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The Impact of Environmental, Social, and Governance Disclosure on Firm Value: The Role of CEO Power

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Abstract

Using a large cross-sectional dataset comprising of FTSE 350 listed firms, this study investigates whether superior environmental, social and corporate governance (ESG) disclosure affects firm value. We find a positive association between ESG disclosure level and firm value, suggesting that improved transparency and accountability and enhanced stakeholder trust play a role in boosting firm value. We also report that higher CEO power enhances the ESG disclosure effect on firm value, indicating that stakeholders associate ESG disclosure from firms with higher CEO power with greater commitment to ESG practice. This evidence is strong and consistent for three different measures of ESG-related disclosure: the ESG, environmental and social disclosure scores. The results are robust to the use of an instrumental variable approach, and the Heckman two-stage estimation procedure.

1. Introduction

In the last decade, the growing attention paid to issues of ‘sustainability’ has led to a boom in firms’ information disclosure on environmental, social and governance (ESG) practices. According to the United Nations (UN) Sustainable Stock Exchange (SSE) initiative, all big companies are expected to report their impact from environmental and social practice by 2030 at the latest (SSE, 2015). Evidence also shows that market interest in the transparency of firms’ ESG performance and practice is large and growing (Eccles, Serafeim & Krzus, 2011). Despite this heightened attention, a prudent question remains unexplored: whether or not ESG information disclosure prompts value creation. And, if it does, what are the drivers? The existing literature fails to give a definitive answer (Cho, Patten & Roberts, 2006; Garay & Font, 2012; Madsen & Rodgers, 2015). Our goal for this paper is to use a comprehensive proxy for ESG disclosure and a relatively large sample size to demonstrate this relationship. In addition, we attempt to examine the underlying drivers of the relationship by investigating the role of the chief executive officer (CEO) in ESG disclosure. In pursuit of this goal, we propose to extend earlier

applications of stakeholder theory to explain how firms generate financial value from ESG information disclosure. By focusing on the firms' key decision-making party, the CEO, we provide empirical evidence of whether ESG disclosure is more value enhancing for firms whose CEOs have greater power.

In the traditional view, the maximisation of shareholders' wealth is the ultimate goal of a company. However, from a stakeholder perspective, it is argued that other parties are also involved in the nexus, employees, suppliers, customers, communities, banks, regulatory agents, etc. Analysis of the association between firm profitability and the satisfaction of diverse stakeholders using survey data implies that major stakeholders can be regarded as a community of interests and their benefits are conjoint (Preston & Sapienza, 1990). Therefore, we argue that firms with better ESG disclosure could be more attractive to both financial investors and other major stakeholders, and that the resulting improved relationship between firms and their multiple stakeholders will financially benefit the former in the long run.

There are five arguments that particularly support our view. First, since ESG practice is very different from accounting practice, disclosures on ESG practice provide additional information to financial data. In the past 20 years, there have been growing demands for improved business reporting, and interestingly the focus is largely on encouraging companies to provide more non-financial information. This demand is due to the fact that the attribution of tangible assets to an entity's market capitalisation plummeted from approximately 82% to about 19% between 1975 and 2009 (Eccles, Serafeim & Krzus, 2011). ESG disclosure, as a major part of non-financial information, helps to offer a greater understanding of firms' businesses. As argued in Duuren, Plantinga & Scholtens (2015), ESG practice involves manufacturing technology, the use of raw materials, the relations with regulatory bodies and community, and has an influence on the business in a long run, and therefore needs well planned strategies. Based on such practice, ESG disclosure provides important additional aspects over and above financial information. This corresponds to the findings that additional and more diversified information in the economy improve price informativeness (Goldstein & Yang, 2015).

Second, the improvement of internal management practices following from ESG disclosure can lead to stronger relationships with multiple stakeholders who do

business with those companies (Vilanova, Lozano & Arenas, 2009; Dhaliwal, Li, Tsang & Yang, 2011). More importantly, Chen, Goldstein & Jiang (2006) suggest that managers tend to learn from the information in stock prices about their own firms' fundamentals and embed this knowledge in their corporate investment decisions. ESG disclosure thus creates a positive feedback loop: by increasing the transparency of ESG issues around the firm, it may further increase the incentives of the manager to improve the internal control mechanisms for complying with the regulations and serving the firm's stakeholders' interests (Cheng, Ioannou & Serafeim, 2014). ESG disclosure thus increases firm value in the long run.

Third, with the improved availability of ESG information disclosure, the asymmetric information between firms and related parties can be reduced, and relationships with important stakeholders can be strengthened, leading to better operating performance through consumption, investment, favourable employment behaviour, etc., and consequently higher firm value. For example, if the customers/community believe that a firm is a good citizen based on their ESG disclosure, the former may wish to buy more products from it, hence increasing profitability. Likewise, a higher level of environmental risk may lower a supplier firm's probability of being selected relative to its industry peers by its potential customers, which again affects financial performance. Current research provides evidence on these arguments (Banerjee et al., 2015). Therefore, we hypothesise that a firm with better ESG disclosure will have higher firm value.

Fourth, ESG disclosure improves transparency and visibility in companies' social and environmental factors and governance (Dubbink, Graafland & Van Liedekerke, 2008; Eccles, Ioannou & Serafeim, 2014; Ioannou & Serafeim, 2014). The latest research finds that not only social responsible funds but also conventional asset funds take ESG dimensions into consideration when they are making investment decisions (Duuren, Plantinga & Scholtens, 2015). Many conventional managers also use ESG factors particularly to assess risk. The more transparent is the ESG information disclosed, the better investment decisions these managers make.

Lastly, ESG disclosure reduces agency costs by encouraging stakeholders to engage and by increasing transparency. Greater ESG disclosure is associated with better stakeholder engagement, lowering the likelihood of myopic decisions. Jo and Kim

(2007, 2008) report that the level of asymmetric information between insiders (managers) and outsiders (shareholders and stakeholders) will be decreased owing to enhanced corporate transparency through frequent and voluntary disclosure, thus discouraging managerial rent extraction (aggressive earnings management, insider trading, and related-party transactions), and therefore enhancing firm value. Furthermore, Bénabou & Tirole (2010) report that corporate social responsibility (CSR) policies help firms adopt a more long-term perspective by discouraging short-term opportunistic behaviour, which boosts firms' value in the long run.

Earlier research on voluntary disclosure of financial information documents that the CEO has influence on disclosure quality, and high-quality disclosure increases firm value (e.g., Francis, Philbrick & Schipper, 1994; Botosan, 1997; Bushman & Smith, 2001; Francis, Nanda & Olsson, 2008; Hui & Matsunaga, 2015). However, as far as we know, there is no literature exploring the CEO's role in ESG disclosure, although Hui & Matsunaga (2015) provide anecdotal evidence that CEOs take responsibility for firms' interaction with not only their investment community but also various other stakeholders. Our paper aims to investigate the CEO's role in ESG disclosure, in particular whether or not CEO power impacts the relation between firm value and ESG disclosure.

To rigorously investigate these effects, we employ a sample of 350 FTSE listed firms during the period 2004 to 2013. The dataset is created from the merging of two sources: Bloomberg, which provides accounting and ESG disclosure data, and Boardex, which provides governance data. The primary independent variable is the ESG disclosure score. Bloomberg rates a firm's ESG disclosure on three dimensions: social, environmental, and governance. ESG scores indicate the rating that Bloomberg's analysts give to the degree of transparency and accountability of a firm's reporting on the 'three pillars' of ESG strategies, performance, and related activities. Note that, while other data providers may use ESG information and different models to estimate ESG scores, the Bloomberg survey requests information directly from companies. The data points are clear and original sources can be identified in company documents. The primary proxy for firm value is Tobin's Q, originally proposed by Tobin (1969) and since then used widely in the literature to account for firm valuation (Yermack, 1996; Gompers, Metrick & Ishii, 2003).

