# Three Essays on Environmental, Social, and Governance Transparency

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#### Abstract

#### Three Essays on Environmental, Social, and Governance Transparency

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This dissertation is comprised of three essays on determinants and consequences of Environmental, Social, and Governance (ESG) Transparency. Transparency refers to high quantity of material and value relevant information about ESG issues. In the first essay, we explore the relationship between our two variables of interest (i.e., audit quality and public media exposure) and ESG transparency on a sample of publicly listed Canadian firms in in the S&P/TSX Index of the Toronto Stock Exchange. Results show that audit quality and public media exposure are two main drivers of ESG transparency, hence, commitment to high quality audits and exposure to high public media coverage drive firms to be more transparent about ESG issues. Finally, as a consequence of ESG transparency, we find a negative association between ESG transparency and firm–level investment inefficiency.

The second essay examine whether the transparency of environmental and social (E&S) information affects financial analysts' forecast properties that reflect their information set. Focusing on a sample of non-financial and non-utility U.S. firms from the S&P 500 index, results suggest that the level of transparency vis-à-vis both E&S information is negatively related to analysts' forecast errors as well as forecast dispersion. These negative relationships become more pronounced for firms with low financial reporting quality, low media coverage, and for those with weak governance. Finally, we find that E&S transparency relates with investment efficiency

essentially via analysts` information environment, which thus acts as a mediating variable. This finding is consistent with financial analysts also playing a monitoring role in capital markets.

The third essay, we investigate how a firm's (E&S) transparency relates with its cash holdings. Focusing on a large sample of S&P 500 firms, results show that a higher level of E&S transparency implies lower firm-level cash holdings. The negative relationship is more pronounced for firms suffering from high information asymmetry, with low financial reporting quality, and for those with weak governance. Further analyses document that the two channels and mechanisms by which E&S transparency affect firm-level cash holdings are the cost of debt and financial constraints. Finally, our findings suggest that E&S transparency increases the market value relevance of an additional dollar in cash holdings.

Keywords: Corporate social responsibility (CSR), environmental transparency, social transparency, investment efficiency, cash holding, analysts' forecast error, analysts' forecast dispersion.

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#### **Chapter 1: Introduction**

In recent years, we observe a growing public demand for firms to pay more attention to ethical, social and environmental issues. This demand has motivated firms to undertake socially appropriate measures and create an alignment between corporate operations and social value (Cormier & Magnan, 2014). This significance originates from the fact that (a) firms face public demand and pressure from different stakeholders to increase their transparency regarding environmental, social and governance (ESG) issues, and (b) different stakeholders such as equity and debt investors as well as mainstream rating agencies take into considerations ESG transparency criteria in their decision making process (Cui, Jo, & Na, 2018; Matsumura, Prakash, & Vera-Munoz, 2014). According to a study presented by the CFA Institute1, more than 73% of investment professionals examine and take ESG information into account in their investment decision-making process. Based on a recent survey conducted by the United Nations, 88% of CEOs from more than 98 countries think that their dedication to ESG practices is reflected in tangible effects that are consistent with their firm's financial prosperity of their firms (Eliwa, Aboud, & Saleh, 2019).

From a theoretical point of view, both institutional theory and legitimacy theory are used to explain firms' motivations to ESG transparency commitment. The institutional theory's concentration on the association between the firm and stakeholders could be used to understand the usefulness of ESG transparency within the institutional field of economic governance (Brammer et al., 2012). Based on this theory, firms are impacted by both independent and governmental organizations that intend to supervise firm behavior. This monitoring influences the decision-making of companies regarding ESG transparency (Brammer et al., 2012; Jackson

<sup>&</sup>lt;sup>1</sup> <u>https://www.cfainstitute.org/-/media/documents/survey/esg-survey-report-2017.ashx</u>

&Apostolakou, 2010). Based on legitimacy theory, meeting societal expectations determines whether a corporation can survive, hence, ESG transparency can be used as a tool to convey a message to society, that the firm is aware of and engaged in meeting stakeholders' expectations. Bansal & Clelland (2004) show that firms not enjoying good legitimacy are more proactive to mitigate this perception through increased CSR commitment. Consistently, ESG transparency can be deployed by firms to gain more legitimacy.

As we see the importance of ESG matte, it becomes crucial for us to understand what are the determinates and consequences of firms' transparency about ESG issues. A major challenge is the measurement of a firm's transparency as it encompasses several sources of information about its ESG practices and their effects. MCSI and Thomson Reuters Asset4 attempt to estimate and report firms' ESG performance, but only Bloomberg tries to measure and report E&S transparency (Bloomberg, 2013). In this context, transparency refers to the high quantity of relevant and valuable information about ESG practices including both aspects of ESG performance and ESG disclosures (Bloomberg, 2013; Yu et al., 2018). In addition, Bloomberg ESG transparency ratings capture both hard information (i.e., quantifiable information) and soft information (e.g., E&S policies) (Bloomberg, 2013; Yu et al., 2018).

In this domain, the first essay aims to introduce two novel determinants of ESG transparency, namely, audit quality and public media exposure. The quality of the audit determines the degree of reliance that financial statement users have on audit opinions. High-quality auditors have both the motivation and capability to increase pressure on management, not only to comply with GAAP but also to be cautious and shun the risk of misstatement altogether (DeFond & Zhang, 2014). High quality auditors enjoy good reputations, however, they also pay greater costs (e.g. high litigation costs and reputational damage) if failures in the auditing process arise (Bedard

et al., 2010), thereby, motivating auditors to intensify their audit efforts and diminish the risk of audit failure.

Prior literature indicates that high-quality audits are associated with more transparent and reliable financial statements (Myers et al., 2003), less earning management and lower discretionary accruals (Becker et al., 1998), higher analyst ranking of financial disclosure quality (Dunn and Mayhew, 2004), lower risk of restatements (Chin & Chi, 2009) and higher reputation capital of the board of directors (Fredriksson et al., 2018). As a result, ceteris paribus, we can infer that audit quality helps mitigate the level of information asymmetry between managers and other stakeholders.

We propose that commitment to high-quality audits is a mechanism that boosts the reliability of ESG information and renders those information to be more informative to stakeholders. Therefore, we show that the reliability of CSR information is reflected in higher ESG transparency. We rely on two commonly used proxies for audit quality: \_ audit fees (Caramanis & Lennox, 2008); and \_ absolute discretionary accruals as proposed by DeFond & Park (2001). Our results show a positive (negative) association between audit fees (absolute discretionary accruals) and ESG transparency, indicating increased ESG transparency with higher audit quality. Our results are robust to using auditors' industry specialization as an alternate measure of audit quality (Sun & Liu, 2011).

Regarding the public media exposure, we argue that in the face of high media exposure, as media coverage can assist firms in communicating their ESG practices to different stakeholders, firms are more likely to improve their ESG transparency in an attempt to be perceived as more trustworthy and to preserve/improve their legitimacy and reputation, as described by the legitimacy theory. We use the number of news reports published about each firm in the Dow Jones FACTIVA database as a measure of public media exposure. Our findings confirm our prediction by showing a significant positive association between public media exposure and ESG transparency.

Finally, as a consequence of ESG transparency, we hypothesize a positive association between ESG transparency and firm investment efficiency. We argue that mitigating information asymmetry between firms and other stakeholders helps promote investment efficiency, and we believe ESG transparency acts in such a manner. We measure investment efficiency as the variation from normal investment levels, based on the methods used in previous studies (Biddle et al., 2009; Chen et al., 2011; Chen et al., 2017). As predicted, our results indicate that ESG transparency is positively (negatively) associated with investment efficiency (inefficiency) in our sample, displaying improved firm resource allocation with increased ESG disclosure. Our findings are robust to using a different measure of investment efficiency (capital expenditure ratio) and a different estimation method (truncated regression).

As we explained, in the first essay, we take look at CSR practices as a bundle of three dimensions of environmental, social and governance matters. In the second and third essay. We focus on each dimension of environmental and social transparency to understand the individual roles of these dimensions.

In the second essay, we focus on a sample of non-financial and non-utility U.S. firms from the S&P 500 index between 2012 and 2018. We examine the relationships between our variables of interest (i.e., social transparency, and environmental transparency) with financial analysts' earnings forecast properties. In that capacity, analysts take on an important information intermediary role for capital market participants (Stuerke, 2005).

We concentrate on two properties of analysts' forecast estimates that are deemed to reflect their information environment (Ali et al., 2019, He et al., 2019, Mattei & Platikanova, 2017, Wei

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& Xue, 2015): (1) analyst forecast error (also called analyst forecast accuracy), and (2) analyst forecast dispersion. Previous research shows that financial analysts consider not only financial information in their forecasting activities but also non-financial information. Such non-financial information is diverse and encompasses management commentary information (Aerts & Tarca, 2014), product-related and business expansion information (He et al., 2019, Nichols and Wieland, 2009), corporate environmental policies (Aerts et al., 2008), customer relationships (Ngobo et al., 2012), intellectual capital (Hsu & Chang, 2011), segment reporting level (Heo & Doo, 2018), and product market threats (Mattei & Platikanova, 2017)..

