA or AA, while companies rated CCC and B are regarded as laggard (Shanaev & Ghimire, 2022). We convert these ratings into numerical scores, where a rating of AAA is assigned to 9, and CCC a value of 3.

3.2.2.2 ESG ratings from Bloomberg Terminal

Bloomberg ESG data covers a broad range of ESG topics and is based on a robust methodology that includes input from various stakeholders, ensuring high-quality and reliable ESG metrics. The ESG dataset offers ESG metrics for more than 14,000 companies in 100+ countries, approximately 88% of global equity market capitalization, with historical data from 2006. It provides over 2,000 company-reported and derived key performance indicators across different ESG topics such as climate change, water and energy management, diversity, and the rights of shareholders.

Bloomberg ESG performance scores are constructed using a proprietary weighting system that normalizes raw data and assigns different weights to ESG factors - environmental, social, and governance - based on their relevance to a specific company or industry. The scores, updated regularly and ranging from 0 to 10, are normalized to facilitate comparisons across companies and industries. While the use of Bloomberg ESG performance scores in academic literature is relatively limited, a significant body of research has utilized the Bloomberg Disclosure score (Arora & Sharma, 2022; Atan et al., 2018; Chauhan & Kumar, 2018; Lopez-de-Silanes et al., 2020; Maaloul et al., 2021; Tamimi & Sebastianelli, 2017; Yoo & Managi, 2022). This includes company-reported ESG data and relevant disclosures, such as sustainability reports, regulatory filings, and other public statements. The disclosure score ranges from 0 to 100, with a higher score indicating more extensive and transparent ESG disclosure.

3.2.2.3 KLD dataset

We use MSCI ESG KLD STATS to obtain the KLD data. KLD is an investment research firm that specializes in tracking company Corporate Social Responsibility (CSR) activities and is commonly used for CSR and financial performance research (Cao et al., 2022; Combs et al., 2023; Di Giuli & Kostovetsky, 2014; Starks et al., 2017). Our contribution to the literature in this field is centered around the fact that our research delves into novel aspects beyond CSR and firm performance. Specially, we examine the connections between both total ESG scores and individual

component scores and financial performance, while also investigating the impact of MSCI IVA on CR and Tobin's Q through mediation analysis. To ensure robust and comprehensive data, we utilize ESG data from reputable sources, including Bloomberg Terminal, Corporate Knights, and MSCI KLD STATS. Moreover, in handling KLD ESG data, we adopt the approach outlined by Servaes and Tamayo (2013) to ensure methodological consistency and comparability.

KLD categorizes CSR activities into 13 areas, including community, diversity, employment, environment, human rights, product, corporate governance, alcohol, firearms, gambling, military, nuclear power, and tobacco. For each category, KLD provides binary data (0/1) on both company strengths and concerns.

We compute the strength and concern index per category by dividing the number of strengths and concerns within each CSR category by the maximum possible number of strengths and concerns in each category and year. We then compute a net CSR score for each area by subtracting the concerns index from the strengths index, which ranges from -1 to +1 for each year (Servaes & Tamayo, 2013).

For the KLD ESG components, we use environment for E, corporate governance for G. To construct our social factor score S, we combine community, diversity, employee relations and human rights into one measure that ranges from +4 to -4. Finally, we add the scores from the three ESG factors - E, S, and G - to obtain the ESG total score ranging from +6 to -6.

As an example, in 2019, Amazon.com Inc exhibited strengths in four out of a maximum of six areas within the employee relations category, resulting in it a strength score of 0.667 (4/6). In the same year, it also has concerns in four out of six areas, yielding a corresponding concerns score of 0.667 (4/6). Therefore, the net CSR score for Amazon.com Inc in 2019 in the employee relations area is zero (0.667 - 0.667). The net CSR scores for Amazon.com Inc in 2019 in the different areas are as follows: in the environment area, the score is zero; in corporate governance, it stands at -0.25; and in the social area (comprising community, diversity, employee relations, and human rights), the score is -1. Furthermore, the KLD ESG score, which encompasses environment, social and corporate governance, is determined to be -1.25.

3.2.2.4 Clean revenue (CR)

The clean revenue (CR) data used in our study is obtained from Corporate Knights, a company

that promotes sustainability integration into business practices. Corporate Knights provides information, analysis, and rankings of companies based on their sustainability performance. They are renowned for their yearly Global 100 ranking of the most sustainable companies, announced at the World Economic Forum in Davos (Gupta & Benson, 2011).

In the context of Corporate Knights, clean revenue is defined as the percentage of total revenue that comes from products or services considered "clean" based on their "clean taxonomy" (in alignment with the UN Sustainable Development Goals) as per their website. The clean taxonomy used by Corporate Knights is formed from various sources and best practices, including the Climate Bonds Taxonomy, Technical Expert Group (TEG) final report on the ET Taxonomy, Sustainability Account Standards Board (SASB) reporting standards, and China Green Bond Endorsed Project Catalogue, among others. The Clean Taxonomy provides definitions for the ten categories and 63 sub-categories, including recognized certifications and ecolabels, as well as the corresponding thresholds that Corporate Knights endorses as evidence of sustainable revenue or investment. The taxonomy is continually evolving and improving with input from stakeholders.

The methodology for CR involves analyzing company financial statements to determine the proportion of their revenue that comes from environmentally friendly or sustainable products and services. The data is then cross checked through the Corporate Knights data portal to ensure accuracy and reliability. For example, Apple's approximate clean revenue ratio for the fiscal year 2020 is 69%. This is because of their gold Electronic Product Environmental Assessment Tool (EPEAT) certification,[2] which accounts for 100% of revenue credited as sustainable according to the Corporate Knights Clean Taxonomy, and only applies to eligible products, such as iPhone, Mac, and iPad, which make up around 69% of Apple's net sales. The remaining products, such as wearables, home & accessories, and services, are not listed on the EPEAT website and, therefore, cannot be considered part of Apple's clean revenue.

Due to challenges related to data accessibility, data quality, and the dynamic nature of CR, the literature exploring the link between CR and financial performance is limited; however, the concept of green revenue, which is closely related to clean revenue, has been studied. Both terms generally refer to the portion of company revenue generated from environmentally sustainable products or

[2] The EPEAT system is designed to evaluate a product's environmental impact throughout its lifecycle, considering various environmental factors. Based on a set of environmental performance criteria, products are ranked as Gold, Silver, or Bronze to indicate their level of environmental friendliness.

services. For example, FTSE Russell's green revenue data measures the percentage of revenue of a firm generated from environmentally friendly business operations and directly measures the impact of the firm on the environment (Bassen et al., 2022; Kruse et al., 2020). Green revenue data is also provided by S&P Global Trucost (In et al., 2017), Newsweek's green ranking (Gao & Tran, 2021), and regional dataset (Kamande & Lokina, 2013).

The limited literature on clean revenue and its relationship with financial performance highlights the need for more research in this area. Our study aims to fill this gap by exploring the relationship between clean revenue and financial performance.

3.2.3 Control variables

Total Assets is commonly used as a proxy for firm size and resources (Atan et al., 2018; Bătae et al., 2020; Brandon et al., 2021; Broadstock et al., 2021; Zhao et al., 2018). This metric indicates the scale of company operations, financial strength and capacity, with larger companies potentially having more resources to invest in environmentally sustainable practices or implement social responsibility programs, as noted by Tang et al. (2012). The natural logarithm of total assets is often utilized to evaluate firm size in empirical corporate finance, according to Dang et al. (2018), as well as in studies conducted by Comment and Schwert (1995) and Harford (1999).