The results confirm our assumption that firms with superior ESG disclosure have higher value, and that the relationship varies according to the level of CEO power. The robustness of our results are tested and confirmed in several ways. We substitute Tobin's Q with the return on assets (ROA), also finding a positive association between ROA and ESG disclosure. We further investigate the relationships between these two variables and environmental and social disclosure, respectively, separately from that with the comprehensive index (i.e. ESG score) to ensure that our results are not dominated by one single factor, since recent research finds that investors may attach different weights to these factors (Chatterji & Levine, 2006; Duuren, Plantinga & Scholtens, 2015). The results are consistent with the main findings. In addition, we implement an IV approach to test whether our findings suffer from any endogeneity bias stemming from reverse causality – namely, that only rich firms can afford costly ESG disclosure. Finally, a two-stage Heckman (1979) estimation procedure with validity-tested instruments is applied to mitigate concerns over endogeneity or omitted-variable bias, and to further strengthen our claims regarding the directionality of our results.

2. Literature Review and Hypothesis Development

Much of the literature has explored the relationship between ESG performance and firm value. However, the results have been equivocal, partly because of measurement concerns or data constraints, and partly because of model misspecification.

Early studies examine the relationship between ESG information disclosure and firm value by focusing on specific environmental, social and ethical events. For example, Blacconiere & Patten (1994) document that investors react less negatively to companies with more environmental information disclosed than those with less information provided when an industrial disaster happened in the chemical industry.

More recent studies have turned their attention to more general cases of ESG disclosure. Specifically, with a sample of Canadian companies, Richardson & Welker (2001) find an unexpected negative association between ESG disclosure and market value. In contrast, research such as that of Cormier & Magnan (2007) and Aerts, Cormier & Magnan (2008) documents a positive relationship. Aerts, Cormier & Magnan (2008) provide evidence that enhanced ESG disclosure among a sample of

EU (Belgian, French, German, and Dutch) and North American (Canadian and US) companies increased firm value by reducing information risk. Cormier & Magnan (2007), using a sample period from 1992 to 1998 for Canadian, German, and French companies, though failing to find a consistent result across all countries, provide evidence of a positive relationship.

There are two main streams of integrated ESG research in terms of their key findings. One set of studies has concluded that the relationship is positive and suggests that the managerial skills of companies with good ESG performance are transferable to or synergised into corporate market activities. In other words, the stakeholder infers that a company with good ESG practices/reputation should also be able to perform well when competing in the market (Frooman, 1997; Schuler & Cording, 2006). Thus, the stakeholders (e.g., investors, consumers, and employees) will reward such 'good management' through investment, consumption, and higher productivity. Similarly, studies based on stakeholder theory suggest that mutual trust and cooperation with stakeholders reduce implicit and explicit costs for negotiating and contracting, and play a role in monitoring management, significantly reducing the likelihood of managers behaving opportunistically and pushing them to adopt a long-term orientation (Jones, 1995; Choi & Wang, 2009; Eccles, Ioannou & Serafeim, 2014).

In contrast, two strands of empirical studies have explored a negative relationship between corporate ESG practices and financial performance. One strand suggests that managers who practise ESG activities neglect the opportunity cost of ESG actions and, consequently, sacrifice activities that would be more profitable for the company (Schuler & Cording, 2006). Over time, such ESG activities result in poor financial performance. The other strand is based on agency cost theory, which states that managers will engage in ESG practices for their own personal interests because monitoring such behaviour is not easy for shareholders (Schuler & Cording, 2006). This stream of research implies that managers who direct resources towards social projects fail to put those resources to their highest productive use and, over time, fail to maximise the firm's financial performance.

To explain and examine such equivocal findings, Preston & O'Bannon (1997) analyse the competing theories and use survey data to understand firms' social-financial performance association. They find that social and financial performance are strongly

positively associated with each other. Their interpretations for this positive relationship are either due to ‘positive synergies’ or ‘available funding’. Dam & Scholtens (2015) further construct a coherent theoretical framework by incorporating both the supply and demand aspects of market participants, and also suggest that CSR and financial performance are theoretically positively associated with each other. In particular, they find that the announcement of firms’ social responsibility may induce its lower stock returns, but not necessarily decrease its market value. Their argument is supported by the 68 empirical studies examined in their paper.

As suggested by Preston & O’Bannon (1997), ‘positive synergies’ and ‘available funding’ provide the best explanations for this observed positive relation. The positive synergies theory is consistent with the stakeholder theory that is applied in the broader CSR literature. For example, Baron (2008) suggests that a firm with better CSR performance can attract customers who value such expenditure and are thus inclined to pay more for what it produces and serves, employees who are happy to work harder thus increasing productivity, even investors who expect a lower financial return because they receive satisfaction from purchasing shares in a firm that makes social expenditures, and managers who may view CSR as a means to increase their personal satisfaction and social accumulation. Patterson (2013) also reports that voluntary ESG reporting and disclosure are expected to boost firms’ sales growth, attract talented employees, and reduce the cost of capital. ESG disclosure will thus enhance firm value in the long run. In addition, some stakeholders delegate their own social responsibility to firms, suggesting that firms’ social responsibility is positively related to stakeholders’ loyalty, which enhances firms’ operating performance. Firms with greater ESG disclosure appeal to customers who are likely to delegate their own social responsibility to firms, resulting in better financial performance in the future. For example, Lev, Petrovits & Radhakrishnan (2010) show that a firm’s philanthropy is positively correlated with its future revenue growth in industries that are quite sensitive to consumer perception.

The available funding or affordability theory, rather than a causal effect from ESG disclosure to firm value, suggests a reverse causality. This theory claims that, although companies may wish to behave like a good corporate citizen, firms without sufficient financial resources cannot afford to engage in the costly social activities. Thus, the causality implied by the affordability model is that financial performance

leads to ESG practice/disclosure. Carroll (1979) argues that, by managing wisely for economic, then legal, and then ethical domains, managers can send resources towards their charitable contribution. Schuler & Cording (2006) suggest that companies such as Anheuser-Busch, Coca-Cola, Eli Lilly, Philip Morris, Target, etc., in devoting a portion of their pre-tax income to various charitable projects, is a group of companies fitting into this category. Preston, Sapienza & Miller (1991) and Preston & O'Bannon (1997) all find some evidence supporting this hypothesis; however, their conclusions are all based on small surveys of US corporations. Qiu, Shaukat & Tharyan (2014) conclude that past profitability drives current social disclosure, with research findings built on affordability theory, but do not find consistent results between environmental disclosure and profitability. In our study, we explicitly test for causal relationships between both environmental and social disclosure and firm value, in addition to testing for causality between combined ESG disclosure and firm value. Alongside our main test, we employ the IV and Heckman (1979) two-stage estimation procedures to determine whether there is a possibility that the affordability theory affects our main inference about the association.

Since ESG information is a subset of non-financial reporting and does not follow a standardised format as financial information does, ESG disclosure tends to vary significantly (Elzahar, Hussainey, Mazzi & Tsalavoutas, 2015). Along these lines, earlier empirical research documents that ESG disclosure differs across companies and countries (e.g., Reverte, 2009; Ioannou & Serafeim, 2014) due to the information content and format being up to management discretion. Duuren, Plantinga & Scholtens (2015) find that the US and European asset managers view ESG in substantially different ways. Baldini et al. (2016) argue that country-specific factors such as political, labour, and cultural systems, significantly affect firms' ESG disclosure practices. Therefore, it is important to understand the relationship between ESG disclosure and financial performance within country-specific contextual factors.