Our argument that enhanced environmental and social (E&S) transparency translates into less information asymmetry and agency problems, as captured by analyst forecast properties, rests on two complementary conceptual perspectives. On one hand, according to information economics and voluntary disclosure theory, E&S transparency provides material and value relevant incremental information that helps firms overcome agency and information asymmetry problems (Eccles et al., 2011, Hinze & Sump, 2019). On the other hand, consistent with stakeholder theory (Freeman, 1984), we expect E&S transparency to contribute to the enhancement of firm values through accrued reputation capital and the building up of a competitive advantage reflective of its social and environmental engagement (Yu et al., 2018). Our results suggest that both E&S transparency are negatively related to financial analysts' forecast error and dispersion. In other words, greater transparency implies less error and dispersion in analyst forecasts.

We also find that the relationship between each E&S transparency and analysts' forecast error and dispersion is more pronounced for firms (a) with weak governance (measured by Bloomberg's governance score), (b) with low levels of financial reporting quality (measured by the DeFond & Park, (2001) model), and (c) with low levels of media coverage (based on the number of news reports published in the FACTIVA database). These findings suggest that each E&S transparency role as an external monitoring mechanism is strengthened when other monitoring mechanisms such as media coverage, financial reporting quality, and governance are not as strong, implying a substitutional role.

In additional analyses, we explore further the influence of E&S transparency on information asymmetry and agency problems by investigating the individual impact of E (S) transparency on firm-level investment efficiency. If we believe that E&S transparency can mitigate information asymmetry issue and help provide a richer and more transparent information environment, then this information asymmetry reduction will be tangible and observable in the context of firm-level investment efficiency as well. In this context, our results suggest that both E&S transparency are positively and significantly related to firm-level investment efficiency (measured by Biddle et al (2009) proposed model) and they are both negatively and significantly related to both firm-level over-investment and under-investment inefficiencies. These results are robust to alternative specifications. However, we find that E&S transparency relates with investment efficiency essentially via the analysts` information environment, which thus acts as a mediating variable. This finding is consistent with financial analysts also playing a monitoring role in capital markets.

In the third essay, we explore how a firm's E&S transparency relates with its cash holdings. US firms have considerably increased their cash (i.e., cash and marketable securities) holdings over the last 40 years. As of 2018, corporate cash holdings by the largest U.S. firms were estimated to be around \$1.7 trillion, which is an economically significant amount. Such large cash holdings do carry a fairly high opportunity cost (e.g., low rate of return and double taxation issues), but also exacerbate the managerial agency problem as cash can be redirected far more easily into

personal welfare and pet projects by firm managers as compared to other assets (Bates, Kahle, & Stulz, 2009; Shin, Kim, Shin, & Lee, 2018). Hence, because of corporate cash holdings' economic significance and its related agency and opportunity costs, it appears to us that it is pivotal to investigate what drivers and conditions influence the mitigation/exacerbation of firm-level cash holding.

Our argument that enhanced E&S transparency translates into less information asymmetry and agency problems, as captured by firm's lower propensity to hold cash, rests on two primary arguments. First, based on information economics and in line with voluntary disclosure theory (Hinze & Sump, 2019),, we believe that E&S transparency provides an informational perspective on the material, value relevant, and incremental current and future costs and benefits a firm will face because of its activities. As such, it alleviates information asymmetry and agency cost problems, thus improving the effective monitoring to which managers are subjected and constraining their opportunistic behavior in the use of cash resources. As a result, equity and debt investors are able to assign higher trust and credibility to transparent firms, and grant them external financing at a lower cost and in an easier manner (Cormier, Aerts, Ledoux, & Magnan, 2009). Hence, it is expected that a transparent firm will exhibit less need to hold cash.

Second, based on a cost-benefit point of view, we believe that E&S transparency leads firms to hold less cash. Firms benefit from cash hoarding to decrease the probability of financial distress and to avail themselves of positive NPV investment opportunities. In this context, there are evidence in literature suggesting that a more extensive CSR orientation can help firms to have lower cost of equity (Dhaliwal, Li, Tsang, & Yang, 2014), cash flow volatility (Han & Qiu, 2007), risky cash flow (Opler, Pinkowitz, Stulz, & Williamson, 1999, bankruptcy risk (W. Sun & Cui, 2014), and litigation risk (Hong & Kacperczyk, 2009). Consistently, we expect firms with greater E&S transparency to be less exposed to default risk, aggregate shocks, and financial distress because of the insurance-like protection of transparency (Yu et al., 2018). Hence, such transparent firms need not hold cash to buffer against adverse shocks.

Our results suggest that the two components of E&S transparency are each individually and negatively related to firm-level cash holding. We also find that the relationship between each E&S transparency and firm-level cash holding is more pronounced for firms (a) exposed to high information asymmetry (measured by the dispersion of financial analysts' earnings forecasts) (b) with weak corporate governance (measured by Bloomberg's governance quality score), (c) with low levels of financial reporting quality (measured by the DeFond & Park, (2001) model). These findings indicate that the role of E&S transparency as an external monitoring mechanism is strengthened when other monitoring mechanisms such as financial reporting quality and governance quality are not as strong, implying a substitution role.

Further analyses document that the two channels and mechanisms by which E&S transparency affect firm-level cash holdings are the cost of debt and financial constraints. Findings suggest that higher E&S transparency can help firms to enjoy lower cost of debt and to be less financially constrained, enabling firms to obtain external financing more easily and at a lower cost, thus less need to hoard cash.

Finally, we look at the cash holding problem from investors' perspective, i.e., how investors expect cash to be used. Thus, we investigate the relationship between E&S transparency and the marginal value of cash holding. If E&S transparency plays a monitoring role, we can expect that these supervisory mechanisms mitigate information asymmetry and agency conflict problems that translate into the potential misuse of cash holdings and the related destruction of cash value. In contrast, in a context of E&S transparency, we expect that investors will assign greater value to

a firm's cash holding. Our findings suggest that each E&S transparency increases the market value of an additional dollar in cash holding.

Chapter 2. Audit Quality, Media Coverage, Environmental, Social, and Governance Disclosure and Firm Investment Efficiency: Evidence from Canada

#### Audit Quality, Media Coverage, Environmental, Social, and Governance Disclosure and

#### Firm Investment Efficiency: Evidence from Canada

#### Abstract

**Purpose**– The purpose of this study is twofold: (1) to introduce two determinants of environmental, social and governance (ESG) disclosure transparency, namely, audit quality and public media exposure; and (2) to investigate the impact of ESG transparency on firm-level investment efficiency.

**Design/methodology/approach**– Ordinary least square (OLS) regressions are applied to explore the relationship between the two variables of interest (audit quality and public media exposure) and ESG transparency on a sample of publicly listed Canadian firms during the period 2008 to 2017. Then, an econometric model is used to investigate the association between ESG transparency and investment efficiency under two identified scenarios, under-investment and over-investment. **Findings**– Results show that audit quality and public media exposure are two main drivers of ESG transparency, hence, commitment to high quality audits and exposure to high public media coverage drive firms to disclose more extensive and transparent ESG information. We also find a negative association between ESG transparency and firm–level investment inefficiency. Thus, ESG transparency generates influential incremental information that helps mitigate the information asymmetry between firms and stakeholders while fostering better resource allocation through investment efficiency.

**Originality/value**– This study contributes to the corporate social responsibility (CSR) and ESG literature (1) by identifying audit quality and public media exposure as two determinants of ESG

transparency; and (2) by noting that higher ESG transparency has a significant economic effect on capital investment decisions through higher firm-level investment efficiency.

**Keywords**: Environmental, social and governance disclosure, audit quality, public media exposure, investment efficiency, corporate social responsibility

Paper type: Research paper

#### **2.1 Introduction**

In recent years, there has been a growing public demand for firms to pay more attention to ethical, social and environmental issues. This demand has motivated firms to undertake socially appropriate measures and create an alignment between corporate operations and social value (Cormier & Magnan, 2014). In addition, this public demand has pressured firms to create a desirable corporate social responsibility (CSR) image in society, and to disclose more information about environmental, social, and governance (ESG) issues as these matters are of high importance to stakeholders (Ioannou & Serafeim, 2012). Cormier and Magnan (2014) note that firms are responding to those pressures, where, an increasing number of Canadian companies are inclined to incorporate ESG as part of their core mandates in response to both investors' demands for more ESG-related disclosures, and to investors' consideration for these issues in their investment decision process. Prior ESG literature has primarily concentrated on ESG performance (Benlemlih & Bitar, 2018; Chih, Shen, & Kang, 2008; De Bakker, Groenewegen, & Den Hond, 2005; Waddock & Graves, 1997), yet there is little research that focuses on (a) how audit quality and public media impact ESG transparency, and (b) how ESG transparency is associated with investment efficiency. This is the gap that we intend to fill in our study.