Prior research has produced mixed findings regarding the relationship between firm size and financial performance. Baumol (1959) introduces the concept in traditional finance theory that large firms have the capacity to invest in operations requiring significant scalability, which may be beyond the reach of small enterprises. In testing this hypothesis, Hall and Weiss (1967) establish a positive correlation between firm size and ROA. However, a study from Shepherd (1972) demonstrates that there exists a negative association between firm size and its profitability, as measured by the rate of return. Anderson and Reeb (2003) also discover that Tobin's Q exhibits a negative correlation with firm size. Conversely, a study conducted by Niresh and Velnampy (2014) finds no definitive correlation between firm size and its profitability among the companies examined in their sample.

Leverage ratio measures company debt relative to its assets (Bruna et al., 2022; Chauhan & Kumar, 2018; Nguyen et al., 2022; Shin et al., 2022; Siew Peng & Isa, 2020). According to Dalal and Thaker (2019), managers tend to disclose more ESG information as leverage increases, possibly due to heightened scrutiny from financial institutions.

Lemke (1970) states that the liquidity ratio is calculated by dividing total current assets by

total current liabilities. This ratio measures the ability of a firm to meet its short-term financial obligations and is commonly used in financial performance studies (Amihud & Mendelson, 1986; Diamond & Verrecchia, 1991). Research by Luo (2022) examines whether liquidity can explain the ESG premium given the greater demands of high ESG stocks. The study finds a positive correlation between stock liquidity and ESG.

Furthermore, we control for years and industries in our analysis to mitigate the impact of macroeconomic conditions and heterogeneity across various industries (Di Giuli & Kostovetsky, 2014; Fatemi et al., 2018; Tamimi & Sebastianelli, 2017).

The industries we use are defined based on the Global Industry Classification Standard (GICS), which was developed jointly by Morgan Stanley Capital International (MSCI) and Standard & Poors (S&P) in 1999. The primary aim of the GICS is to provide a consistent and comprehensive method for categorizing companies worldwide based on their main business activities. The investment community extensively employs GICS to classify and track companies across various countries and regions. GICS features four levels of specificity: 11 sectors, 24 industry groups, 69 industries, and 157 sub-industries. Each company is assigned a GICS code reflecting its primary business activities as determined by revenue, earnings, and market perception (Phillips & Ormsby, 2016). The GICS's significant contribution to the investment community lies in its provision of a global standard for classifying companies and facilitating cross-border comparisons of companies across diverse regions and countries. In our study, we derive the 2-digit GICS Sector code from COMPUSTAT (DasGupta, 2022). The GICS Sectors item represents the first level in the GICS hierarchy, denoted by the leftmost two digits of the total GICS code.

Phillips and Ormsby (2016) explore the industry classification schemes used in business research, including the Standard Industrial Classification system (SIC), North American Industry Classification System (NAICS), Global Industry Classification Standard (GICS), and other industry classifications. Regarding GICS, companies typically undergo review and receive a GICS code annually; however, MSCI and S&P continually monitor the companies and their business activities. If changes in primary business activities transpire, MSCI and S&P update the GICS code accordingly. This ensures that the GICS classification system accurately mirrors the current state of the companies, permitting precise comparisons and analyses of companies across different regions and sectors.

4. Methodology

To analyze the strength of the relationship between Tobin's Q and ROA with overall ESG scores and the three ESG factors, we utilize panel data regression analysis. Additionally, to investigate the influence of MSCI IVA on CR and Tobin's Q, we conduct a mediation analysis featuring a Mediator Variable (MSCI IVA), an Independent Variable (CR), and a Dependent Variable (Tobin's Q), while controlling for variables such as total assets, leverage ratio, and liquidity. We also account for industry-specific and year-specific effects using fixed effects, following methodologies employed in previous studies (Di Giuli & Kostovetsky, 2014; Fatemi et al., 2018; He et al., 2022). Definitions of these variables are provided in Table 2.

**********Insert Table 2 here**********

4.1 Panel data regression

Panel data regression is a prevalent method in literature examining the relationship between ESG and financial performance (Arora & Sharma, 2022; Atan et al., 2018; Bruna et al., 2022; Dalal & Thaker, 2019; Giannopoulos et al., 2022; Kamande & Lokina, 2013; Landi & Sciarelli, 2019; Zhao et al., 2018). This method allows researchers to analyze data gathered over time and across multiple firms, accounting for both within-firm and between-firm variations. For instance, Giannopoulos et al. (2022) use panel data regression in Stata, employing two distinct models for two different dependent variables, ROA and Tobin's Q. Similarly, Zhao et al. (2018) utilize a panel regression approach to investigate the connection between the financial performance of listed power generation firms in China and their ESG performance.

Other methodologies have also been applied in this realm of research, including fixed-effects and pooled regression (Okafor et al., 2021), regression discontinuity approach (Flammer, 2015), difference-in-differences regression approach (Chen & Xie, 2022; Tan & Zhu, 2022), structural equation models (Maaloul et al., 2021), event study analysis (Li et al., 2022; Shanaev & Ghimire, 2022; Wong et al., 2021), and mediation analysis with linear regression (Wang & Sarkis, 2017; Wheeler, 2019).

Subsequently, we provide the equations for the panel data regression model, using MSCI IVA as an illustrative ESG rating.

Model 1, without industry and year fixed effects

$$Tobin's\ Q_{it} = \alpha_0 + \beta_1 MSCI\_IVA_{it} + \beta_2 Log\_Total\_Assets_{it} + \beta_3 Leverage\_Ratio_{it} + \beta_4 Liquidity_{it} + \varepsilon_{it} \quad (1)$$

$$ROA_{it} = \alpha_0 + \beta_1 MSCI\_IVA_{it} + \beta_2 Log\_Total\_Assets_{it} + \beta_3 Leverage\_Ratio_{it} + \beta_4 Liquidity_{it} + \varepsilon_{it} \quad (2)$$

Model 2, with industry fixed effects only

$$Tobin's\ Q_{it} = \alpha_0 + \beta_1 MSCI\_IVA_{it} + \beta_2 Log\_Total\_Assets_{it} + \beta_3 Leverage\_Ratio_{it} + \beta_4 Liquidity_{it} + Industries_{it} + \varepsilon_{it} \quad (3)$$

$$ROA_{it} = \alpha_0 + \beta_1 MSCI\_IVA_{it} + \beta_2 Log\_Total\_Assets_{it} + \beta_3 Leverage\_Ratio_{it} + \beta_4 Liquidity_{it} + Industries_{it} + \varepsilon_{it} \quad (4)$$

Model 3, with industry and year fixed effects

$$Tobin's\ Q_{it} = \alpha_0 + \beta_1 MSCI\_IVA_{it} + \beta_2 Log\_Total\_Assets_{it} + \beta_3 Leverage\_Ratio_{it} + \beta_4 Liquidity_{it} + Industries_{it} + Years_{it} + \varepsilon_{it} \quad (5)$$

$$ROA_{it} = \alpha_0 + \beta_1 MSCI\_IVA_{it} + \beta_2 Log\_Total\_Assets_{it} + \beta_3 Leverage\_Ratio_{it} + \beta_4 Liquidity_{it} + Industries_{it} + Years_{it} + \varepsilon_{it} \quad (6)$$

4.2 Mediation analysis

Mediation analysis, also known as the Baron and Kenny method, is an analytical process that explores the relationship between independent and dependent variables and the extent to which a mediator variable explains this relationship (Baron & Kenny, 1986; Judd & Kenny, 1981; James & Brett, 1984). A mediator variable illuminates the mechanism through which the independent variable influences the dependent variable.