The UK is one of the leading countries when it comes to advocating ESG disclosure. It requires ESG disclosure in a firm's Business Review, as laid out in the Companies Act (2006). It is expected that the Business Review of a quoted company must disclose a series of ESG information. Such information includes disclosure on the influence of the company's business on the environment, information about the company's employees, and social and community as well as any policies implemented

by the company regarding these issues and the effectiveness of those policies. These requirements provide a relatively clear data structure for ESG research in the UK compared to previous studies that have relied mostly on survey data (see, for example, Preston & O'Bannon, 1997; Duuren, Plantinga & Scholtens, 2015). We therefore investigate the relationship within a UK data setting.

In sum, our study builds on previous and recent studies to address the inconsistent findings surrounding the relation between corporate ESG disclosure and financial value. These earlier findings lead to our first hypothesis:

H1: There is a positive and significant relationship between ESG disclosure level and firm value.

Different stakeholders or managers may have different reactions to corporate ESG practices. For instance, a firm's practice of donating to the local communities in which its stores operate may be praised by local employees but criticised by distant shareholders. Thus, a more fine-grained group analysis is required to better understand the relationship of ESG to firm value. One of the determinants of the importance of stakeholder–management subgroups depends on their relative power (Mitchell, Agle & Wood, 1997). We emphasise one of the key decision-making groups, CEOs, who have the power of direct control over companies' operations, and suggest that a necessary condition for better understanding the relationship between ESG disclosure and financial performance is to consider CEO power.

A variety of studies has suggested that a CEO has the ability to influence disclosure policies. Song & Thakor (2006) provide evidence on the CEO's incentive to control the information disclosed to the board. Other studies that recognise the CEO's ability to influence information disclosure include Goldman & Slezak (2006), Singh (2006), and Axelson & Baliga (2009). Since disclosure quality reflects executives' ability to understand the underlying competitive environment and effectively anticipate future outcomes, higher disclosure quality could signal executives' ability to enhance firm value (Hui & Matsunaga, 2015). As the core of the executive team, the CEO's efforts regarding ESG disclosure should be a key determinant of disclosure quality. Thus, we posit that increased firm value, led by ESG disclosure, will be stronger in the presence of greater CEO power, since stakeholders will then perceive the signalling effects of ESG disclosure to be a bigger commitment from the firm.

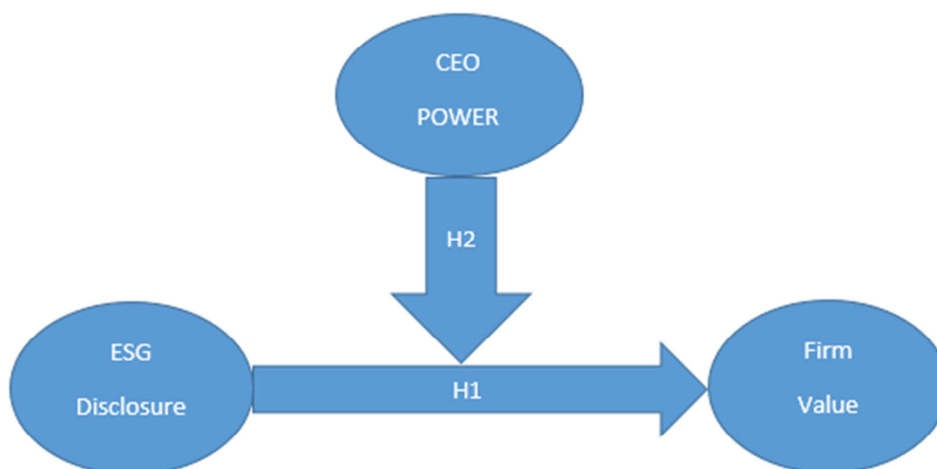
Furthermore, Chang, Dasgupta & Hilary (2010) document a mechanism through which disclosure quality is linked to CEO pay. They argue that the provision of high-quality information requires managers to have a strong understanding of the underlying economic and competitive environment faced by the firm and to foresee how the firm will be able to succeed in that environment. Because similar skills are useful for making effective strategic and operating decisions, the quality of a firm's financial disclosures signals the manager's ability to increase firm value (Chang, Dasgupta & Hilary, 2010). Therefore, superior disclosure shifts the reservation wage in the labour market, leading to a positive relation between disclosure quality and pay. We therefore examine the role of CEO power, proxied by the CEO's relative payment, in the relationship between ESG disclosure and firm value.

However, it could be argued that CEOs with strong power are also protected by their authority. Therefore, they may manipulate disclosure policy or obscure information transparency so that their rent seeking behaviour will not be revealed. If such an argument is the case, we would observe that strong CEO power might weaken the relation between ESG disclosure and firm value.

Summarising the discussion above, we propose our second hypothesis:

H2: The effect of ESG disclosure on firm value is more pronounced when the firm has high CEO power than when the firm has low CEO power.

Figure 1 places CEO power within a conceptual framework illustrating its moderating role of ESG disclosure effect on firm value.



The lack of consensus over a measurement methodology in regard to ESG disclosure may also contribute to the equivocal empirical results in the literature. We use a comprehensive score developed by Bloomberg since early 2000 to proxy for ESG disclosure. Given its credibility, this proxy is also commonly applied in practice by companies.¹ Further, we suggest that a breakdown of the ESG disclosure score into different subsets employing different measurement strategies is a necessary step when conducting any relationship tests, because ESG has different dimensions to which, as Chatterji & Levine (2006) and Duuren, Plantinga & Scholtens (2015) suggest, investors attach different weights.

Likewise, there is little consensus over which instrument should be applied to measure financial performance. Many researchers use market measures such as the stock market return, while others propose accounting measures (ROA, ROE, etc.). We apply Tobin's Q and ROA to measure firm value. We do not consider the stock market return because it is more closely related to the investor's financial return than the stakeholder's valuation. Meanwhile, Dam & Scholtens (2015) find that the association between stock returns and the level of social responsibility can either be positive or negative, depending ultimately on how strongly investors and firms, respectively, value the internalisation of external influence. Thus, we use Tobin's Q, complemented by ROA, in this study. Each measure represents a particular perspective on the ways that firms' financial performance is assessed. More specifically, the market-orientated measure is forward looking and focuses on market performance, while the accounting measure captures historical aspects of firm performance (Tsoutsoura, 2004). Tobin's Q, calculated as the ratio of the market value of a firm (stock market-based orientation) to the replacement cost of its total assets (historical orientation), has been applied to explain many important aspects of corporate finance.

3. Research Design

3.1 Sample and data

¹ See, for example, CLP Group's disclosure of its ESG scores on its website, as a means of communication with its stakeholders. The scores they quote are sourced from the Bloomberg terminal (<https://www.clpgroup.com/en/sustainability/sustainability-ratings/bloomberg-esg-disclosure>).

To study the relationship between ESG disclosure level and firm valuation among FTSE 350 firms in the UK, we obtain data from the following sources: Bloomberg, which provides accounting, ESG disclosure, environmental disclosure, and social disclosure data; and Boardex, which provides CEOs' and directors' compensation data. To be able to perform our analysis, we require firms to have data available for net property, plant and equipment (PPE), total assets, total debts, sales, cash and near cash items, capital expenditure, Tobin's Q, ROA, ESG disclosure data, environmental disclosure data and social disclosure data available from Bloomberg and CEO pay (CEO POWER) data available in Boardex. Our final sample contains 2,415 firm-year observations (main model) representing 367 individual firms between 2004 and 2013.