Based on a sample of 151 companies listed in the S&P/TSX Index of the Toronto Stock Exchange over the period of 2008 to 2017, this paper explores (1) whether audit quality and public media exposure act as determinants of ESG transparency; and (2) whether ESG transparency is associated with investment efficiency. Following prior literature (e.g. Eccles, Serafeim, & Krzus, 2011), we rely on Bloomberg's ESG score as a measure of ESG disclosure and transparency. This score ranges from 0 to 100 and indicates the quantity and transparency of information disclosed by firms. Further details of Bloomberg's ESG score are provided in the research design section.

Based on prior literature (e.g. Atkins, 2006; Hemingway & Maclagan, 2004), we propose that commitment to high quality audits is a mechanism<sup>2</sup> that boosts the reliability of CSR reports and renders those reports more informative to investors. Therefore, we believe that the reliability of CSR reporting is reflected in higher ESG transparency. We rely on two commonly used proxies for audit quality, (a) audit fees (Caramanis and Lennox, 2008) and (b) absolute discretionary accruals as proposed by (M. L. DeFond & Park, 2001). Our results show a positive (negative) association between audit fee (absolute discretionary accruals) and ESG transparency, indicating increased ESG transparency with higher audit quality. Our results are robust to utilizing auditors' industry specialization as an alternate measure of audit quality (Sun & Liu, 2011).

With respect to public media exposure, we argue that, in the face of high media exposure, as media coverage can assist firms in communicating their ESG activities to different stakeholders, firms are more likely to improve the quantity and transparency of ESG disclosures in an attempt to be perceived as more trustworthy and to preserve/improve their legitimacy and reputation, as described by the legitimacy theory. We use the number of news reports published about each firm in the Dow Jones FACTIVA database as a measure of public media exposure. Our findings confirm

<sup>&</sup>lt;sup>2</sup> Commitment to voluntary ESG transparency is used as a mechanism by manager to share private information about the company's current and future status to various stakeholders. We argue that committing to high audit quality helps the managers to convey the authenticity and trustworthiness of their ESG transparency to different stakeholders (including Bloomberg analysts). In other words, managers can transfer truthfulness of their commitment ESG matters when they allocate more resources such as paying higher audit fees or using industry specialist auditors to achieve high audit quality.

our prediction by showing a significant positive association between public media exposure and ESG transparency.

Finally, with respect to investment efficiency, we hypothesize a positive association between ESG transparency and firm investment efficiency. We argue that mitigating information asymmetry between firms and other stakeholders helps promote investment efficiency, and we believe ESG transparency acts in such a manner. We measure investment efficiency as the variation from normal investment levels, based on the methods used in previous studies (Biddle, Hilary, & Verdi, 2009; R. Chen, El Ghoul, Guedhami, & Wang, 2017; S. Chen, Sun, Tang, & Wu, 2011). As predicted, our results indicate that ESG transparency is positively (negatively) associated with investment efficiency (inefficiency) in our sample, displaying improved firm resource allocation with increased ESG disclosure. Our findings are robust to utilizing a different measure of investment efficiency (capital expenditure ratio) and a different estimation method (truncated regression).

Our paper offers several contributions. First, our paper extends the literature that focuses on the determinants of firm's ESG transparency (Cucari, Esposito De Falco, & Orlando, 2018; Manita, Bruna, Dang, & Houanti, 2018; Yu, Guo, & Luu, 2018) by identifying two additional determinants to ESG transparency. Second, by highlighting the role of audit quality as an important determinant of ESG transparency across a sample of Canadian firms, we contribute to the literature that relates to CSR in Canada (e.g. Cormier & Magnan, 2014; Thorne, Mahoney, Gregory, & Convery, 2017) and to the literature that seeks to understand the relationship between audit quality and CSR (e.g. LópezPuertas-Lamy, Desender, & Epure, 2017). To the best of our knowledge, this study is the first one to employ Bloomberg's ESG score in the Canadian context to explore the link between audit quality/media coverage and the ESG side of CSR disclosure. In our opinion, understanding the impact that audit quality has on Canadian firms' ESG transparency is important, as ESG information enhances transparency, improves stakeholders' capabilities of evaluating the nonfinancial dimensions of firms' performance, and more importantly, the market pays a premium to invest in companies with ESG initiatives (Czerwińska & Kaźmierkiewicz, 2015).

Third, our study extends the literature investigating the association between media exposure and CSR disclosure (e.g. Aerts & Cormier, 2009) by showing that increased media exposure is linked to higher ESG transparency, hence, providing insight into firms' ESG reporting when underneath the spotlight. Fourth, our work contributes to the corporate disclosure literature (Eccles, Ioannou, & Serafeim, 2014; Eccles et al., 2011) and to the investment efficiency literature (e.g. Lai, Liu, & Wang, 2014; Lara, Osma, & Penalva, 2016) by examining the relation between ESG transparency and real investment decisions and noting that . Our findings suggest that the high levels of ESG transparency have significant economic effects on capital investment decisions (reflected through higher firm-level investment efficiency), which may be due to the improved visibility (reduced information asymmetry) that stakeholders enjoy with better ESG transparency.

The remainder of the paper is structured as follows. Section 2 presents a review of literature and develops our hypotheses. Section 3 presents our data and sample selection along with our research design. Section 4 reports the empirical results. Section 5 presents the robustness test and section 6 concludes.

#### 2.2 Literature review and hypotheses development

#### 2.2.1 Evolution of Corporate ESG disclosure

The role played by companies in society is changing. Emphasis and pressure are mounting on firms to be more cautious about social, environmental, and ethical issues. People expect firms to align corporate operational goals with environmental, social and ethical values (Reverte, 2009), this is also true for regulatory bodies and market participants; for instance, Ioannou & Serafeim (2012) state that "growing numbers of regulators globally are reviewing the government arrangements of corporation to ensure that corporate practices are aligned with broader societal interests". Hence, pressures are rising for firms to disclose more information about ESG issues. In this context, Solomon & Solomon (2006) illustrate that in recent years, analysts and institutional investors have become more interested in firms' CSR reports. According to a survey done by CFA Institute, almost 75% of investment professionals incorporate companies' ESG reports into their investment decisions (CFA Institute, 2017). Moreover, a report by the Governance & Accountability Institute shows that the percentage of S&P 1500 firms presenting sustainability reports increased significantly from less than 20% in 2011 to 85% in 2017 (Governance & Accountability Institute, 2018).

From a theoretical point of view, both institutional theory and legitimacy theory have been utilized to explain firms' motivations to present ESG disclosures. The institutional theory's concentration on the association between the firm and stakeholders could be used to understand the usefulness of ESG within the institutional field of economic governance (Brammer, Jackson, & Matten, 2012). Based on this theory, firms are impacted by both independent and governmental organizations that intend to supervise firm behavior. This monitoring influences the decision making of companies regarding ESG disclosure (Brammer et al., 2012; Jackson & Apostolakou, 2010). In this context, based on institutional theory, since firms are influenced by the two monitoring mechanisms of audit quality and public media exposure, hence, these mechanisms can impact the decision-making process of companies regarding ESG disclosure transparency.

The legitimacy theory addresses the significance of societal admission in assuring firms' continuity (Suchman, 1995). According to Suchman (1995), legitimacy is explained as "a

generalized perception or assumption that the actions of any entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs and definitions". Based on this theory, meeting societal expectations determines whether a corporation can survive or not, hence, ESG disclosure can be used as a tool to convey a message to society, that the firm is aware of and engaged in meeting stakeholders' expectations. Bansal & Clelland (2004) show that firms not enjoying good legitimacy are more proactive to mitigate this perception through increased CSR disclosures. In this context, ESG transparency can be deployed by firms to gain more legitimacy. It is important to note that the legitimacy theory and institutional theory are not mutually exclusive. The existing overlap between these theories can be beneficial in understanding firms' motivations to be attentive of ESG issues (Reast, Maon, Lindgreen, & Vanhamme, 2013). Finally, the other theory used in literature to explain the motivation of firms to provide transparent ESG disclosures is the stakeholder theory (Manita et al., 2018). Based on the stakeholder theory (Freeman, 1984), firms should be in charge toward both the primary stakeholders and secondary stakeholders, and must deal with them effectively. In addition, this theory suggests that the ultimate objective of each corporation is to illustrate that they respond properly to the demands and expectations of different stakeholders. In this context, based on the assumption of this theory, transparent ESG disclosure is deployed as a mechanism to supply and present information for different stakeholders such as shareholders, customers, employees, social communities, local authorities, etc. (Manita et al., 2018). In other words, transparent ESG disclosure is used as a tool to meet the various expectations and information demands of the different stakeholders (Manita et al., 2018).