Mediation analysis recognizes two forms: Full mediation and partial mediation. Full mediation emerges when the mediator variable entirely accounts for the relationship between the independent and dependent variables. That is, the direct impact of the independent variable on the dependent variable becomes insignificant after controlling for the mediator variable, implying that the independent variable affects the dependent variable exclusively through the mediator variable. This phenomenon has been explored in studies such as Bardos et al. (2020) and Fedaseyeu et al. (2018), where they probe the mediating role of product market perception and board functions, respectively.

Wheeler (2019) also utilizes this approach to explore whether regulatory pressure during economic stress explains the link between bank loan loss accounting and procyclical lending. Hoitash et al. (2016) employ mediation analysis as a robustness check in their study on the relationship between accountant CFOs and firm value, where they identified full mediation effects. Additionally, Jum'a et al. (2021) test the mediating role of environmental sustainability in the relationship between supply chain management practices and financial performance using Structural Equation Modelling (SEM).

On the other hand, partial mediation arises when the mediator variable explains some, but not all, of the relationship between the independent and dependent variables. Consequently, the independent variable still retains a significant direct effect on the dependent variable unaccounted for by the mediator variable. This means that the mediator variable only partially mediates the relationship, and the independent variable affects the dependent variable both directly and indirectly through the mediator. Such a scenario, as detailed in Kenny et al. (1998), suggests that the mediator variable partially explicates the relationship between the independent and dependent variables, indicating that it has a role in transmitting the effect of the independent variable to the dependent variable. For example, Barton and Mercer (2005) use the Sobel test to confirm that persistence partially mediates the impact of explanation plausibility on analyst earnings per share forecasts.

Baron and Kenny (1986) provide a specific compendium of analytic procedures regarding mediation analysis, also called the Baron and Kenny approach. The mediation analysis investigates the mediating effect of a variable on the relationship between an independent variable and a dependent variable. It involves a four-step process:

i. Demonstrate a significant relationship between the independent variable and dependent

variable.

ii. Show that the mediator is significantly related to the dependent variable, controlling for the independent variable.

iii. The independent variable is significantly related to the mediator.

iv. The direct effect of the independent variable on the dependent variable is significantly reduced or becomes non-significant when the mediator is added to the model.

We conduct three sets of regressions: the first set without any industry or year fixed effects, the second set with only industry effects, and the third set with both industry and year fixed effects. All models have a significance level of 10%. For simplicity, we present only the regression equations for the third group.

In step 1, we try to understand the direct effect of CR on Tobin's Q, controlling for other variables that could also affect financial performance, such as total assets, leverage ratio, liquidity, industry, and years factors.

Model 1:

$$Tobin's\ Q_{it} = \alpha_0 + \beta_1 CR_{it} + \beta_2 Log\_Total\_Assets_{it} + \beta_3 Leverage\_Ratio_{it} + \beta_4 Liquidity_{it} + Industries_{it} + Years_{it} + \varepsilon_{it} \quad (7)$$

Where *i* and *t* denote the firm and year respectively. $Log\_Total\_Assets_{it}$, the natural logarithm of total assets, is used as a metric to measure the firm size, $Leverage\_ratio_{it}$ is to capture the riskiness of a firm by dividing total debt by total assets, $Liquidity_{it}$ measures the capacity of a firm to fulfill its financial obligations in the short term by dividing total current assets by total current liabilities, and ε is the error term.

In step 2, we examine the direct effect of the mediator - MSCI IVA on Tobin's Q - while controlling for the same set of variables as in Model 1. Steps 1 and 2 are essential in establishing the independent effects of CR and MSCI IVA on Tobin's Q before examining their potential mediation effect.

Model 2:

$$Tobin's\ Q_{it} = \alpha_0 + \beta_1 MSCI\_IVA_{it} + \beta_2 Log\_Total\_Assets_{it} + \beta_3 Leverage\_Ratio_{it} + \beta_4 Liquidity_{it} + Industries_{it} + Years_{it} + \varepsilon_{it}$$

(8)

In step 3, the direct effect of CR and the mediator - MSCI IVA is examined (Model 3), while controlling for the same set of variables as in Model 1 and 2.

Model 3:

$$MSCI\_IVA_{it} = \alpha_0 + \beta_1 CR_{it} + \beta_2 Log\_Total\_Assets_{it} + \beta_3 Leverage\_Ratio_{it} + \beta_4 Liquidity_{it} + Industries_{it} + Years_{it} + \varepsilon_{it}$$

(9)

In step 4, we test the mediation effect when including Tobin's Q as dependent variable, and both CR and the mediator - MSCI IVA - as the independent variables (Model 4).

Model 4:

$$Tobin's\ Q_{it} = \alpha_0 + \beta_1 CR_{it} + \beta_2 MSCI\_IVA_{it} + \beta_3 Log\_Total\_Assets_{it} + \beta_4 Leverage\_Ratio_{it} + \beta_5 Liquidity_{it} + Industries_{it} + Years_{it} + \varepsilon_{it}$$

(10)

5. Results

5.1 Descriptive statistics

Table 3 provides the descriptive statistics and correlations of the principal variables employed in this study. The sample is composed of 398 firm-year observations across ten industries from fiscal years 2017 to 2020.

**********Insert Table 3 here**********

Panel A presents the mean, median, standard deviation, and minimum and maximum values for each variable. The average ROA is 0.135 with a standard deviation of 0.065. Tobin's Q demonstrates a mean of 2.5 and a standard deviation of 1.851, ranging from 0.906 to 19.453. The natural logarithm of total assets has a mean of 10.215 and a standard deviation of 1.100. The leverage ratio and liquidity respectively average 0.348 and 1.463, with standard deviations of 0.137 and 1.273.

We also report values for CR, MSCI IVA, BbP, BbD, and KLD ESG scores. Notably, the CR demonstrates a mean of 0.184 with a standard deviation of 0.245, suggesting that less than 20% of revenue is generated from sustainable products or services in our sample firms on average. BbP_E, Social, and Governance scores average 3.607, 3.786, and 7.297, respectively, on a scale from 0 to 10. BbD_ESG scores range from 0 to 100, with a mean of 58.257 and a standard deviation of 10.742, indicating high transparency and accountability concerning ESG practices. Lastly, the KLD ESG score has a mean of 1.535 and a standard deviation of 1.171.

Prior to conducting the correlation analyses, we initially carry out a univariate analysis on ESG ratings (MSCI IVA, BbP, BbD, and KLD). The outcomes of one-way ANOVA reveal that there is no significant difference across ESG ratings. The calculated F-statistic surpasses the critical F-value, with a *p*-value of less than 0.1. Therefore, we infer that a significant difference in means among the ESG groups is present.

Panel B provides a correlation matrix featuring Pearson correlation coefficients for eighteen variables. This matrix helps examine interrelationships between variables and identify those with strong correlations (Cohen et al., 2009). This assists in understanding the factors contributing to a particular outcome, such as financial performance.

The results suggest that while CR does not significantly impact the association with BbP_E, BbD_E, and KLD_E scores, CR is negatively correlated with BbP_E and BbD_E, and positively correlated with KLD_E. A weak correlation is observed among the four environmental ratings, aligning with previous literature (Avramov et al., 2022; Brandon et al., 2021; Cao et al., 2022; Dor, 2015).