3.2 Regression variables

3.2.1 ESG disclosure measurement: ESG disclosure score

Our main explanatory variable is the ESG disclosure score. Besides the mandatory requirements for basic disclosure, ESG disclosure is usually voluntary and, from the normative stakeholder point of view, regarded as an expression of transparency and accountability. Thus, the ESG disclosure score reflects a firm's specific level of disclosure. Fortunately, Bloomberg provides ESG disclosure scores for large public firms. Since several proprietary databases have been developed in recent years, research has begun to use them to assess ESG disclosure or performance. However, Halbritter & Dorfleitner (2015) and Semenova & Hassel (2015) find that the ESG concepts in these datasets are non-consistent and do not converge; in addition, investigating the overall ESG score or some particular pillars may yield different results. However, given the datasets that they examined, Halbritter & Dorfleitner (2015) show that the Bloomberg subcriteria are fairly consistent with the overall measure. Therefore, we apply Bloomberg's ESG score as an overall ESG measure and the individual pillars to address the concern that the relation between ESG disclosure and firm value might be driven by some specific dimensions.

The ESG disclosure score proprietarily provided by Bloomberg is based on the extent of a company's ESG disclosure, the data being compiled from all available firm information, including websites, CSR reports, annual reports, and Bloomberg surveys. By 2015, Bloomberg was providing ESG data on more than 11,300 public companies

who have the most active trading in 69 countries. The comprehensive score of ESG disclosure is calculated from a total of 120 indicators, covering three aspects: environment, social activities, and governance. The span is 0.1 (minimum disclosure) to 100. The weight attached to every data point is allocated according to its importance. Different industry sectors are also considered when constructing these scores. By this means, each company is only evaluated with regard to the data that are relevant to its industry sector.² The score is widely used by academics (see, for example, Baldini et al., 2016), professionals, and companies, and the total number of customers using the ESG score was 12,078 by 2015.³

As some research indicates that ESG effects are driven by governance factors (e.g. Duuren, Plantinga & Scholtens, 2015), we want to relieve this concern by further examining our research questions using two individual ESG scores: an environmental disclosure score and a social disclosure score. These scores also come directly from Bloomberg.

3.2.2 Empirical model for Hypothesis 1

To test our first hypothesis, we propose that ESG disclosure is positively related to firm valuation. We test the following regression model, between firm valuation and the ESG disclosure score and a set of control variables:

$$\begin{aligned} \text{Tobin's } Q_{i,t} = & \beta_0 + \beta_1 \text{ESG}_{i,t} + \beta_2 \text{PPE}_{i,t} + \beta_3 \text{LN}TA_{i,t} + \beta_4 \text{CAPEX}_{i,t} + \beta_5 \text{LEVERAGE}_{i,t} \\ & + \beta_6 \text{GROWTH}_{i,t} + \beta_7 \text{CASH}_{i,t} + \text{YearFixedEffect}_t \\ & + \text{IndustryFixedEffect}_i + \varepsilon_{i,t} \end{aligned} \quad (1)$$

Following Aggarwal, Erel, Stulz & Williamson (2010), we include the firm characteristics that are reported to be influencing firm valuation and financial performance. Specifically, PPE is calculated as the ratio of property, plant, and equipment to total sales, firm size is measured as the natural log of total assets (LN_TA), CAPEX is measured as capital expenditure divided by total sales, LEVERAGE is measured as total debts divided by total assets, sales growth (GROWTH) is captured as the percentage change in sales over the prior year, and CASH is cash divided by total assets. To further test the relationship between ESG

² This information comes from Bloomberg's 2012 Sustainability Report and its 2015 Impact Report Update.

³ This information comes from Bloomberg's 2015 Impact Report Update.

disclosure and the firm's financial performance, we also estimate the association between ESG disclosure and firm profitability as measured by ROA.

3.2.3 Moderator: CEO power

Our measure of CEO power is based on Veprauskaitė & Adams (2013). They construct a variable termed CEO-Remuneration to proxy for CEO power. The proxy is defined as the annual compensation that the CEO received divided by the total annual compensation of all directors on the board. Boyd (1995) states that a powerful CEO may succeed in persuading the remuneration committee members to design generous compensation packages that bear little relation to real financial performance. Bebchuk, Cremers & Peyer (2011) state that the CEO's remuneration may reflect his/her relative importance and ability to extract rents. Here, we measure the CEO's pay ratio in the same way as that constructed in Veprauskaitė & Adams (2013), and define an indicator variable to represent higher and lower CEO power.⁴ CEO POWER is set to one if the CEO pay ratio for a firm is in the top quartile of the distribution, otherwise it is set to zero.

3.2.4 Empirical model for Hypothesis 2

To test our second hypothesis that CEO power has a positive moderating effect on the relationship between ESG disclosure scores and firm value, we include CEO Power and an additional interaction term in our main regression:

$$\begin{aligned}
 \text{Tobin's } Q_{i,t} = & \beta_0 + \beta_1 \text{ESG}_{i,t} + \beta_2 \text{CEO POWER}_{i,t} + \beta_3 \text{ESG}_{i,t} * \text{CEO POWER}_{i,t} + \\
 & \beta_4 \text{LN TA}_{i,t} + \beta_5 \text{CAPEX}_{i,t} + \beta_6 \text{LEVERAGE}_{i,t} + \beta_7 \text{GROWTH}_{i,t} + \\
 & \beta_8 \text{CASH}_{i,t} + \beta_9 \text{PPE}_{i,t} + \text{YearFixedEffect}_t + \\
 & \text{IndustryFixedEffect}_i + \varepsilon_{i,t}
 \end{aligned} \tag{2}$$

To further test whether CEO power positively moderates the relationship between ESG disclosure and a firm's financial performance, we once again repeat the regression, replacing the dependent variable Tobin's Q with ROA.

⁴ We also apply CEO POWER measures as a continuous variable, pay ratio, to conduct all the related tests, and find that the results are also strong and consistent with our findings presented here.

4. Results

4.1 Descriptive statistics

Table 1 displays the descriptive statistics for all variables. We winsorize all variables at the 1% and 99% levels to control the effect of outliers. The average ESG disclosure score is 30.670 in our main model. In addition, the 25th and 75th percentiles are 21.900 and 37.600, respectively, suggesting that there is sufficient variation in ESG disclosure level to examine the effect of ESG disclosure on firm value. Tobin's Q has a mean of 1.791 (median = 1.471). Multicollinearity is not likely to be problematic in our multivariate test because no VIF (variance inflation factor) exceeds 10 for any of our explanatory variables (e.g., Hair et al., 2006).

Table 1: Descriptive statistics

| VARIABLES | (1) N | (2) mean | (3) Std.dev. | (4) p25 | (5) p50 | (6) p75 |
|-----------|----------|-------------|-----------------|------------|------------|------------|
| ESG | 2,415 | 30.670 | 11.170 | 21.900 | 28.930 | 37.600 |
| Tobin's Q | 2,415 | 1.791 | 1.053 | 1.091 | 1.471 | 2.092 |
| CEO POWER | 2,415 | 0.250 | 0.433 | 0.000 | 0.000 | 1.000 |
| ROA | 2,415 | 0.065 | 0.083 | 0.022 | 0.058 | 0.100 |
| PPE | 2,415 | 0.927 | 2.569 | 0.059 | 0.179 | 0.479 |
| CAPEX | 2,415 | 0.095 | 0.186 | 0.014 | 0.032 | 0.078 |
| LEVERAGE | 2,415 | 0.219 | 0.178 | 0.064 | 0.198 | 0.326 |
| GROWTH | 2,415 | 0.103 | 0.243 | -0.006 | 0.066 | 0.166 |
| CASH | 2,415 | 0.099 | 0.097 | 0.032 | 0.068 | 0.132 |
| LNTA | 2,415 | 7.592 | 1.822 | 6.338 | 7.315 | 8.537 |
| SOC | 2,364 | 32.080 | 12.440 | 22.810 | 28.070 | 38.600 |
| ENV | 2,207 | 21.340 | 13.900 | 9.302 | 18.600 | 31.010 |

Notes: This table displays summary statistics for all variables used in our regression models.