Although, there are many rating agencies such as MCSI, Bloomberg and Thomson Reuters Asset4 that try to assess firms' performance from the perspectives of environmental (e.g. carbon emissions), social (e.g. human rights) and governance data (e.g. shareholders' rights), the studies that examine firms' ESG transparency are scarce (ESG transparency is an indicator of the quantity and quality of ESG disclosure – (Yu et al., 2018). Yu et al. (2018) use Bloomberg's ESG score to evaluate the impact of ESG transparency on firm value. They note that higher levels of ESG transparency augment firm value. In other work, Cucari et al. (2018) investigate the impact of board characteristics (such as gender diversity, existence of a CSR committee, board age, and percentage of independent directors) on ESG transparency. They show that a company's ESG transparency is positively related to the percentage of independent directors and the existence of a CSR committee in the firm. They do not find significant results for gender diversity (presence of women on board) and the age of the board. Prior literature also notes that ESG transparency helps firms create legitimacy and reputations for themselves (Eccles et al., 2014). In this context, it has been shown that ESG transparency is associated with a lower cost of capital (Galbreath, 2013), fewer capital constraints (Cheng, Ioannou, & Serafeim, 2014) and a lower probability of bankruptcy (Fisch, 2018).

In Canada, according to CPA Canada (2010), the majority of ESG disclosures have been provided in voluntary reports, rather than in regulatory filings. CPA Canada also notes that although ESG disclosures are not mainly mandatory, institutional investors are incorporating ESG factors into their investment decision making (CPA Canada, 2010). These investors are also asking for corporate disclosures that exceed what is currently provided in financial reporting, which has led international and domestic organizations (e.g. the Ontario Securities Commission – OSC) to work on improving corporate ESG disclosures (CPA Canada, 2010). In fact, the OSC recognized in its statement of priorities in 2018 "the growing financial relevance to investors of ESG factors

and the need for ESG disclosure by companies"<sup>3</sup>; it also stated "it would continue to monitor developments in respect of ESG practices to assess whether additional or new forms of disclosure are required"<sup>4</sup>. Therefore, due to increased investor interest in ESG, along with the regulators' interests in the compilation and assessment of information on international ESG standards, it is crucial to gain an understanding of the determinants of ESG disclosure transparency.

#### 2.2.2 Audit quality and ESG transparency

According to the Public Company Accounting Oversight Board (PCAOB) "Auditing regulations mandate auditors to arrange and conduct audits to achieve acceptable assurance about whether the financial statements are free of material misstatements and to state an opinion about the fair presentation of the financial statements"<sup>5</sup>. In this context, the quality of the audit determines the degree of reliance that financial statement users have on audit opinions. High quality auditors have both the motivation and capability to increase pressure on management, not only to comply with GAAP, but also to be cautious and shun the risk of misstatement altogether (M. DeFond & Zhang, 2014). High quality auditors enjoy good reputations, however, they also pay greater costs (e.g. high litigation costs and reputational damage) if failures in the auditing process arise (Bedard, Johnstone, & Smith, 2010), thereby, motivating auditors to intensify their audit efforts and diminish the risk of audit failure. Another feature of high-quality auditors is that they are commonly large and are not dependent on a single client, consequently, they are independent and compelling when dealing with managers on revising any mismatches, misestimates and errors (Myers, Myers, & Omer, 2003).

<sup>&</sup>lt;sup>3</sup> https://www.osc.gov.on.ca/en/SecuritiesLaw\_sn\_20180705\_11-781\_rfc-sop-end-2019.htm

<sup>4</sup> https://www.osc.gov.on.ca/en/SecuritiesLaw\_sn\_20180705\_11-781\_rfc-sop-end-2019.htm

<sup>5</sup> https://pcaobus.org/Standards/Auditing/Pages/Auditing\_Standard\_14.aspx

Prior literature indicates that high-quality audits are associated with more transparent and reliable financial statements (Myers et al., 2003), less earning management and lower discretionary accruals (Becker, DeFond, Jiambalvo, & Subramanyam, 1998), higher analyst ranking of financial disclosure quality (Dunn & Mayhew, 2004), lower risk of restatements (Chin & Chi, 2009) and higher reputation capital of the board of directors (Fredriksson, Kiran, & Niemi, 2018). As a result, ceteris paribus, we can infer that audit quality helps mitigate the level of information asymmetry between managers and other stakeholders.

Prior literature shows that disclosure of non-financial information, such as ESG, can convey valuable information to different stakeholders (Clarkson, Fang, Li, & Richardson, 2013; Dhaliwal, Radhakrishnan, Tsang, & Yang, 2012). In line with this, a manager can use voluntary ESG disclosure as a mechanism to share private information about the company's current and future status to various stakeholders. To implement this mechanism, managers are in need of a credible and constructive signal that displays and improves their truthfulness and authenticity regarding ESG disclosures. In this context, we argue that committing to high audit quality helps managers convey the authenticity and trustworthiness of their ESG voluntary disclosure to different stakeholders. In other words, managers can transfer the truthfulness of their ESG disclosure when they allocate more resources such as paying higher audit fees or using industry specialist auditors to obtain high audit quality (Ball, Jayaraman, & Shivakumar, 2012; L. Chen, Srinidhi, Tsang, & Yu, 2016).

Researchers (e.g. Hemingway & Maclagan, 2004) have argued that committed firms need to be openly responsible for both their financial performance and ESG performance. Moreover, (Atkins, 2006) demonstrates that high quality financial reports that are audited by external auditors could be used by firms as a mechanism to illustrate social responsibility. Finally, as firms are bounded by social contracts, they strive to obtain legitimacy from different stakeholders through ESG disclosure, hence, a commitment to high quality audits helps firms create and preserve legitimacy in the eyes of different stakeholders. Therefore, considering that there is a huge overlap between the information systems that create financial reports and those that create ESG reports (Dunn & Mayhew, 2004), it could be expected that as high-quality audits improve financial reporting, they may also improve ESG reporting. We posit that audit quality can play a significant role in ESG transparency, where high quality audits could increase the reliability of CSR reports and render those reports more informative to investors. In similar vein, if audit quality and ESG transparency do not converge, investors may consider this a signal that managers are not providing authentic and truthful disclosures. We formulate the following hypothesis:

H1: Ceteris paribus, there is a positive association between the audit quality a firm receives and its ESG transparency.

#### 2.2.3 Public media exposure and ESG transparency

Legitimacy of a firm is evaluated constantly by different stakeholders such as customers, employees, investors and different members of society based on distinguished values, norms and predispositions, as well as, how they perceive that firm's activities. Studies show that media reports and coverage have an impact on firms and their behavior. For instance, public media exposure has been associated with firms' market values (Xu, Zeng, Zou, & Shi, 2016), corporate environmental and social disclosures (Brown & Deegan, 1998) and CSR disclosures (Aerts & Cormier, 2009). In other work, Comiran, Fedyk, & Ha (2018) show that high public media coverage can play the role of a watch dog that impedes real earning management at the time of seasoned equity offerings.

Yet, media coverage may be favorable or unfavorable. Given that ESG disclosures could be used by firms to boost legitimacy and reputation (Eccles et al., 2014), then when coverage is favorable, firms may be incentivized to provide more information in ESG disclosures to magnify the effects of ESG disclosures through the media. From another perspective, environmental and social disclosures could be applied as defensive mechanisms to assist firms in managing their legitimacy (Goosen-Botes & Samkin, 2013), hence, when media coverage is negative, firms may defensively increase their ESG disclosures. Given that media exposure can assist firms in communicating their ESG activities to different stakeholders, we argue that in the face of high media exposure, as media coverage can assist firms in communicating their ESG activities to different stakeholders, companies are likely to boost the quantity and quality of ESG disclosures (higher ESG transparency) to positively impact their legitimacy and public perception, as described by legitimacy theory. We formulate the following legitimacy-oriented hypothesis:

H2: Ceteris paribus, there is a positive association between the media exposure a firm receives and its ESG transparency.