When comparing BbP, BbD, KLD, and MSCI IVA ratings, we observe stronger correlations between BbP Environmental, Social, and Governance factors and BbD than with KLD and MSCI IVA ESG ratings. This suggests greater consistency when evaluations within the same rating agency are conducted using the same data and documents. Moreover, the significant association within the same rating agency across environmental, social, and governance ratings aligns with Berg et al.'s (2022) findings. This observation indicates a rater effect, wherein a rating agency is more likely to assign consistently high scores across categories for a particular company.

In line with Dogan (2013), a negative relationship between the leverage ratio and ROA is observed, while a positive relationship is discerned between liquidity rate and ROA.

5.2 Main results

In our study, we explore the relationship between ESG ratings from four different vendors and ROA/Tobin’s Q. We also examine the mediation effect of MSCI IVA ESG rating on the relationship between CR and Tobin’s Q.

5.2.1 Panel regression results

Our study seeks to analyze the correlation between ESG scores and financial performance, measured by Tobin’s Q and ROA. Specifically, we investigate whether Tobin’s Q and ROA are more strongly associated with the overall ESG score or the three ESG factors: environmental, social, and governance.

The sub-sample we use is drawn from the S&P 500. As a result, we can expect these firms to perform well in terms of profitability and growth. We observe a positive and highly significant correlation between Tobin’s Q and ROA (our two dependent variables) suggesting that firms that are more efficient in using their assets also have higher market valuations. We also conclude that there is a strong link between market-based and accounting-based measures of financial performance for our sample firms.

Clean revenue (CR), the revenue generated from products or services that have a positive environmental or social impact, has a high correlation with Tobin's Q, but no correlation with ROA. The explanation is that CR is connected to the growth opportunities of a firm, which can affect its market-to-book ratio, but not its current profitability. High Tobin's Q shows that investors expect the high CR firms to grow quickly and create more value in the future. However, CR does not mean that these companies are more profitable right now. They may have higher expenses or lower profits than other companies. Therefore, CR does not have an impact on ROA.

Regarding Tobin's Q, as shown in Table 4, we find that Tobin's Q is positively and significantly associated with MSCI IVA, and no significant correlation is found with BbD ESG and KLD ESG. CR, BbP_E and KLD_E have positive and significant effects on Tobin's Q. However, there is no significant correlation between Tobin's Q and BbD_E. Tobin's Q is negatively and significantly associated with BbP_S, but no significant correlation is found between Tobin's Q and both BbD_S and KLD_S. Tobin's Q is significantly and positively associated with the KLD_G, but not correlated with BbP_G and BbD_G.

**********Insert Table 4 here**********

Table 5 presents the regressions results of ROA. We observe that ROA has a positive and significant correlation with BbD ESG, but no correlation with the MSCI_IVA as well as the KLD_ESG scores. ROA is not significantly correlated with CR, and the correlation with BbD_E score is not significant. However, ROA shows a significant positive correlation with BbP_E and KLD_E. The Social scores from BbP_S, BbD_S, and KLD_S have no significant correlation with ROA. ROA is not significantly correlated with BbP_G and KLD_G, but it is positively associated with BbD_G.

**********Insert Table 5 here**********

Based on our results, it is difficult to determine which ESG measure is more strongly associated with financial performance, or whether the ESG performance score is more effective than the disclosure score. The findings are mixed, indicating that different ESG measures may be more appropriate for different contexts.

Controlling for the fixed effects of industry and industry/year, we find that the significant correlation between Tobin's Q and BbP_S disappears. Similarly, KLD_E becomes insignificant with Tobin's Q when we control for these effects. After accounting for these effects, CR, BbP_S, BbP_G,

BbD_E, BbD_S show a significant association with ROA. However, BbD_G loses its significance with ROA when we account for these effects.

5.2.2 Mediation analysis results

Table 6 presents the results of a mediation analysis investigating the effect of MSCI IVA on the relationship between CR and Tobin's Q, controlling for other factors such as natural logarithm of total assets, leverage ratio, and liquidity. In this analysis, the direct effect of CR on Tobin's Q can be estimated first by including CR as a predictor variable and Tobin's Q as the outcome variable in a regression model (Model 1). We then add the mediator variable - MSCI IVA - to the model to estimate the indirect effect of CR on Tobin's Q through MSCI IVA (Model 3, 4).

**********Insert Table 6 here**********

The table reports estimates and *p*-values for a multiple regression remodel with four different specifications: model 1 with Tobin's Q as the dependent variable and CR as the independent variable; model 2 with Tobin's Q as the dependent variable and MSCI IVA as the independent variable; model 3 with MSCI IVA as the dependent variable and CR as the independent variable; model 4 with Tobin's Q as the dependent variable, and both CR and MSCI IVA as independent variables.

Table 6 Panel A, the first model, shows that CR positively and significantly affects Tobin's Q (estimate = 1.725, *p*-value <.0001). The second model presents the direct effect of the mediator, MSCI IVA, on Tobin's Q, which is positive and statistically significant. This suggests that firms with higher MSCI IVA scores tend to have higher Tobin's Q, indicating better financial performance. The natural logarithm of total assets has a negative and significant effect on Tobin's Q, while liquidity has a positive and significant effect. However, the leverage ratio does not have a significant effect. The third model shows the effect of CR on MSCI IVA. The last model shows the total effect of CR and MSCI IVA on Tobin's Q. In Panel A, we do not observe any mediation effect. However, the inclusion of industry fixed effects or industry and year fixed effects reveals the presence of the mediation effect.

Panel B and C present that MSCI IVA partially mediates the positive relationship between CR and Tobin's Q, as evidenced by the Sobel test *z*-score 1.998 and 1.994, respectively. In other words, the positive relationship between CR and Tobin's Q is influenced by the MSCI IVA rating of a company.

6. Robustness tests

In the robustness checks, CR is replaced with BbP_E. The results are presented in Table 7, where Panel A reports the analysis without industry and year fixed effects, whereas Panel B incorporates industry fixed effects and Panel C includes both industry and year fixed effects.

**********Insert Table 7 here**********

For Panel A, the results show a partial mediation effect of MSCI IVA on the positive relationship between BbP_E and Tobin's Q.

To summarize, the robustness checks are performed by replacing CR with BbP_E. The results suggest that the original findings are relatively stable. In other words, the main conclusions drawn from the initial analysis are supported by the finding of the robustness checks.

7. Conclusions

This study explores the relationship between ESG scores and two key financial performance metrics: Tobin's Q and ROA. Additionally, we perform a mediation analysis, employing the Sobel test statistics, to discern the significance of MSCI IVA in mediating the association between CR and Tobin's Q.

Our findings reveal that CR exerts a significant positive influence on Tobin's Q, while demonstrating an insignificant negative effect on ROA, which suggests that an increase in CR is associated with higher market rewards. ESG performance and disclosure scores from Bloomberg show a stronger correlation with ROA than with Tobin's Q. MSCI IVA ratings and KLD demonstrate a robust association with Tobin's Q. Our mediation analysis uncovers a partial mediation effect of MSCI IVA on the relationship between CR and Tobin's Q, a novel finding within existing research. Furthermore, a robustness check conducted using BbP_E instead of CR consistently reveals the same partial mediation effect of MSCI IVA.

Tobin's Q has no significant correlation with Bloomberg disclosure total and individual components scores. It might be due to industry dynamics, data quality issues, or short-term market sentiment. From the results of panel regressions of ROA, we find that there are industry-specific and time-specific factors at play that are influencing these relationships.