4.2 Main regression results⁵

Table 2 reports the results from estimating equation (1). Panel A of Table 2 reports the results of estimating equation (1) using the ESG disclosure as a test variable. The estimated coefficient of ESG is 0.016 and is statistically significant at 1% level (t-statistics = 8.729). Consistent with our prediction, the result indicates that firms with higher ESG disclosure have higher firm value. Using the summary data of ESG reported in Table 1, we find that a one standard deviation increase in the ESG disclosure leads to a 17.872% (0.016×11.170) increase in the value of Tobin's Q. Turning to our other control variables, we find that the signs of their coefficients largely correspond with findings in the existing literature. First, firm size (LNTA) and the PPE are negatively related to Tobin's Q, consistent with Aggarwal, Erel, Stulz & Williamson (2010). Second, consistent with Martinez-Sola, Garcia-Teruel & Martinez-Solano (2013) and Konijn, Krassel & Lucas (2011), the ratio of cash to total assets (CASH) is positively associated with Tobin's Q. Third, sales growth (GROWTH) is positively related to firm value, which corroborates the conjecture of King & Santor (2008).

Each component (environmental, social, and governance) is equally weighted in the calculation of Bloomberg's proprietary aggregate ESG disclosure score. According to Ammann, Oesch & Schmid (2011), firm-level corporate governance is positively associated with firm value, based on a previously unused dataset provided by Governance Metrics International (GMI) covering 64 individual corporate governance attributes. To show that our findings are not driven by the governance component, we change our independent variable of interest to an environmental disclosure score and a social disclosure score, respectively. As presented in Panel B of Table 2, when an environmental disclosure score is used as our test variable, the coefficient on ENV is positive and significant (t-statistics = 5.394), suggesting that our results are not driven by the governance component. Panel C of Table 2 reports the results of estimating equation (1) using SOC as test variable. We show that the coefficient on SOC is

⁵ Given the lengthy content of this paper and the multiple tests we conduct, we not only report our main OLS regression results for models 1 and 2, but also our robustness test results, i.e., from the two-stage least squares (2SLS) and Heckman models, in the tables in this section for simplicity.

positive and significant (t-statistics = 6.959), consistent with our findings in Panel A and Panel B.

Table 2: The impact of ESG disclosure (ESG), environmental disclosure (ENV), and social disclosure (SOC) on firm value (Tobin's Q).

| Panel A: The impact of ESG disclosure (ESG) on firm value (Tobin's Q) | | | |
|---|------------------------|------------------------|-----------------------|
| VARIABLES | (1) OLS | (2) 2SLS | (3) HECKMAN |
| ESG | 0.016*** (8.729) | 0.019*** (6.667) | |
| ESG_DUM | | | 0.277*** (6.889) |
| PPE | -0.047*** (-6.267) | -0.048*** (-6.413) | -0.009 (-0.998) |
| LNTA | -0.190*** (-14.962) | -0.201*** (-14.182) | 0.425*** (6.754) |
| CAPEX | 0.199 (1.618) | 0.194 (1.583) | 0.987*** (6.712) |
| LEVERAGE | 0.057 (0.471) | 0.060 (0.501) | 0.200* (1.682) |
| GROWTH | 0.468*** (5.601) | 0.480*** (5.720) | -0.327*** (-3.093) |
| CASH | 3.759*** (12.113) | 3.759*** (12.177) | 3.063*** (10.138) |
| LAMBDA | | | 2.067*** (8.778) |
| Constant | 2.097*** (11.249) | 2.106*** (11.372) | -5.266*** (-6.154) |
| Observations | 2,415 | 2,415 | 2,415 |
| Adjusted R ² | 35.4% | 35.4% | 37.1% |
| Industry dummies | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes |
| Panel B: The impact of environmental disclosure (ENV) on firm value (Tobin's Q) | | | |
| VARIABLES | (1) OLS | (2) 2SLS | (3) HECKMAN |
| ENV | 0.007*** (5.394) | 0.012*** (5.789) | |
| ENV_DUM | | | 0.118*** (3.112) |
| PPE | -0.050*** (-6.505) | -0.054*** (-6.949) | 0.010 (0.886) |
| LNTA | -0.147*** (-12.807) | -0.170*** (-12.599) | 0.364*** (5.634) |
| CAPEX | 0.228* (1.812) | 0.227* (1.808) | 0.820*** (6.712) |

| | | | |
|------------------|----------|----------|-----------|
| | (1.722) | (1.706) | (5.521) |
| LEVERAGE | 0.107 | 0.121 | 0.225** |
| | (0.959) | (1.103) | (2.032) |
| GROWTH | 0.458*** | 0.481*** | -0.341*** |
| | (5.689) | (5.928) | (-2.856) |
| CASH | 3.334*** | 3.344*** | 2.461*** |
| | (11.843) | (11.920) | (8.576) |
| LAMBDA | | | 1.917*** |
| | | | (7.171) |
| Constant | 2.133*** | 2.240*** | -4.469*** |
| | (11.353) | (11.884) | (-4.911) |
| Observations | 2,207 | 2,207 | 2,207 |
| Adjusted R^2 | 31.8% | 31.3% | 32.8% |
| Industry dummies | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes |

Panel C: The impact of social disclosure (SOC) on firm value (Tobin's Q)

| VARIABLES | (1) OLS | (2) 2SLS | (3) HECKMAN |
|------------------|------------------------|------------------------|-----------------------|
| SOC | 0.012*** (6.959) | 0.014*** (5.046) | |
| SOC_DUM | | | 0.243*** (5.112) |
| PPE | -0.043*** (-5.679) | -0.044*** (-5.761) | -0.139*** (-9.185) |
| LNTA | -0.168*** (-14.050) | -0.175*** (-12.845) | 0.526*** (6.162) |
| CAPEX | 0.191 (1.537) | 0.186 (1.514) | 2.419*** (7.508) |
| LEVERAGE | 0.070 (0.561) | 0.066 (0.532) | 1.368*** (6.576) |
| GROWTH | 0.470*** (5.339) | 0.476*** (5.407) | 0.066 (0.709) |
| CASH | 3.859*** (11.941) | 3.850*** (11.980) | 4.757*** (13.216) |
| LAMBDA | | | 2.692*** (7.662) |
| Constant | 2.001*** (10.513) | 2.000*** (10.565) | -7.410*** (-5.940) |
| Observations | 2,364 | 2,364 | 2,364 |
| Adjusted R^2 | 35.3% | 35.3% | 36.8% |
| Industry dummies | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes |

Notes: Panel A of Table 2 (Model (1)) provides results of the regression of firms' Tobin's Q on their ESG disclosure score (ESG), which proxies for the firms' ESG disclosure level. Models (2) and (3) examine the robustness of our main inference. Panel B, Model (1) provides results of the regression of firms' Tobin's Q on their environmental disclosure score (ENV), which proxies for their environmental disclosure level. Models (2)

and (3) again examine the robustness of our main inference. Panel C, Model (1) provides results of the regression of firms' Tobin's Q on their social disclosure score (SOC), which proxies for their social disclosure level. Models (2) and (3) again check the robustness of our main inference. ***, **, and * significance at the 1%, 5%, and 10% levels, respectively.