Our argument related to H2 also has theoretical support from the media agenda setting theory that suggests that there is an association between the topic's degree of significance among community members and the relative importance of that topic in media (Ader, 1995; Brown & Deegan, 1998). Hence, with the increase in public demand for ESG related disclosures, we can also expect increased public media coverage. Consequently, firms respond to this growing demand by providing more transparent ESG disclosure. Nevertheless, public media coverage has the ability to impact stakeholders' perception regarding the significance of ESG issues. This shaping role of public media drives firms to disclose more transparent information about ESG issues to influence that perception. In line with this argument, in a seminal work, Brown & Deegan (1998) show that public media coverage can be influential, and they find that it can drive the public's concerns about firms' environmental performance. They also note that companies react to this pressure by raising

the extent of environmental disclosure. Based on this argument, we expect the transparency of ESG disclosure to have a positive association with the degree of media coverage. Our arguments and expectations regarding the association between public media coverage and ESG transparency have theoretical support from the literature and are in line with previous studies (S. F. Cahan, Chen, & Nguyen, 2015; Mullainathan & Shleifer, 2005).

#### 2.2.4 ESG transparency and investment efficiency

According to Modigliani & Miller (1958), investment opportunities are categorized based on net present value (NPV) as either profitable (NPV>0) or unprofitable (NPV<0), where the profitable ones are the main catalysts of firms' investments, are likely to receive external financing and should all be pursued until their marginal advantage become equivalent to their marginal costs. In this context, former research notes that market frictions may result in departures from the optimal level of firms' investments into either an underinvestment or an overinvestment (Lara et al., 2016). When managers decide to invest extravagantly by allocating the firms' resources into unprofitable projects with the incentive of appropriating some of the firm's resources, an overinvestment happens. On the other hand, underinvestment occurs when firms pull out of profitable projects because of financial restrictions and high costs of raising debt and equity (Lai et al., 2014).

Prior literature has identified information asymmetry and agency problems as the two main sources of market frictions that could lead to either over- or under-investments (Lara et al., 2016). The information asymmetry that exists between managers and external capital providers can cause adverse selection and moral hazard. Adverse selection problems imply that managers have access to private information. For example, if securities are overvalued, then managers may want to issue new overpriced securities. If successful, the managers might over-invest these proceeds (Biddle et al., 2009). However, investors may react logically by restricting their investments (i.e. restricting capital), causing an ex-post under-investment.

On the other hand, an agency problem and its subsequent moral hazard phenomenon occur when there is a divergence between the interests of shareholders and mangers and no monitoring exists. In this case, managers may try to maximize their personal wealth and disregard stakeholders' interests. As a result, managers may invest inefficiently in some unprofitable projects due to the deviation in principal-agent incentives (Biddle et al., 2009). Blanchard, Lopez-de-Silanes, & Shleifer (1994) empirically examine the agency problem and ratify that it is the primary driver of declines in investment efficiency.

The aforementioned arguments suggest that the existence of information asymmetry and principal-agent problems between firms and external capital providers leads to moral hazard and adverse selection problems, which may result in investment inefficiency (over- or underinvestment). In this context, factors that may attenuate agency problems and information asymmetry may also help enhance investment efficiency. Therefore, we propose that ESG transparency can play a significant role in attenuating information asymmetry, thereby resulting in higher firm investment efficiency. Previous studies show that firms with good quality and quantity CSR disclosures enjoy less agency conflicts and information asymmetry (Cho, Lee, & Pfeiffer Jr, 2013; Krüger, 2015). From a theoretical point of view, our argument regarding the association between a firm's ESG transparency and its investment efficiency is based on (a) the stakeholder theory – improved managerial performance due to stakeholders' considerations – (Freeman, 1984) and (b) the agency theory – reduction in information asymmetry – (Jensen & Meckling, 1976). Cornell & Shapiro (1987) argue that if firms cannot satisfy stakeholders' expectations, concern may arise in markets, resulting in undesirable consequences such as negative stock price movements and loss of profitable opportunities for the company. Since ESG disclosure has become a public demand, we expect managers to respond to this demand by disclosing transparent ESG reports.

In addition, Waddock & Graves (1997) argue that firms with high ESG performance and disclosure enjoy managers with appropriate managerial and strategic skills that could boost financial performance. Therefore, we expect ESG transparency to have a positive impact on investment efficiency as a considerable determinant of good financial performance. Previous research shows that non-financial information disclosure such as ESG disclosure helps to decrease information asymmetry and present a more precise image about company's situation and performance. For instance, Chih et al. (2008) show that earnings smoothing as a proxy for information asymmetry will be mitigated by good CSR performance and disclosure. Dhaliwal, Li, Tsang, & Yang (2011) note that firms with high ESG disclosure quality, release more financial and non-financial information than firms with low ESG disclosure quality. They deduce that ESG disclosure can play a substitution role for financial disclosure, particularly in terms of attenuating information asymmetry between firms and their non-financial stakeholders. Furthermore, Dhaliwal et al. (2012) show that CSR disclosure quality is associated with lower analyst forecast error, which is a proxy for information asymmetry. In similar work, Aerts, Cormier, & Magnan (2008) find that analysts' earnings forecasts precision (dispersion) is greater (smaller) for firms with higher level of environmental disclosures. Finally, with respect to the informative role of ESG disclosure, Sharfman & Fernando (2008) show that more transparent ESG disclosure is related to lower cost of capital for the firm. If ESG transparency results in information transparency (lower information asymmetry), then this should be reflected in firms' investment of efficiency. Therefore, we formulate the following hypotheses:

- H3a: Ceteris paribus, there is a positive association between a firm's ESG transparency and its investment efficiency.
- H3b. Ceteris paribus, there is a negative association between a firm's ESG transparency and its underinvestment problem.
- H3c. Ceteris paribus, there is a negative association between a firm's ESG transparency and its overinvestment problem.

#### 2.3 Research design

#### 2.3.1 Data and sample selection

The primary sample of this paper comprises 233 Canadian firms that made up the S&P/TSX Index of the Toronto Stock Exchange during the period 2008 to 2017, for a potential number of 2,330 firm-year observations. These companies constitute more than 90 percent of the Canadian stock market capitalization. Out of 233 companies, we omit financial firms (SIC codes 6000-6999; 429 firm year observations) and utility firms (SIC codes 4900-4999; 165 firm year observations) because of their different accounting practices and specific disclosure requirements. Finally, we also exclude firms with missing ESG, financial and media exposure data (594 firmyear observations), yielding a final sample of 1,142 firm-year observations (151 unique firms). Table 1 represents the sector and year breakdowns of our final sample. We extract, from the Bloomberg database, variables for ESG transparency and for financial and governance measures. The public media exposure data is obtained from the Dow Jones FACTIVA database. Finally, Audit quality data (Audit fees) are collected from Audit Analytics (SEDAR) from Wharton Research Data Services (WRDS). An important characteristic of the Canadian audit market is that a considerable proportion of the listed companies in S&P/TSX Index are audited by Big4 firms and only 3.1% of S&P/TSX Index companies are audited by non-Big4 companies. In our dataset,

all of our firms have been audited by one of the Big 4 firms throughout our sample period. We exclude outliers by winsorizing each continuous variable at the 1 and 99 percent levels of their distribution.

\*\*\* Table 1 Approximately Here \*\*\*

#### 2.3.2 Measurement of variables for testing Hypothesis 1 and 2

#### 2.3.2.1 Dependent variable

Following prior research (e.g. Yu et al. (2018)) our ESG transparency variable is extracted from Bloomberg's ESG disclosure score that is grounded on suggestions from the Global Reporting Initiative (GRI)<sup>6</sup>. Based on Bloomberg's explanation, ESG data is gathered from various sources such as companies' websites, annual reports, sustainability reports, third-party research and Bloomberg's independent survey that asks firms about their disclosure practices (Bloomberg, 2013; Xie, Nozawa, Yagi, Fujii, & Managi, 2019). According to Bloomberg (2013) and Eccles et al. (2011), this score is calculated based on a firm's ESG disclosure index by employing a set of data points gathered by the analysts of Bloomberg, examining the environmental, social and the governance dimensions. Weights are allocated to each data point based on their significance and materiality for the specific industry sector. Hence, we expect firms with higher ESG disclosure scores to have more transparent ESG disclosures. According to the procedure applied by the Bloomberg to measure the ESG score, we consider that this score is seen as the reflection of a firm's ESG disclosures that assists stakeholders to evaluate a firm's ESG disclosure transparency (Yu et al., 2018).

This score has been widely used to capture the level of disclosure transparency (e.g. Arayssi, Dah, & Jizi, 2016; Cucari et al., 2018; Jizi, 2017; Manita et al., 2018; Nollet, Filis, &

<sup>&</sup>lt;sup>6</sup> https://www.globalreporting.org/Pages/default.aspx

Mitrokostas, 2016; Siew, 2015; Xie et al., 2019; Yu et al., 2018). We normalize our ESG transparency proxy (*LNESG*) by taking a natural logarithm of it.