Our study contributes to the existing literature in three key ways: Firstly, we probe the correlation between ESG ratings and financial performance, employing Tobin's Q and ROA as metrics. Specifically, we identify which rating aligns more closely with Tobin's Q or ROA. Secondly, we differentiate between ESG performance scores and ESG disclosure scores, examining both datasets to corroborate our findings of weak correlation. Lastly, we not only analyze the direct relationships between CR and Tobin's Q, as well as MSCI IVA and Tobin's Q, but also investigate the relationship between all three variables collectively.

ESG considerations have increasingly become a focal point in recent years, however, the impact of ESG factors on financial performance requires further exploration. Our regression analysis reveals mixed outcomes between ESG ratings and financial performance. Various contributing factors, such as ESG rating methodology, industry classification of the company, and market stakeholder expectations, may explain why certain ESG ratings correlate more strongly

with Tobin's Q and others with ROA.

Furthermore, the presence of ESG rating uncertainty (Avramov et al., 2022) suggests that different measures of ESG factors may exhibit stronger correlations with financial performance. The advent of ESG rating vendors is driven by multiple factors, including the rising importance attributed to sustainability and social responsibility by investors and stakeholders, fostering a growing demand for ESG information. However, the absence of a standardized ESG reporting framework grants companies' flexibility in reporting their ESG performance and disclosure, leading to different ESG rating vendors adopting unique methodologies and data sources. This subsequently results in variations in the ratings companies receive.

In conclusion, the relationship between ESG and financial performance is intricate and multi-dimensional. Although evidence regarding the relationship between ESG and financial performance is mixed, certain limitations exist in employing ESG ratings as predictors of financial performance. The phenomenon of "greenwashing," wherein companies overstate their ESG credentials without making significant changes in their practices, further complicates the scenario. As such, stakeholders need to adopt a variety of tools and strategies to evaluate ESG and the financial performance of potential investments. Overall, our study underscores the necessity of a comprehensive approach to sustainable investing that encompasses both ESG and financial considerations.

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Table 1: Sample composition by year and industry

This table provides a sample breakdown by year (fiscal years 2017-2020) and industry. Firms are classified into 10 non-financial industries according to the Global Industry Classification Standard (GICS).

Sample A: composition by year	
2007	80
2008	112
2009	121
2010	85
Total	398
Sample B: composition by industry	
Information Technology	70
Consumer Staples	44
Materials	34
Utilities	81
Energy	4
Consumer Discretionary	29
Real Estate	16
Communication Services	4
Healthcare	26
Industrials	90
Total	398

Table 2: Definitions and sources of variables

Variable	Definition	Source
Tobin's Q	(Total assets + Total number of common shares outstanding*Closing price of common stock at the end of the fiscal year - Total common/ordinary equity)/Total assets	COMPUSTAT
ROA	(Operating income before depreciation/Total assets) * 100	COMPUSTAT
CR	Clean revenue/Total revenue	Corporate Knights
MSCI_IVA	MSCI ESG intangible value assessment	Bloomberg Terminal
BbP_E	Bloomberg Environmental Performance Score	Bloomberg Terminal
BbP_S	Bloomberg Social Performance Score	Bloomberg Terminal
BbP_G	Bloomberg Governance Performance Score	Bloomberg Terminal
BbD_ESG	Bloomberg Disclosure ESG Score	Bloomberg Terminal
BbD_E	Bloomberg Environmental Disclosure Score	Bloomberg Terminal
BbD_S	Bloomberg Social Disclosure Score	Bloomberg Terminal
BbD_G	Bloomberg Governance Disclosure Score	Bloomberg Terminal
KLD_ESG	KLD ESG Score. Formerly known as Kinder, Lydenberg, Domini & Co., was later renamed to MSCI KLD STATS as a legacy database. To differentiate it from the MSCI IVA dataset, we retain the original name of the dataset.	MSCI KLD STATS
KLD_E	KLD Environmental Score	MSCI KLD STATS
KLD_S	KLD Social Score	MSCI KLD STATS
KLD_G	KLD Governance Score	MSCI KLD STATS
Log_Total_Assets	Natural logarithm of total assets	Bloomberg Terminal
Leverage_Ratio	Total debt/Total assets	Bloomberg Terminal
Liquidity	Total current assets/Total current liabilities	Bloomberg Terminal
Industries	Industry dummy variables, based on 2- digit GICS sector codes	GICS classification
Years	Year dummy variable (2017, 2018, 2019, 2020)	Bloomberg Terminal

Table 3: Descriptive statistics and correlations

Panel A presents summary statistics for the variables used in the study, including the number of observations (N), mean, median, standard deviation (Std Dev), minimum and maximum for each variable. Panel B presents the pairwise correlation matrix for all variables. Please refer to Table 2 for all variable definitions.

Variable	N	Mean	Median	Std Dev	Minimum	Maximum
Tobin's Q	398	2.500	1.994	1.851	0.906	19.453
ROA	388	0.135	0.126	0.065	-0.070	0.452
CR	398	0.184	0.100	0.245	0.000	1.000
MSCI_IVA	398	7.314	7.000	1.090	4.000	9.000
BbP_E	383	3.607	3.650	1.727	0.000	8.260
BbP_S	383	3.786	3.530	1.915	0.000	8.550
BbP_G	398	7.297	7.410	0.681	5.260	9.130
BbD_ESG	396	58.257	60.467	10.742	30.560	81.471
BbD_E	396	47.138	50.529	19.150	0.000	80.308
BbD_S	396	36.578	37.122	13.136	10.641	66.264
BbD_G	396	90.928	91.240	5.166	65.924	100.000
KLD_ESG	299	1.535	1.400	1.171	-1.250	4.667
KLD_E	299	0.377	0.333	0.280	-0.071	1.000
KLD_S	299	0.911	0.881	0.882	-1.167	3.667
KLD_G	299	0.247	0.000	0.452	-0.500	1.000
Log_Total_Assets	398	10.215	10.169	1.100	7.090	12.836
Leverage_Ratio	398	0.348	0.350	0.137	0.000	1.056
Liquidity	387	1.463	1.273	1.000	0.221	8.027