4.3 Moderation test

In Table 3 (Panel A), we examine the role of CEO power on the relationship between ESG disclosure level and firm value. In order to test the moderation hypothesis, the key variable of interest here is the interaction term (ESG * CEO POWER). The interaction term captures the difference in the effects of ESG disclosure on firm value between those with high and low CEO power firms. Equally important, the coefficient on ESG captures the effects of ESG disclosure for lower CEO power. The positive coefficient of ESG * CEO POWER ($\beta_3 = 0.012, t = 3.324$) indicates that, controlling for other factors, the average increase in firm value led by ESG disclosure is larger for firms in which the CEO has greater power (Table 3, Panel A, Model (1)). Thus, for example, using Model (1), a one standard deviation increase in the ESG disclosure leads to a 13.404% increase ($0.012 * 11.170$) in the value of Tobin's Q for firms with lower CEO power, and a one standard deviation increase in the ESG disclosure leads to a 26.808% increase ($0.012 * 11.170 + 0.012 * 11.170$) in the value of Tobin's Q for firms with higher CEO power. Accordingly, supporting our second hypothesis, the interaction between ESG disclosure and CEO power positively influences firm value, suggesting that the positive relationship between ESG disclosure and firm value is more pronounced for firms with greater CEO power.

We also test the moderating effect of CEO power on the relationship between the environmental disclosure level and firm value (Panel B of Table 3) and the relationship between the social disclosure level and firm value (Panel C of Table 3). The coefficients of the interaction terms, ENV*CEO POWER and SOC*CEO POWER, are positive and significant at the 1% level, respectively. This finding suggests that the presence of a CEO with greater power positively moderates the association between the environmental disclosure score and firm value and that between the social disclosure score and firm value, which is consistent with our second hypothesis.

To sum up, the above analysis indicates that a higher ESG disclosure level increases firm value. Moreover, this relationship is stronger in the presence of greater CEO power.

Table 3: The moderating effect of CEO power on the relationship between different measures of ESG-related disclosure and firm value (Tobin's Q)

| Panel A: The moderating effect of CEO power on the relationship between ESG disclosure (ESG) and firm value (Tobin's Q) | | | |
|---|------------------------|------------------------|-----------------------|
| VARIABLES | (1) OLS | (2) 2SLS | (3) HECKMAN |
| ESG | 0.012*** (6.429) | 0.015*** (5.162) | |
| CEO POWER | -0.444*** (-3.466) | -0.498*** (-2.953) | -0.101** (-2.102) |
| ESG*CEO POWER | 0.012*** (3.324) | 0.014*** (2.757) | |
| ESG_DUM | | | 0.203*** (4.913) |
| ESG_DUM*CEO POWER | | | 0.289*** (2.944) |
| PPE | -0.046*** (-6.135) | -0.047*** (-6.271) | -0.008 (-0.855) |
| LNTA | -0.188*** (-14.855) | -0.200*** (-14.026) | 0.428*** (6.839) |
| CAPEX | 0.194 (1.573) | 0.188 (1.533) | 0.987*** (6.721) |
| LEVERAGE | 0.057 (0.477) | 0.060 (0.506) | 0.199* (1.677) |
| GROWTH | 0.463*** (5.535) | 0.474*** (5.669) | -0.332*** (-3.179) |
| CASH | 3.794*** (12.257) | 3.793*** (12.324) | 3.071*** (10.199) |
| LAMBDA | | | 2.074*** (8.874) |
| Constant | 2.180*** (11.577) | 2.202*** (11.629) | -5.272*** (-6.204) |
| Observations | 2,415 | 2,415 | 2,415 |

| | | | |
|------------------|-------|-------|-------|
| Adjusted R^2 | 35.8% | 35.7% | 37.4% |
| Industry dummies | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes |

Panel B: The moderating effect of CEO power on the relationship between environmental disclosure (ENV) and firm value (Tobin's Q)

| VARIABLES | (1) OLS | (2) 2SLS | (3) HECKMAN |
|-------------------|------------------------|------------------------|-----------------------|
| ENV | 0.005*** (3.632) | 0.011*** (4.840) | |
| CEO POWER | -0.194** (-2.549) | -0.186* (-1.877) | -0.040 (-0.890) |
| ENV*CEO POWER | 0.008*** (2.829) | 0.008* (1.798) | |
| ENV_DUM | | | 0.070* (1.794) |
| ENV_DUM*CEO POWER | | | 0.196** (2.079) |
| PPE | -0.049*** (-6.352) | -0.053*** (-6.826) | 0.013 (1.085) |
| LNTA | -0.147*** (-12.773) | -0.171*** (-12.558) | 0.371*** (5.777) |
| CAPEX | 0.229* (1.726) | 0.228* (1.710) | 0.830*** (5.602) |
| LEVERAGE | 0.101 (0.912) | 0.117 (1.066) | 0.221** (1.998) |
| GROWTH | 0.461*** (5.695) | 0.484*** (5.939) | -0.350*** (-2.957) |
| CASH | 3.345*** (11.933) | 3.358*** (12.018) | 2.435*** (8.530) |
| LAMBDA | | | 1.946*** (7.327) |
| Constant | 2.164*** (11.530) | 2.273*** (11.984) | -4.556*** (-5.041) |
| Observations | 2,207 | 2,207 | 2,207 |
| Adjusted R^2 | 32.0% | 31.5% | 32.9% |
| Industry dummies | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes |

Panel C: The moderating effect of CEO power on the relationship between social disclosure (SOC) and firm value (Tobin's Q)

| VARIABLES | (1) OLS | (2) 2SLS | (3) HECKMAN |
|-----------|------------|-------------|----------------|
|-----------|------------|-------------|----------------|

| | | | |
|-------------------------|------------------------|------------------------|-----------------------|
| SOC | 0.009*** (5.390) | 0.012*** (3.732) | |
| CEO POWER | -0.402*** (-3.019) | -0.362** (-2.233) | -0.082* (-1.684) |
| SOC*CEO POWER | 0.010*** (2.749) | 0.009* (1.889) | |
| SOC_DUM | | | 0.184*** (3.649) |
| SOC_DUM*CEO POWER | | | 0.251** (2.427) |
| PPE | -0.043*** (-5.565) | -0.043*** (-3.701) | -0.140*** (-9.260) |
| LNTA | -0.169*** (-14.008) | -0.176*** (-11.529) | 0.527*** (6.200) |
| CAPEX | 0.178 (1.431) | 0.174 (1.090) | 2.428*** (7.574) |
| LEVERAGE | 0.069 (0.555) | 0.065 (0.576) | 1.373*** (6.651) |
| GROWTH | 0.466*** (5.300) | 0.472*** (6.114) | 0.062 (0.663) |
| CASH | 3.887*** (12.054) | 3.879*** (18.180) | 4.766*** (13.212) |
| LAMBDA | | | 2.696*** (7.729) |
| Constant | 2.088*** (10.848) | 2.077*** (9.979) | -7.396*** (-5.972) |
| Observations | 2,364 | 2,364 | 2,364 |
| Adjusted R ² | 35.6% | 35.5% | 36.9% |
| Industry dummies | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes |

Notes: Panel A, Model (1) provides results of a test of the moderating effect of CEO Power on the relationship between ESG disclosure and firm value. Models (2) and (3) examine the robustness of our main inference. Panel B, Model (1) provides results of a test of the moderating effect of CEO Power on the relationship between environmental disclosure (ENV) and firm value. Models (2) and (3) check the robustness of our main inference. Panel C, Model (1) provides results of a test of the moderating effect of CEO Power on the relationship between social disclosure (SOC) and firm value. Models (2) and (3) examine the robustness of our main inference. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

5. Sensitivity Test

To further test both the relationship between ESG disclosure and firm value and the moderating effect of CEO power on that relationship, we change our dependent variable to ROA, as a sensitivity test. Tables 4, 5, and 6 (Model (1)) show that the impacts of ESG disclosure, environmental disclosure, and social disclosure,

respectively, on firms' financial performance are all positive and significant. Moreover, in Model (4) of the three tables, we also test the moderating effect of CEO power on those relationships. In Model (4) of Table 4 we report that the coefficient on ESG * CEO POWER has a positive value ($\beta_3=0.001$, $t=2.396$). Meanwhile, in Tables 5 and 6, respectively, the coefficients on ENV*CEO POWER and SOC*CEO POWER are both positive, and significant at the 5% level.