#### 2.3.2.2 Independent variables

To measure audit quality, we use two proxies. The first proxy is audit fees which has been widely used in the literature (e.g. Caramanis & Lennox, 2008; Frankel, Johnson, & Nelson, 2002; Hay, Knechel, & Wong, 2006). Audit fees as a proxy for audit quality has two noticeable features that makes it suitable for our study. First, it is a continuous variable that can capture fine differences in quality, not restricted to a limited subgroup of firms (M. DeFond & Zhang, 2014). Second, because of the competitive market that exists among auditing firms, fee premium catches client's inclination to pay for valuable services that are associated with higher quality financial statements authentication, internal controls testing, and mitigating the risk of misconduct such as fraudulent operation (M. DeFond & Zhang, 2014). We normalize our fee measure (LNAUDFEE), audit fees (in thousands of Canadian dollars) paid by the client company to the audit firm, by taking a natural logarithm of it. Our second proxy for audit quality is the absolute discretionary accruals proposed by (M. L. DeFond & Park, 2001). Discretionary accruals are commonly in the literature used as a proxy for audit quality (e.g. Gul, Fung, & Jaggi, 2009; Krishnan, Wen, & Zhao, 2011; Lennox & Li, 2012; Menon & Williams, 2004; Michas, 2011), since it is directly associated with the quality of financial reports which in its turn has a huge impact on audit quality. In addition, DeFond & Zhang (2014) show in their seminal work that discretionary accruals can be considered as a proxy for audit quality due to its effect on financial reporting quality. Since studies outside the US are restricted to smaller samples, they have often measured audit quality based on DeFond & Park, (2001) model rather than cross-sectional models (e.g. Jones (1991)) that require an adequate number of industry-level observations to estimate abnormal accruals (Ittonen, Johnstone,

& Myllymäki, 2015; Zerni, Haapamäki, Järvinen, & Niemi, 2012). Abnormal working capital accruals are modeled as follows:

$$abwca_{i,t} = wca_{it} - \left[\left(\frac{wca_{i,t-1}}{Sales_{i,t-1}}\right) \times Sales_{i,t}\right]$$
(1)

In equation (1), *abwca* represents the abnormal part of working capital accruals and is measured as actual working capital accruals (*wca<sub>it</sub>*) minus expected working capital accruals ( $\left[\left(\frac{wca_{i,t-1}}{sales_{i,t-1}}\right) \times Sales_{i,t}\right]$ ). *wca<sub>i,t</sub>* for firm *i* in time *t* is computed as the difference between current assets (minus cash and cash equivalents) and current liabilities (minus short term debt). We scale *abwca<sub>i,t</sub>*, by lagged total asset for firm *i*. *Sales<sub>i,t</sub>* denotes the sales amount of firm *i* in time *t*. To capture both income-increasing and income-decreasing accruals, the absolute value of *abwca<sub>i,t</sub>* is used as the proxy of audit quality. Higher amounts of */abwca<sub>i,t</sub>* represents lower audit quality for the firm *i* in year *t*.

To test hypothesis 2, we use the number of news reports published about each firm that is available in the Dow Jones FACTIVA database during the period 2008 to 2017. The Factiva database is global in its coverage, including more than 8,000 worldwide publications from major media sources (e.g. The Wall Street Journal, The Guardian, Far Eastern Economic Review, Shanghai Daily, etc.). Factiva has been widely used in literature exploring media exposure (e.g. ( Cahan, Cahan, Lee, & Nguyen, 2017; Hooghiemstra, Kuang, & Qin, 2015; Qi, Yang, & Tian, 2014). Following previous research (Zhang, Tong, Su, & Cui, 2015), we obtain media coverage data through a keyword search for firms' names in the Dow Jones FACTIVA database, and manually collect the number of news articles about a firm in each fiscal year. To make our analysis more robust and consistent with the literature (e.g. Chahine, Mansi, & Mazboudi, 2015), we
exclude news reports that do not include any informative content. Finally, we normalize our proxy (*LNFACTIVA*), the number of news reports on companies, by taking a natural logarithm of it (Comiran et al., 2018).

2.3.2.3 Model specification and estimation method for hypotheses 1 and 2

To estimate the impact of audit quality and public media disclosure on ESG transparency, we estimate the following model by the use of an OLS estimator:

$$LNESG_{i,t} = \beta_0 + \beta_1 AuditQuality_{i,t-1} + \beta_2 LNFACTIVA_{i,t-1} + \beta_3 LNSIZE_{i,t-1} + \beta_4 ROA_{i,t-1} + \beta_5 LEV_{i,t-1} + \beta_6 CurrentRatio_{i,t-1} + +\beta_7 Indep_{i,t-1} + \beta_8 LNBoardSize_{i,t-1} + \beta_9 CEOduality_{i,t-1} + \beta_{10} female_{i,t-1} + \beta_{11} LOSS_{i,t-1} + (2) \beta_{12} CashFlow_{i,t-1} + \beta_{13} GFC + \sum \beta_k Industry dummies + \sum \beta_j Year dummies + \varepsilon_{i,t}$$

Where *LNESG* denotes to natural logarithm of the ESG score, *AuditQuality* is proxied by two different variables (a) audit fees (*LNAUDFEE*), and (b) absolute discretionary accruals (*/abwca/*). *LNFACTIVA* is the natural logarithm of number of news reports; *LNSIZE* represents the firm size, calculated as the natural logarithm of average market capitalization (in millions of Canadian dollars); *ROA* is the ratio of earnings before interests to total assets; *LEV* controls for financial leverage and is defined as the debt to total asset ratio; *CurrentRatio* represents the ratio of current assets to current liabilities; *Indep* is the proportion of independent directors, who are neither current nor previous managers of the firm; *LNBoardSize* is the natural logarithm of the number of directors sitting on each firm's board as of the annual general meeting date in the given year; *CEOduality* is a dummy variable that takes a value of 1 if the CEO of the firm is also a member of the board, zero otherwise; *female* represents the percentage of female directors on the

firm's board; *LOSS* is a dummy variable that takes the value of one if net income before extraordinary items is negative, and zero otherwise; and *CashFlow* is the ratio operating cash flow to total assets. Based on prior literature (e.g. Cucari et al., 2018), these control variables represent factors that may impact ESG transparency. In addition, regarding the explanatory variables of equation (2), prior research (Cucari et al., 2018), document a positive relationship between corporate governance characteristics and ESG transparency.

As internal corporate governance mechanisms help mitigate information asymmetry problems, we predict a positive (negative) sign for Indep and LNBoardSize, (CEOduality). Following Kassinis, Panayiotou, Dimou, & Katsifaraki (2016), we predict a positive association between the percentage of women on the board (female) and ESG transparency. Furthermore, we predict a positive (negative) association between ESG transparency and LNSIZE, ROA, *CurrentRatio* and *CashFlow* (LOSS) as documented in the literature (Cucari et al., 2018; Reverte, 2009; Yu et al., 2018). Finally, we predict a positive sign for LEV since risk can be applied to measure visibility to investors. In this context, debt holders and creditors play a monitoring role and pressure the firm for more ESG disclosure (Fernandez-Feijoo, Romero, & Ruiz, 2014). To correct for the concurrent endogeneity problem, we lag AuditQuality, LNFACTIVA and control variables by one period (Ahmed & Duellman, 2013). We also incorporate year and industry (based on two-digit SIC code) fixed effects in our models. To capture the effect of global financial crisis in 2008 in our models, we report the coefficient of year-fixed effect dummy variable of 2008 separately as GFC variable that takes value 1 for year 2008, zero otherwise. The model is estimated with t-statistics clustered at the firm level and robust to both heteroscedasticity and within-firm serial correlation (Liu, Wei, & Xie, 2014). We also consider the likelihood that the determination of ESG transparency and each of media coverage, and audit quality variables are nearly

intertwined. Therefore, we evaluate whether or not endogeneity exists between the variables using the Hausman test<sup>7</sup> (Hausman, 1978). According to this test, the null hypothesis of no endogeneity is not rejected with respect to ESG transparency and each of audit quality proxies, and with respect to ESG transparency and each of audit quality proxies, and with respect to ESG transparency and each of audit quality proxies, and with respect to ESG transparency and each of audit quality proxies, and with respect to ESG transparency and each of audit quality proxies, and with respect to ESG transparency and each of audit quality proxies, and with respect to ESG transparency and each of audit quality proxies, and with respect to ESG transparency and each of audit quality proxies, and with respect to ESG transparency and media coverage as the related p-values are not statistically significant<sup>8</sup>. Therefore, the use of OLS estimator is appropriate for our setting.