Panel B: Pearson correlation coefficients

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) Tobin's Q	1																	
(2) ROA	0.503	1																
	(<.0001)																	
(3) CR	0.245	-0.075	1															
	(<.0001)	(0.140)																
(4) MSCI_IVA	0.169	0.078	0.126	1														
	(0.001)	(0.123)	(0.012)															
(5) BbP_E	0.041	0.122	-0.078	0.085	1													
	(0.418)	(0.019)	(0.127)	(0.098)														
(6) BbP_S	-0.210	-0.086	-0.141	-0.049	0.290	1												
	(<.0001)	(0.098)	(0.006)	(0.344)	(<.0001)													
(7) BbP_G	-0.236	-0.083	-0.161	0.086	0.230	0.259	1											
	(<.0001)	(0.101)	(0.001)	(0.087)	(<.0001)	(<.0001)												
(8) BbD_ESG	-0.105	0.008	-0.058	0.195	0.585	0.349	0.359	1										
	(0.038)	(0.878)	(0.253)	(<.0001)	(<.0001)	(<.0001)	(<.0001)											
(9) BbD_E	-0.086	-0.003	-0.059	0.146	0.622	0.296	0.262	0.926	1									
	(0.087)	(0.946)	(0.244)	(0.004)	(<.0001)	(<.0001)	(<.0001)	(<.0001)										
(10) BbD_S	-0.075	-0.002	-0.006	0.194	0.440	0.343	0.398	0.862	0.639	1								
	(0.138)	(0.970)	(0.901)	(0.000)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)									
(11) BbD_G	-0.143	0.067	-0.126	0.186	0.250	0.221	0.262	0.619	0.449	0.472	1							
	(0.004)	(0.190)	(0.012)	(0.000)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)								
(12) KLD_ESG	0.026	-0.003	-0.001	0.235	0.279	0.154	0.272	0.481	0.432	0.449	0.273	1						
	(0.658)	(0.961)	(0.980)	(<.0001)	(<.0001)	(0.009)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)							
(13) KLD_E	0.012	0.151	0.028	0.229	0.295	0.183	0.140	0.537	0.454	0.479	0.466	0.502	1					
	(0.830)	(0.010)	(0.635)	(<.0001)	(<.0001)	(0.002)	(0.015)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)						
(14) KLD_S	-0.041	-0.114	-0.032	0.182	0.207	0.136	0.264	0.357	0.338	0.332	0.139	0.873	0.220	1				
	(0.477)	(0.052)	(0.587)	(0.002)	(0.000)	(0.021)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.017)	(<.0001)	(0.000)					
(15) KLD_G	0.139	0.122	0.041	0.112	0.144	0.024	0.103	0.214	0.175	0.216	0.146	0.577	0.251	0.174	1			
	(0.016)	(0.037)	(0.483)	(0.053)	(0.015)	(0.691)	(0.076)	(0.000)	(0.002)	(0.000)	(0.012)	(<.0001)	(<.0001)	(0.003)				
(16) Log_Total_Assets	-0.324	-0.259	-0.038	-0.185	0.266	0.228	0.238	0.356	0.331	0.292	0.252	0.178	0.265	0.152	0.000	1		
	(<.0001)	(<.0001)	(0.453)	(0.000)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.002)	(<.0001)	(0.008)	(0.997)			
(17) Leverage_Ratio	-0.144	-0.111	-0.106	-0.087	-0.025	0.093	0.106	0.097	0.100	0.058	0.085	0.050	0.076	0.036	0.011	0.002	1	
	(0.004)	(0.028)	(0.034)	(0.084)	(0.629)	(0.069)	(0.035)	(0.054)	(0.047)	(0.246)	(0.092)	(0.393)	(0.191)	(0.534)	(0.850)	(0.964)		
(18) Liquidity	0.422	0.463	0.033	0.009	-0.047	-0.099	-0.241	-0.161	-0.131	-0.180	-0.063	-0.105	-0.071	-0.132	0.028	-0.234	-0.289	1
	(<.0001)	(<.0001)	(0.513)	(0.853)	(0.364)	(0.056)	(<.0001)	(0.002)	(0.010)	(0.000)	(0.216)	(0.072)	(0.226)	(0.024)	(0.637)	(<.0001)	(<.0001)	

Table 4: Panel regressions of Tobin's Q

This table presents the results for the panel regressions of Tobin's Q. Panel A reports the analysis without industry and year fixed effects, whereas Panel B incorporates industry fixed effects and Panel C includes both industry and year fixed effects. The significance level of all models is set at 10%.

Panel A: Without industry and year fixed effects

	CR	MSCI_IVA	BbP_E	BbP_S	BbP_G	BbD_ESG	BbD_E	BbD_S	BbD_G	KLD_ESG	KLD_E	KLD_S	KLD_G
Intercept	5.297	3.643	5.805	5.624	7.651	5.708	5.953	5.840	7.362	4.919	5.142	4.894	4.827
	(0.001)	(0.087)	(0.003)	(0.004)	(0.000)	(0.002)	(0.002)	(0.002)	(0.017)	(0.000)	(0.000)	(0.000)	(0.000)
Variable of interest	1.725	0.229	0.135	-0.118	-0.288	0.008	0.004	0.010	-0.019	0.157	0.739	0.096	0.408
	(0.017)	(0.040)	(0.097)	(0.080)	(0.124)	(0.579)	(0.575)	(0.363)	(0.561)	(0.211)	(0.077)	(0.521)	(0.097)
Log_Total_Assets	-0.392	-0.361	-0.448	-0.343	-0.371	-0.434	-0.431	-0.438	-0.384	-0.354	-0.376	-0.337	-0.329
	(0.009)	(0.029)	(0.01)	(0.033)	(0.026)	(0.017)	(0.014)	(0.015)	(0.026)	(0.006)	(0.005)	(0.006)	(0.005)
Leverage_Ratio	-0.182	-0.297	-0.415	-0.300	-0.437	-0.564	-0.572	-0.536	-0.452	-0.148	-0.190	-0.115	-0.146
	(0.806)	(0.679)	(0.567)	(0.702)	(0.576)	(0.449)	(0.446)	(0.472)	(0.563)	(0.821)	(0.772)	(0.868)	(0.824)
Liquidity	0.666	0.681	0.649	0.647	0.628	0.667	0.664	0.676	0.664	0.664	0.651	0.661	0.646
	(0.000)	(<.0001)	(0.000)	(0.002)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Industry fixed effects	No	No	No	No	No	No	No	No	No	No	No	No	No
Year fixed effects	No	No	No	No	No	No	No	No	No	No	No	No	No
Adjusted R^2	0.276	0.243	0.227	0.225	0.236	0.226	0.226	0.229	0.227	0.306	0.309	0.295	0.307
N	387	387	372	372	387	385	385	385	385	293	293	293	293

Panel B: With industry fixed effects

	CR	MSCI_IVA	BbP_E	BbP_S	BbP_G	BbD_ESG	BbD_E	BbD_S	BbD_G	KLD_ESG	KLD_E	KLD_S	KLD_G
Intercept	5.169	4.414	5.850	5.496	7.291	5.767	6.067	5.880	7.875	4.654	5.042	4.581	4.510
	(0.009)	(0.076)	(0.008)	(0.014)	(0.002)	(0.009)	(0.005)	(0.007)	(0.008)	(0.004)	(0.004)	(0.005)	(0.004)
Variable of interest	1.708	0.188	0.153	-0.036	-0.239	0.009	0.005	0.012	-0.028	0.140	0.561	0.095	0.403
	(0.011)	(0.103)	(0.040)	(0.581)	(0.188)	(0.502)	(0.444)	(0.280)	(0.343)	(0.204)	(0.210)	(0.475)	(0.097)
Log_Total_Assets	-0.382	-0.406	-0.466	-0.381	-0.389	-0.463	-0.461	-0.469	-0.383	-0.345	-0.371	-0.328	-0.326
	(0.016)	(0.023)	(0.009)	(0.030)	(0.03)	(0.013)	(0.009)	(0.013)	(0.037)	(0.009)	(0.009)	(0.010)	(0.009)
Leverage_Ratio	0.085	0.212	0.298	0.206	0.083	0.009	0.001	0.040	0.142	0.092	0.062	0.109	0.079
	(0.905)	(0.773)	(0.677)	(0.784)	(0.912)	(0.991)	(0.999)	(0.958)	(0.849)	(0.888)	(0.924)	(0.873)	(0.900)
Liquidity	0.597	0.530	0.476	0.508	0.501	0.515	0.511	0.525	0.511	0.546	0.554	0.547	0.536
	(0.009)	(0.016)	(0.037)	(0.042)	(0.034)	(0.026)	(0.027)	(0.022)	(0.042)	(0.036)	(0.032)	(0.041)	(0.043)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No	No	No	No	No
Adjusted R^2	0.340	0.309	0.308	0.292	0.305	0.299	0.299	0.303	0.303	0.384	0.383	0.376	0.388
N	387	387	372	372	387	385	385	385	385	293	293	293	293