Table 4: The impact of ESG disclosure (ESG) on firm profitability (ROA) and the moderating effect of CEO power on that relationship

| VARIABLES | (1) OLS | (2) 2SLS | (3) HECKMAN | (4) OLS | (5) 2SLS | (6) HECKMAN |
|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| ESG | 0.001*** (6.790) | 0.001*** (3.923) | | 0.001*** (5.040) | 0.001*** (3.147) | |
| ESG_DUM | | | 0.021*** (5.440) | | | 0.017*** (3.461) |
| PPE | -0.000 (-0.381) | -0.000 (-0.381) | 0.000 (0.378) | -0.000 (-0.298) | -0.000 (-0.311) | 0.001 (0.553) |
| LNTA | -0.011*** (-8.835) | -0.011*** (-7.242) | 0.005 (0.923) | -0.011*** (-8.776) | -0.011*** (-7.284) | 0.006 (0.951) |
| CAPEX | -0.006 (-0.351) | -0.006 (-0.352) | 0.014 (0.812) | -0.006 (-0.358) | -0.006 (-0.404) | 0.016 (0.979) |
| LEVERAGE | -0.046*** (-4.132) | -0.046*** (-4.160) | -0.042*** (-3.786) | -0.046*** (-4.172) | -0.046*** (-4.706) | -0.043*** (-4.259) |
| GROWTH | 0.057*** (5.987) | 0.057*** (5.973) | 0.038*** (3.457) | 0.057*** (5.979) | 0.057*** (8.585) | 0.036*** (3.564) |
| CASH | 0.171*** (6.341) | 0.171*** (6.376) | 0.154*** (5.597) | 0.168*** (6.143) | 0.168*** (9.088) | 0.148*** (7.467) |
| CEO POWER | | | | -0.018 (-1.634) | -0.017 (-1.277) | 0.002 (0.561) |
| ESG*CEO POWER | | | | 0.001** (2.396) | 0.001* (1.751) | |
| ESG_DUM*CEO POWER | | | | | | 0.016* (1.931) |
| LAMBDA | | | 0.047** (2.501) | | | 0.051** (2.471) |
| Constant | 0.077*** (3.576) | 0.077*** (3.593) | -0.083 (-1.242) | 0.082*** (3.865) | 0.082*** (4.569) | -0.097 (-1.247) |

| | | | | | | |
|------------------|-------|-------|-------|-------|-------|-------|
| Observations | 2,415 | 2,415 | 2,415 | 2,415 | 2,415 | 2,415 |
| Adjusted R^2 | 17.1% | 17.1% | 16.8% | 17.3% | 17.3% | 16.9% |
| Industry dummies | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: This table provides results of the regression of ROA on the ESG disclosure score (ESG), which proxies for firms' ESG disclosure level (Model (1)). Models (2) and (3) examine the robustness of our main inference in Model (1). Model (4) provides results of a test of the moderating effect of CEO Power on the relationship between ESG disclosure and ROA. Models (5) and (6) check the robustness of our main inference in Model (4). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 5: The impact of environmental disclosure (ENV) on firm profitability (ROA) and the moderating effect of CEO power on that relationship

| VARIABLES | (1) OLS | (2) 2SLS | (3) HECKMAN | (4) OLS | (5) 2SLS | (6) HECKMAN |
|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| ENV | 0.001*** (5.145) | 0.001*** (3.992) | | 0.001*** (3.789) | 0.001*** (3.642) | |
| ENV_DUM | | | 0.006* (1.653) | | | 0.003 (0.736) |
| PPE | -0.000 (-0.266) | -0.001 (-0.459) | 0.003* (1.844) | -0.000 (-0.181) | -0.000 (-0.391) | 0.003** (2.061) |
| LNTA | -0.010*** (-8.149) | -0.011*** (-7.194) | 0.006 (1.490) | -0.010*** (-8.132) | -0.011*** (-7.693) | 0.007 (1.414) |
| CAPEX | -0.004 (-0.234) | -0.004 (-0.241) | -0.011 (-0.643) | -0.004 (-0.217) | -0.004 (-0.258) | -0.011 (-0.775) |
| LEVERAGE | -0.045*** (-4.004) | -0.045*** (-3.977) | -0.058*** (-4.989) | -0.046*** (-4.061) | -0.045*** (-4.568) | -0.060*** (-5.464) |
| GROWTH | 0.060*** (5.838) | 0.061*** (5.939) | 0.040*** (3.609) | 0.060*** (5.868) | 0.062*** (8.510) | 0.038*** (3.923) |
| CASH | 0.167*** (6.003) | 0.167*** (6.053) | 0.122*** (4.024) | 0.162*** (5.783) | 0.163*** (8.394) | 0.115*** (4.512) |
| CEO POWER | | | | -0.005 (-0.666) | -0.007 (-0.746) | 0.004 (0.800) |
| ENV*CEO POWER | | | | 0.001** (2.034) | 0.001 (1.643) | |
| ENV_DUM*CEO POWER | | | | | | 0.009 (1.168) |
| LAMBDA | | | 0.065*** (3.027) | | | 0.070*** (2.923) |
| Constant | 0.119*** (6.814) | 0.125*** (6.905) | -0.050 (-0.951) | 0.121*** (7.008) | 0.127*** (6.456) | -0.062 (-1.012) |

| | | | | | | |
|------------------|-------|-------|-------|-------|-------|-------|
| Observations | 2,207 | 2,207 | 2,207 | 2,207 | 2,207 | 2,207 |
| Adjusted R^2 | 16.8% | 16.6% | 16.1% | 17.0% | 16.8% | 16.3% |
| Industry dummies | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: This table (Model (1)) provides results of a regression of ROA on the environmental disclosure score (ENV), which proxies for firms' environmental disclosure level. Models (2) and (3) examine the robustness of our main inference in Model (1). Model (4) provides results of a test of the moderating effect of CEO Power on the relationship between the environmental disclosure score (ENV) and ROA. Models (5) and (6) examine the robustness of our main inference in Model (4). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6: The impact of social disclosure (SOC) on firm profitability (ROA) and the moderating effect of CEO power on that relationship

| VARIABLES | (1) OLS | (2) 2SLS | (3) HECKMAN | (4) OLS | (5) 2SLS | (6) HECKMAN |
|-----------|-----------------------|-----------------------|---------------------|-----------------------|-----------------------|--------------------|
| SOC | 0.001*** (5.546) | 0.001*** (3.264) | | 0.001*** (3.937) | 0.001** (2.422) | |
| SOC_DUM | | | 0.015*** (4.057) | | | 0.010** (2.294) |
| PPE | 0.000 (0.078) | 0.000 (0.076) | -0.002 (-1.131) | 0.000 (0.152) | 0.000 (0.141) | -0.002 (-1.279) |
| LNTA | -0.009*** (-8.036) | -0.009*** (-6.984) | 0.005 (0.839) | -0.009*** (-8.087) | -0.009*** (-6.771) | 0.007 (1.065) |
| CAPEX | -0.007 (-0.416) | -0.007 (-0.422) | 0.037 (1.318) | -0.007 (-0.452) | -0.007 (-0.510) | 0.043 (1.532) |
| LEVERAGE | -0.046*** | -0.046*** | -0.022 | -0.047*** | -0.047*** | -0.019 |