2.3.2.4 Model specification and estimation method for H3a, H3b and H3c

To test the impact of ESG transparency on investment efficiency, we rely on former studies (Biddle et al., 2009; R. Chen et al., 2017; S. Chen et al., 2011) and estimate the following model by the use of an OLS estimator:

$$Invef_{i,t} = \beta_0 + \beta_1 LNESG_{i,t-1} + \beta_2 LNSIZE_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 LEV_{i,t-1} + \beta_5 CurrentRatio_{i,t-1} + \beta_6 tobin_{i,t-1} + \beta_7 Indep_{i,t-1} + \beta_8 LNBoardSize_{i,t-1} + \beta_9 CEOduality_{i,t-1} + \beta_{10} female_{i,t-1} + \beta_{11} LOSS_{i,t-1} + \beta_{12} CashFlow_{i,t-1} + \beta_{13} GFC + \sum \beta_k Industry dummies + \sum \beta_i Year dummies + \varepsilon_{i,t}$$
(3)

*Invef* is the firm's investment efficiency and *tobin* is the firm's Tobin's Q; the remaining variables are defined above. To measure *Invef*, we follow Biddle et al. (2009) where *Invef* is computed as the absolute value of the residuals from the following model:

 $<sup>^{7}</sup>$  The rationale behind the Hausman test is that it helps to decide whether it is necessary to use an instrumental variable approach instead of OLS, i.e., whether a set of estimates obtained by least squares is consistent or not. In this line, we use audit quality (or media coverage) as dependent variable and use all the control variables in Equation 2 as the independent variables and we compute residuals of this regression. In the next stage, we put these residuals as independent variable in the main regression (Equation 2) and if the coefficient of these residuals is not significant, we can conclude that the use of OLS estimator is appropriate for our setting (Hausman, 1978).

<sup>&</sup>lt;sup>8</sup> ESG transparency and audit fee (t= .67, p-value > .49);

ESG transparency and discretionary accruals (t= .48, p-value > .63); and

ESG transparency and media coverage (t= 1.16, p-value > .24)

$$Inv_{i,t} = \beta_0 + \beta_1 salesgrowth_{i,t-1} + \varepsilon_{i,t}$$
(4)

*Inv* denotes the net increase in tangible and intangible assets, and is scaled by lagged total assets; *sales growth* represents the lagged change rate in sales. For each year and industry (based on two digit SIC codes), the model is estimated in a cross-sectional manner through OLS, and *Invef* is measured based on the residuals of the model. In other words, a higher value for *Invef* in equation 3 signifies lower (higher) investment efficiency (inefficiency). Therefore, we expect a negative coefficient for  $(\beta_1)$  in equation 3 to support H3a. Under-investment scenarios refer to negative residuals and over-investment scenarios refer to positive residuals. The absolute value of these residuals is used to construct our dependent variable (*Invef*) that reflects the deviation from the expected investment level, where higher values of this absolute value denote lower investment efficiency. Again, to impede the concurrent endogeneity problem, we lag LNESG and the control variables by one period. Equation (4) is estimated with t-statistics clustered at the firm level and robust to both heteroscedasticity and within-firm serial correlation (Liu et al., 2014). To examine hypotheses H3b and H3c, we estimate equation (4) for the sub-samples of under-investment and over-investment observations. In this respect, two variables Inv - under (absolute value of the negative residuals of equation 4) and Inv - over (absolute value of the positive residuals of equation 4) are created and they represent the under-investment and over-investment subsamples, respectively. Once again, the absolute values of the residuals are used for both under-investment and over-investment problems, hence, higher amounts of Inv - under and Inv - over imply more under-investment and over-investment problems, respectively. Therefore, we expect a negative coefficient for  $(\beta_1)$  in equation 3 to support H3b and H3c. As we know, residuals are

measured as the difference between real values of Inv and estimated ones by OLS estimator from equation (4).

We also evaluate the possibility that the determination of investment efficiency and ESG transparency are closely intertwined. Hence, once again we assess whether or not endogeneity exists between the variables using the Hausman test (Hausman, 1978). Results suggest that, no endogeneity exists with respect to investment efficiency and ESG transparency<sup>9</sup>. Hence, the use of OLS estimator is convenient for our context. Regarding the explanatory variables of equation (3), we predict a positive association between investment efficiency and our measures of LNSIZE, ROA, tobin and CashFlow, as documented in the literature (Benlemlih & Bitar, 2018). Therefore, we expect a negative coefficient for these variables in equation (3). We also predict a positive coefficient for LOSS, hence, showing a negative relationship between having negative income and investment efficiency. In addition, Lai & Liu (2018) show that, there is a positive association between internal corporate governance mechanisms and investment efficiency. Therefore, we predict a negative (positive) coefficient for Indep, LNBoardSize and female (CEOduality). Finally, we predict a positive association between LEV and investment efficiency as a more levered company is under pressure to reimburse the interest, therefore, there is a lower probability of accessing additional debt financing, which limits the firm's capability to invest, thereby forcing efficient investment decisions. Furthermore, creditors play a monitoring role in an attempt to impede inefficient investments (Benlemlih & Bitar, 2018). Therefore, we expect a negative coefficient for *LEV* in equation (3).

<sup>&</sup>lt;sup>9</sup> Investment efficiency and ESG transparency (t= .78, p-value > .42); Over-investment and ESG transparency (t= .97, p-value > .33); and Under-investment and ESG transparency (t= .44, p-value > .67)

## 2.4 Empirical results and discussion

### 2.4.1 Descriptive statistics

Table 2 demonstrates the descriptive statistics for the variables used in this paper. As mentioned before, to normalize our variables due to econometric reasons, we have used the natural logarithm of ESG disclosure score (LNESG), audit fee (LNAUDFEE), average market capitalization (LNSIZE), number of news reports (LNFACTIVA) and board size (LNBoardSize) in our analysis. Regarding to our second proxy for audit quality which is the absolute abnormal part of working capital accrual (abwca), the mean equals to 0.03. The maximum (minimum) ESG score is 64.18 (8.21) for our sample, reflected in the amount of 4.19 (2.12) after taking natural logarithm in table 2. The current ratio (*CurrentRatio*) has a mean of 1.47, reflecting the good liquidity of the companies in our sample. On average, 21% of the firm year observations in our sample suffer losses (LOSS). In our sample, the percentage of women's presence on board is 13.65% on average, and the percentage of independent director is 78.1% on average. In addition, 13% of our firm-year observations indicate CEO duality. Finally, about 52% of our sample demonstrates an underinvestment scenario (594 out of 1142). This percentage indicates that Canadian firms in our sample, which include more than 60% (151 unique firms) of S&P/TSX index, are almost equally split between over-investment and under-investment. The average level of the variable Inv - under (Inv - over) is 0.58 (0.32), reflecting that under-investment (overinvestment) companies inefficiently invest 0.58 (0.32) per cent of the total assets on average in a fiscal year.

# \*\*\* Table 2 Approximately Here \*\*\*

Table 3 demonstrates the correlation matrix for the variables used in equations 2 and 3. As we expected, the correlation coefficient between ESG transparency (*LNESG*) and our first audit

quality proxy (*LNAUDFEE*) is positive and significant (0.45, significant on at least 5% level significance). As for our second audit quality proxy, absolute value of abnormal working capital accrual, this coefficient is negative and significant (-0.11, significant on at least 5% level significance), displaying a positive relationship between audit quality and ESG transparency. In line with our surmise related to hypothesis 2, our ESG transparency measure (*LNESG*) is positively and significantly (0.46, significant on at least 5% level significance) correlated with our public media exposure proxy (*LNFACTIVA*), indicating positive relationship between public media exposure and ESG transparency.

Related to hypothesis 3, table 3 displays the correlation coefficient between *LNESG* and *Invef* as negative and significant (-0.07, significant on at least 5% level significance), implying negative (positive) relationship between ESG transparency and investment inefficiency (efficiency). Most of the correlation coefficients for the board characteristics and control variables are also in line with findings of prior studies. For instance, the positive correlation between the percentage of independent directors (*Indep*) and ESG transparency (*LNESG*) is also noted by Cucari et al., 2018). Finally, to test for the possibility of existence of multicollinearity between our independent and control variables, Variance Inflation Factor (VIF) was computed. The mean of VIF was 1.91 with the maximum value of 2.51 for firm's size (*LNSIZE*), implying that there is no serious concern for multicollinearity issues.