Panel C: With industry and year fixed effects

	CR	MSCI_IVA	BbP_E	BbP_S	BbP_G	BbD_ESG	BbD_E	BbD_S	BbD_G	KLD_ESG	KLD_E	KLD_S	KLD_G
Intercept	5.329	4.638	5.978	5.777	7.791	6.047	6.240	6.102	8.526	4.666	5.053	4.593	4.530
	(0.008)	(0.071)	(0.008)	(0.013)	(0.002)	(0.009)	(0.005)	(0.007)	(0.007)	(0.004)	(0.004)	(0.004)	(0.004)
Variable of interest	1.728	0.188	0.130	-0.064	-0.281	0.005	0.004	0.009	-0.034	0.132	0.568	0.078	0.390
	(0.008)	(0.102)	(0.107)	(0.371)	(0.130)	(0.711)	(0.614)	(0.438)	(0.263)	(0.233)	(0.209)	(0.559)	(0.107)
Log_Total_Assets	-0.410	-0.435	-0.477	-0.402	-0.413	-0.476	-0.478	-0.486	-0.406	-0.349	-0.380	-0.334	-0.332
	(0.013)	(0.020)	(0.009)	(0.026)	(0.024)	(0.012)	(0.008)	(0.012)	(0.030)	(0.009)	(0.009)	(0.009)	(0.008)
Leverage_Ratio	-0.013	0.122	0.220	0.117	-0.007	-0.060	-0.069	-0.040	0.064	0.061	0.016	0.068	0.050
	(0.986)	(0.868)	(0.761)	(0.876)	(0.993)	(0.935)	(0.926)	(0.958)	(0.931)	(0.926)	(0.98)	(0.921)	(0.938)
Liquidity	0.588	0.517	0.468	0.500	0.484	0.501	0.498	0.509	0.494	0.550	0.558	0.551	0.540
	(0.010)	(0.021)	(0.045)	(0.050)	(0.043)	(0.036)	(0.036)	(0.032)	(0.055)	(0.034)	(0.029)	(0.039)	(0.040)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.349	0.317	0.310	0.302	0.315	0.306	0.306	0.308	0.313	0.383	0.384	0.376	0.387
N	387	387	372	372	387	385	385	385	385	293	293	293	293

Table 5: Panel regressions of ROA

This table presents the results for the panel regressions of ROA. Panel A reports the analysis without industry and year fixed effects, whereas Panel B incorporates industry fixed effects and Panel C includes both industry and year fixed effects. The significance level of all models is set at 10%.

Panel A: Without industry and year fixed effects

	CR	MSCI_IVA	BbP_E	BbP_S	BbP_G	BbD_ESG	BbD_E	BbD_S	BbD_G	KLD_ESG	KLD_E	KLD_S	KLD_G
Intercept	0.195	0.157	0.173	0.167	0.149	0.167	0.193	0.184	0.048	0.202	0.221	0.202	0.199
	(0.000)	(0.009)	(0.001)	(0.002)	(0.039)	(0.003)	(0.001)	(0.001)	(0.608)	(0.001)	(0.000)	(0.001)	(0.001)
Variable of interest	-0.026	0.003	0.007	-0.001	0.006	0.001	0.000	0.001	0.002	0.004	0.059	-0.003	0.016
	(0.163)	(0.405)	(0.016)	(0.759)	(0.292)	(0.072)	(0.122)	(0.137)	(0.046)	(0.322)	(0.001)	(0.597)	(0.145)
Log_Total_Assets	-0.010	-0.009	-0.011	-0.007	-0.010	-0.012	-0.012	-0.011	-0.011	-0.011	-0.014	-0.010	-0.010
	(0.055)	(0.082)	(0.049)	(0.136)	(0.043)	(0.034)	(0.039)	(0.054)	(0.022)	(0.064)	(0.016)	(0.077)	(0.068)
Leverage_Ratio	0.003	0.010	0.016	0.016	0.006	0.002	0.002	0.006	0.002	-0.005	-0.010	-0.004	-0.005
	(0.932)	(0.743)	(0.584)	(0.627)	(0.845)	(0.955)	(0.943)	(0.839)	(0.944)	(0.868)	(0.716)	(0.901)	(0.852)
Liquidity	0.028	0.028	0.028	0.028	0.029	0.029	0.028	0.029	0.028	0.026	0.026	0.026	0.026
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Industry fixed effects	No	No	No	No	No	No	No	No	No	No	No	No	No
Year fixed effects	No	No	No	No	No	No	No	No	No	No	No	No	No
Adjusted R^2	0.240	0.234	0.251	0.218	0.235	0.248	0.240	0.244	0.248	0.215	0.266	0.211	0.222
N	387	387	372	372	387	385	385	385	385	293	293	293	293

Panel B: With industry fixed effects

	CR	MSCI_IVA	BbP_E	BbP_S	BbP_G	BbD_ESG	BbD_E	BbD_S	BbD_G	KLD_ESG	KLD_E	KLD_S	KLD_G
Intercept	0.157	0.149	0.133	0.109	0.086	0.127	0.162	0.142	0.053	0.149	0.183	0.147	0.145
	(0.02)	(0.029)	(0.059)	(0.094)	(0.281)	(0.074)	(0.028)	(0.054)	(0.567)	(0.055)	(0.021)	(0.053)	(0.054)
Variable of interest	-0.033	-0.001	0.007	0.004	0.010	0.001	0.001	0.001	0.001	0.004	0.045	0.000	0.010
	(0.109)	(0.84)	(0.007)	(0.052)	(0.05)	(0.008)	(0.013)	(0.027)	(0.11)	(0.239)	(0.008)	(0.936)	(0.309)
Log_Total_Assets	-0.007	-0.006	-0.007	-0.005	-0.007	-0.011	-0.009	-0.009	-0.008	-0.006	-0.010	-0.006	-0.006
	(0.219)	(0.289)	(0.245)	(0.364)	(0.189)	(0.112)	(0.135)	(0.174)	(0.165)	(0.316)	(0.141)	(0.348)	(0.346)
Leverage_Ratio	0.020	0.020	0.036	0.030	0.019	0.015	0.016	0.020	0.017	0.000	-0.003	0.000	-0.001
	(0.528)	(0.529)	(0.214)	(0.301)	(0.53)	(0.588)	(0.585)	(0.499)	(0.581)	(0.989)	(0.911)	(0.998)	(0.981)
Liquidity	0.021	0.023	0.022	0.022	0.024	0.023	0.023	0.024	0.023	0.022	0.023	0.022	0.022
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.000)	(<.0001)	(0.000)	(0.000)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No	No	No	No	No	No
Adjusted R^2	0.349	0.3361	0.3677	0.3464	0.3447	0.3643	0.3544	0.3628	0.3417	0.3315	0.3574	0.3266	0.3311
N	387	387	372	372	387	385	385	385	385	293	293	293	293