| | | | | | | |
|-------------------|----------|----------|----------|----------|----------|----------|
| | (-4.143) | (-4.156) | (-1.257) | (-4.185) | (-4.724) | (-1.094) |
| GROWTH | 0.056*** | 0.056*** | 0.047*** | 0.056*** | 0.056*** | 0.046*** |
| | (5.634) | (5.625) | (4.476) | (5.614) | (8.206) | (4.389) |
| CASH | 0.168*** | 0.168*** | 0.185*** | 0.165*** | 0.165*** | 0.183*** |
| | (6.210) | (6.234) | (6.373) | (6.010) | (8.761) | (6.242) |
| CEO POWER | | | | -0.018 | -0.010 | 0.001 |
| | | | | (-1.553) | (-0.706) | (0.261) |
| SOC*CEO POWER | | | | 0.001** | 0.000 | |
| | | | | (2.247) | (1.103) | |
| SOC_DUM*CEO POWER | | | | | | 0.024*** |
| | | | | | | (2.919) |
| LAMBDA | | | 0.053** | | | 0.059** |
| | | | (1.972) | | | (2.203) |
| Constant | 0.072*** | 0.072*** | -0.107 | 0.078*** | 0.076*** | -0.126 |
| | (3.245) | (3.263) | (-1.150) | (3.544) | (4.118) | (-1.364) |
| Observations | 2,364 | 2,364 | 2,364 | 2,364 | 2,364 | 2,364 |
| Adjusted R^2 | 16.6% | 16.6% | 16.3% | 16.8% | 16.8% | 16.6% |
| Industry dummies | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: This table (Model (1)) provides results of a regression of ROA on the social disclosure score (SOC), which proxies for firms' social disclosure level. Models (2) and (3) check the robustness of our main inference in Model (1). Model (4) provides the results of a test of the moderating effect of CEO Power on the relationship between the social disclosure score (SOC) and ROA. Models (5) and (6) examine the robustness of our main inference in Model (4). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

6. Robustness Tests

To check the robustness of our main findings that the ESG disclosure level is positively associated with firm value and that firm value is positively associated with the interaction of the ESG disclosure score and CEO power, several robustness tests are performed. The results are discussed in this section. They are all consistent with our main hypotheses.

To control for any endogeneity bias stemming from reverse causality, specifically that firms with higher valuation or that have performed better in the past might be able to afford or support higher ESG disclosure levels and more ESG-related investment, we re-estimate our analysis using the IV approach and report our findings here (the results are presented in Model (2) of Tables 2 and 3, and Models (2) and (5) of Tables 4, 5, and 6).

First, we implement the IV estimation procedure to check whether our results suffer from endogeneity between ESG disclosure and firm value. We follow Attig, Ghoual, Guedhami & Suh (2013) in using the firm-level initial value of the ESG disclosure score (ESG_INI) as an instrument. This IV is very likely to be exogenous to the contemporaneous ESG disclosure score. We employ a two-step regression to estimate the IV model. First, we regress the ESG disclosure level on the IV and all the control variables used in the main regression model (Table 2, Panel A, Model (1)). Second, we preserve the predicted value of the ESG disclosure level and fit it into our baseline model. The first-stage regression findings show that the IV is significantly related to the ESG disclosure score. Due to space constraints, we do not present the results in a table. We then save the predicted value of the ESG disclosure score and use it rather than the ESG disclosure score in the regression examining the impact of the ESG disclosure score on firm value. We present the 2SLS regression results in Model (2) (Panel A of Table 2). The findings are consistent with our main prediction that the ESG disclosure level is positively and significantly associated with firm value (t -statistics = 6.667), suggesting that endogeneity does not drive our main findings.

Second, we follow Harjoto & Jo (2009) and use Heckman's (1979) two-stage estimation procedure to solve the potential endogeneity of ESG disclosure. First, we redefine the ESG disclosure score into a dummy variable (ESG_DUM) coded one for firm-level ESG disclosure in the top quartile of the distribution. In the first step, a probit model regression using ESG_DUM as the dependent variable is carried out. The explanatory variables in the first-stage probit regression include all the control variables from the baseline model (Table 2, Panel A, Model (1)), and industry and year dummy variables.⁶ The estimated parameters from the first-stage probit regression model are used to calculate the self-selection parameter LAMBDA (or inverse Mill's ratio), which is incorporated as an additional explanatory variable in the second-stage OLS estimation. Using Heckman's two-stage selection model, we correct the specification for endogeneity and test whether ESG disclosure enhances firm value. The second-stage regression (Table 2, Panel A, Model (3)) results suggest that the positive relationship between ESG disclosure and firm value is maintained (t-statistics = 6.889). The coefficient on LAMBDA is significant in the second-stage regression, implying that the firm characteristics making them choose to disclose more ESG-related information are significantly associated with firm value. Following the same procedure, we implement robustness tests for all our models. Although we fail to find the interaction term (ENV*CEO POWER) significant in the both Heckman and 2SLS models and (SOC*CEO POWER) significant in the 2SLS model when regressed on ROA, respectively, we find the remaining results to be consistent with our two main hypotheses.

7. Conclusion and limitations

We investigate in this paper whether superior ESG disclosure affects firm value by using a large sample of UK public firms from the Bloomberg database over the period 2004-2013. We document that the ESG disclosure level is positively associated with firm value, and find that the interaction between higher CEO power and ESG disclosure is positively related to firm value. This evidence is strong and consistent for three different measures of ESG-related disclosure,

⁶ We do not report the results in a table for space reasons (see Appendix A.1 for details).

i.e., the ESG, environmental, and social disclosure scores. Our results hold when we use two different financial measures, i.e., Tobin's Q and ROA, an IV approach, and the Heckman (1979) two-stage estimation approach.

Our findings suggest that ESG disclosures can enhance firm value through improved transparency and accountability, and enhanced stakeholder trust. In addition, the association between ESG disclosure level and firm value is more pronounced when CEO power is greater, indicating that shareholders treat ESG disclosure from firms with higher CEO power as associated with greater commitment to ESG practice. A variety of studies has suggested that the CEO is able to influence information and disclosure policy. These include Goldman & Slezak (2006), Singh (2006), and Axelson & Baliga (2009). Since disclosure quality reflects the executives' ability to appreciate the underlying competitive environment and effectively anticipate future outcomes, higher disclosure quality could signal their ability to enhance firm value (Hui & Matsunaga, 2015).

While we show that superior ESG disclosure may add firm value and that CEO power positively moderates the relationship between ESG disclosure level and firm value, we emphasize that our study is not free of limitations. First, although we identify CEO power as a positive moderator of the relationship, we believe there may be other moderators affecting this relationship, such as ownership structures, executive incentives, and product market competition, but they are not considered in this study. It would be interesting to explore them in future work. Second, our sample consists only of large UK public firms, due to data constraints, which impede the generalisation of our inferences. Future research could include small and medium-sized firms, which have different reputational costs to large firms.

Appendix A.1 Probit model results

This table shows the results from probit regressions with ESG_DUM as the dependent variable. ESG_DUM is an indicator variable that set to one for firm-level ESG disclosure in the top quantile of the distribution.

| Dependent variable | ESG_DUM |
|--------------------|------------------------|
| CAPEX | -0.133 (-0.526) |
| PPE | 0.070*** (3.560) |
| CASH | -0.198 (-0.405) |
| LNTA | 0.446*** (17.969) |
| LEVERAGE | -0.069 (-0.293) |
| GROWTH | -0.510*** (-3.779) |
| Constant | -4.910*** (-10.598) |
| Pseudo R-Squared | 0.290 |
| Industry dummy | Yes |
| Year dummy | Yes |

Z-statistics in parenthese *** p<0.01, ** p<0.05, * p<0.1.

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