Panel C: With industry and year fixed effects

	CR	MSCI_IVA	BbP_E	BbP_S	BbP_G	BbD_ESG	BbD_E	BbD_S	BbD_G	KLD_ESG	KLD_E	KLD_S	KLD_G
Intercept	0.149	0.139	0.124	0.099	0.073	0.116	0.153	0.132	0.038	0.146	0.180	0.145	0.143
	(0.026)	(0.038)	(0.075)	(0.125)	(0.357)	(0.101)	(0.036)	(0.072)	(0.681)	(0.057)	(0.022)	(0.054)	(0.056)
Variable of interest	-0.030	-0.001	0.008	0.005	0.010	0.001	0.001	0.001	0.001	0.003	0.045	-0.001	0.007
	(0.156)	(0.876)	(0.008)	(0.038)	(0.037)	(0.007)	(0.014)	(0.025)	(0.082)	(0.401)	(0.007)	(0.83)	(0.473)
Log_Total_Assets	-0.007	-0.006	-0.007	-0.005	-0.007	-0.010	-0.009	-0.009	-0.008	-0.007	-0.010	-0.006	-0.006
	(0.233)	(0.299)	(0.257)	(0.373)	(0.194)	(0.119)	(0.144)	(0.184)	(0.169)	(0.307)	(0.129)	(0.329)	(0.325)
Leverage_Ratio	0.020	0.020	0.036	0.029	0.019	0.015	0.015	0.020	0.016	-0.002	-0.005	-0.002	-0.002
	(0.547)	(0.55)	(0.228)	(0.329)	(0.553)	(0.596)	(0.597)	(0.508)	(0.607)	(0.952)	(0.861)	(0.948)	(0.946)
Liquidity	0.022	0.024	0.022	0.022	0.024	0.024	0.023	0.025	0.024	0.022	0.023	0.022	0.022
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.000)	(<.0001)	(0.000)	(0.000)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.3525	0.3422	0.3758	0.355	0.352	0.3721	0.3609	0.3705	0.349	0.3348	0.3634	0.3322	0.3344
N	387	387	372	372	387	385	385	385	385	293	293	293	293

Table 6: Mediation effect of MSCI_IVA on the relationship between CR and Tobin's Q

This table displays the results of a mediation analysis of MSCI_IVA on the relationship between clean revenue and Tobin's Q. The dependent variable in models 1, 2, and 4 of Panel A is Tobin's Q, which serves as a market measure for a firm's financial performance. In model 3, the dependent variable is MSCI_IVA. In Panel B, we present the results of the mediation analysis, including industry fixed effects. Panel C shows the analysis with industry and year fixed effects. The significance level of all models is set at 10%.

Panel A: Without industry and year fixed effects

Variables	(1) Tobin's Q		(2) Tobin's Q		(3) MSCI_IVA		(4) Tobin's Q	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	5.297	<.0001	3.643	0.002	9.628	<.0001	3.516	0.002
CR	1.725	<.0001			0.516	0.021	1.630	<.0001
MSCI_IVA			0.229	0.004			0.185	0.016
Log_Total_Assets	-0.392	<.0001	-0.361	<.0001	-0.198	<.0001	-0.355	<.0001
Leverage_Ratio	-0.182	0.769	-0.297	0.640	-0.835	0.044	-0.028	0.964
Liquidity	0.666	<.0001	0.681	<.0001	-0.079	0.178	0.680	<.0001
Observations	398		398		398		398	
Sobel test statistic				1.821				
R^2	0.284		0.250		0.063		0.295	

Panel B: With industry fixed effects

Variables	(1) Tobin's Q		(2) Tobin's Q		(3) MSCI_IVA		(4) Tobin's Q	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	5.169	<.0001	4.414	0.002	7.508	<.0001	4.240	0.002
CR	1.708	<.0001			0.839	0.000	1.604	<.0001
MSCI_IVA			0.188	0.017			0.124	0.113
Log_Total_Assets	-0.382	<.0001	-0.406	<.0001	-0.094	0.076	-0.370	<.0001
Leverage_Ratio	0.085	0.8916	0.212	0.742	-0.853	0.041	0.191	0.761
Liquidity	0.597	<.0001	0.530	<.0001	-0.049	0.443	0.603	<.0001
Observations	398		398		398		398	
Sobel test statistic				1.998				
R^2	0.363		0.332		0.178		0.367	

Panel C: With industry and year fixed effects

Variables	(1) Tobin's Q		(2) Tobin's Q		(3) MSCI_IVA		(4) Tobin's Q	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	5.329	<.0001	4.638	0.001	7.515	<.0001	4.393	0.001
CR	1.728	<.0001			0.835	0.000	1.624	<.0001
MSCI_IVA			0.188	0.016			0.125	0.108
Log_Total_Assets	-0.410	<.0001	-0.435	<.0001	-0.094	0.079	-0.398	<.0001
Leverage_Ratio	-0.013	0.984	0.122	0.849	-0.850	0.042	0.093	0.881
Liquidity	0.588	<.0001	0.517	<.0001	-0.050	0.437	0.595	<.0001
Observations	398		398		398		398	
Sobel test statistic				1.994				
R^2	0.376		0.345		0.178		0.380	

Table 7: Robustness tests: The mediation effect of MSCI_IVA on the relationship between the Bloomberg environmental performance score and financial performance

To ensure the robustness of our analysis, we replace the variable clean revenue with the Bloomberg environmental performance score (BbP_E). This table demonstrates the outcomes of the mediation analysis examining the impact of MSCI_IVA on the connection between the Bloomberg environmental performance score and Tobin's Q. Panel A omits industry and year fixed effects. Panel B includes the industry fixed effects. Panel C includes industry and year fixed effects. All models have a significance level of 10%.

Panel A: Without industry and year fixed effects

Variables	(1) Tobin's Q		(2) Tobin's Q		(3) MSCI_IVA		(4) Tobin's Q	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	5.805	<.0001	3.643	0.002	9.960	<.0001	3.458	0.005
BbP_E	0.135	0.009			0.100	0.002	0.112	0.030
MSCI_IVA			0.229	0.004			0.236	0.004
Log_Total_Assets	-0.448	<.0001	-0.361	<.0001	-0.251	<.0001	-0.389	<.0001
Leverage_Ratio	-0.415	0.520	-0.297	0.640	-0.960	0.020	-0.189	0.769
Liquidity	0.649	<.0001	0.681	<.0001	-0.090	0.124	0.670	<.0001
Observations	398		398		398		398	
Sobel test statistic				2.119				
R^2	0.235		0.250		0.076		0.252	

Panel B: With industry fixed effects

Variables	(1) Tobin's Q		(2) Tobin's Q		3) MSCI_IVA		(4) Tobin's Q	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	5.850	<.0001	4.414	0.002	8.231	<.0001	4.436	0.002
BbP_E	0.153	0.0029			0.076	0.024	0.140	0.007
MSCI_IVA			0.188	0.017			0.172	0.033
Log_Total_Assets	-0.466	<.0001	-0.406	<.0001	-0.166	0.004	-0.438	<.0001
Leverage_Ratio	0.298	0.6462	0.212	0.742	-0.914	0.032	0.455	0.484
Liquidity	0.476	<.0001	0.530	<.0001	-0.111	0.083	0.495	<.0001
Observations	398		398		398		398	
Sobel test statistic				1.649				
R^2	0.331		0.332		0.144		0.339	

Panel C: With industry and year fixed effects

Variables	(1) Tobin's Q		(2) Tobin's Q		(3) MSCI_IVA		(4) Tobin's Q	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	5.978	<.0001	4.638	0.001	8.254	<.0001	4.520	0.002
BbP_E	0.130	0.0138			0.082	0.018	0.115	0.029
MSCI_IVA			0.188	0.016			0.177	0.028
Log_Total_Assets	-0.477	<.0001	-0.435	<.0001	-0.165	0.004	-0.448	<.0001
Leverage_Ratio	0.220	0.7351	0.122	0.849	-0.883	0.040	0.376	0.563
Liquidity	0.468	<.0001	0.517	<.0001	-0.115	0.076	0.488	<.0001
Observations	398		398		398		398	
Sobel test statistic				1.696				
R^2	0.338		0.345		0.147		0.347	