# \*\*\* Table 3 Approximately Here \*\*\*

### 2.4.2 Results for the main analysis

#### 2.4.2.1 Main analysis for hypotheses 1 and 2

Table 4 demonstrates the results for the model estimation shown by equation (2); examining the impacts of our two variables of interest, audit quality and public media exposure,

on ESG transparency. Model 1 represents the results without our test variables, audit quality and public media exposure. The results related to our proxy for public media exposure are shown in model 2. The coefficient of LNFACTIVA in model 2 is positive (0.000) and significant at the 5% level which is consistent with our prediction in hypothesis 2. Model 3 shows the results of incorporating audit quality (proxied by audit fees - LNAUDFEE). The coefficient of LNAUDFEE in model 3 is positive (0.128) and significant at 1% level, which is in line with our prediction related to hypothesis 1. The results of using absolute value of the abnormal part of working capital accrual (abwca) as our proxy of audit quality are reported in model 4. Model 4 results also support hypothesis 1 as the coefficient of |abwca| is negative (-0.206) and significant at the 1% level. Finally, Model 5 illustrates the results that include all of our test variables. Compatible with our predictions related to hypothesis 1 and 2, findings imply a positive association between ESG transparency and both audit quality and public media exposure. In all of our models in table 4, we incorporate year and industry (based on two-digit SIC code) fixed effects. The coefficients for most of the control variables are in line with former research. For instance, the coefficient of LNSIZE in both model 1 and 2 is positive and significant (0.055 and 0.045 respectively), indicating that larger firms also have higher ESG transparency (Cucari et al., 2018; Yu et al., 2018). In addition, the coefficient of CurrentRatio is positive and significant in models 4 and 5 (0.011 and 0.008 respectively), showing that a company with higher level of liquidity will be more transparent in ESG issues (Yu et al., 2018) and the coefficient of  $LEV^{10}$  is positive and significant in all of our models, implying that high leveraged firms have more ESG transparency in our sample. Finally,

<sup>&</sup>lt;sup>10</sup> The positive sign of *LEV* variable is in line with previous stuidies and suggest that leverage can be used to increase the visibility to investors, leading to higher ESG transparency (Baldini et al, 2018).

we do not note any significant results for the board characteristic (*Indep, LNBoardSize*, *CEOduality and female*) variables for our sample.

# \*\*\* Table 4 Approximately Here \*\*\*

#### 2.4.2.2 Main analysis for hypothesis 3

Table 5 reports the results of examining the impact of ESG transparency on firm investment efficiency (equation 3). Model 1 exhibits the results of the full sample and model 2 and 3 demonstrate the results related to the subsamples of under-investment and over-investment, respectively. In line with hypothesis H3a, the coefficient of LNESG is negative (-0.983) and significant at the 1% level, implying negative (positive) association between ESG transparency and investment inefficiency (efficiency). Results of model 2 support H3b as the coefficient of LNESG is also negative (-1.939) and significant at the 1% level. Finally, we do not find significant results to support H3c (the over-investment scenario) as the coefficient of LNESG is negative but not significant in Model 3 (-0.0311) as predicted by H3c. The coefficients for some of the other control variables are in line with former research. For instance, the coefficient of *CashFlow* is negative (-4.844) and significant in model 1, implying that higher operating cash flows equips companies with more financial resources to invest efficiently (Biddle & Hilary, 2006). Taken together, our results suggest that higher ESG transparency helps companies mitigate underinvestment problems, but not over-investment problems. As we mentioned earlier, an overinvestment scenario occurs when managers decide to invest extravagantly by allotting company resources into unprofitable projects with the incentive of appropriating some of the firm's resources. On the other hand, underinvestment takes place when firms pull out of profitable projects because of financial restrictions and high costs of raising debt and equity (Lai et al., 2014). In this context, our empirical findings suggest that ESG disclosure transparency can be influential

in impeding managers from investing in unprofitable investment opportunities likely selected with some expropriating purposes. Finally, based on stakeholder theory and agency theory, our results are consistent with previous studied (Byun & Oh, 2018; M. E. Clarkson, 1995; Hillman & Keim, 2001) since we provide evidence that presenting transparent ESG reports as a response to stakeholders' demands has a positive impact on firms' performance as proxied by the level of firms' under-investment inefficiency.

\*\*\* Table 5 Approximately Here \*\*\*

### 2.5 Robustness checks

### 2.5.1 Alternative measure of audit quality

Researchers (e.g. DeBoskey & Jiang, 2012; Sun & Liu, 2011), show that auditor's industry specialization can play a paramount role in boosting an auditor's competency and ability. An auditor's knowledge about a specific client's sector (such as information about the business of client firm, its strategy and accounting information system), can help that auditor provide a relatively high quality audit report (Sun & Liu, 2011). In addition, due to their valuable experience and considerable investment in technologies adapted to clients' industries, specialist auditors are usually more aware of the kind and frequency of potential errors, thereby equipping the presentation of high quality audit reports (Sun & Liu, 2011). Following previous studies (Dunn & Mayhew, 2004; Greiner, Kohlbeck, & Smith, 2016), we define auditor's industry specialization (*Specialist*) to take the value 1 if the auditor has a market share of at least 10% of an industry (based on two-digit SIC code), and 0 otherwise. We then re-estimate equation (2) (to test the association between ESG transparency and audit quality and press coverage) and present the results in Table 6. The coefficients on the variable *Specialist* in models 1 and 2 are positive (0.192 and 0.193, respectively) and significant at 5%, indicating that our conclusion for hypothesis 1

(ESG transparency is positively associated with audit quality and media coverage) is stable and robust to different measures of audit quality.

### \*\*\* Table 6 Approximately Here \*\*\*

# 2.5.2 Alternative estimation method for investment efficiency

There are concerns that the investment efficiency variable suggested by (Biddle et al., 2009) may result in biased ordinary least square (OLS) coefficients, as it is truncated at 0 (Li & Liao, 2014). To mitigate this concern, we re-estimate equation (3) (to test the relation between ESG transparency and investment efficiency) using a truncated regression proposed by (Maddala, 1986). Truncated regression models are primarily applied when the observations of the dependent variable that are lower or higher than the defined thresholds, are systematically omitted from the sample (Amemiya, 1973; Lewbel & Linton, 2002). In other words, in these models, the range of the outcome variable is constrained considerably when data are truncated so that reasonable amounts of the outcome variable are excluded from the sample (Amemiya, 1973; Lewbel & Linton, 2002). In this context, these models help us to reach less biased coefficients in the regression analysis for the specific mentioned type of data such as investment efficiency since it is truncated at zero. Table 7 presents the results of this estimation method that provide additional support for hypotheses H3a and H3b.

# \*\*\* Table 7 Approximately Here \*\*\*

### 2.5.3 Alternative measure of investment efficiency

Following Chen et al., 2017; McLean, Zhang, & Zhao (2012), we use an alternate measure for investment efficiency as our dependent variable of equation (3). The alternate measure is the capital expenditure ratio (*CAPXRAT*), which is measured by capital expenditure deflated by the lagged book value of assets. This ratio is a direct proxy for investment efficiency, therefore, we predict a positive sign for the coefficient of ESG transparency (*LNESG*) in equation (3), indicating a positive association between ESG transparency and investment efficiency. Table 8 presents the results where the coefficient of *LNESG* is positive (0.023) and significant at 1%, implying that our conclusion related to the hypothesis 3 holds for different measures of investment efficiency.

\*\*\* Table 8 Approximately Here \*\*\*

# 2.6 Discussion and conclusion

### 2.6.1 Discussion

To best of our knowledge, our paper is the first one to investigate the association between audit quality and ESG transparency. As mentioned before, voluntary transparent ESG disclosure is deployed as a tool by managers to disseminate private information about the firm's present and future status to various stakeholders. To execute this approach, managers need a credible and constructive signal that displays and improves upon their perceived truthfulness and authenticity regarding voluntary ESG disclosure. Committing to high quality audits can provide this signal. This authenticating and monitoring role of audit quality has support form both institutional theory and previous studies (e.g. Ball et al., 2012; L. Chen et al., 2016). Based on institutional theory, companies are influenced by the independent and governmental organizations that intend to supervise firms' behavior. This monitoring power influences the decision making process of companies regarding ESG disclosure (Brammer et al., 2012; Jackson & Apostolakou, 2010). As audit quality can impact firms through a supervisory mechanism, it can have an effect on firms' decision-making processes regarding the transparency of ESG disclosure. In this context, our paper shows that, on average and based on our OLS analyses, audit quality is used as a signal by managers to illustrate the transparency and credibility of their ESG disclosure. Our arguments and

findings have theoretical support from the literature and are in line with previous studies (e.g. Ball et al., 2012; L. Chen et al., 2016).

With respect to the introduction of the novel association of public media exposure with ESG transparency, our arguments are supported by the theory of legitimacy (Suchman, 1995), and the media agenda setting theory (Ader, 1995; Brown & Deegan, 1998). Bansal & Clelland (2004) find that companies not enjoying good legitimacy are more proactive to smooth this image through increased ESG disclosures. In this context, in the face of high media coverage (which can assist in communicating ESG activities to different stakeholders), firms are more likely to increase the quantity and transparency of ESG disclosures in an effort to be perceived as more trustworthy and to preserve/improve their legitimacy and reputation, as described by legitimacy theory. In addition, based on the media agenda setting theory, since we observe a growing demand for increased ESG disclosures, we can expect this increasing demand to be reflected in increased public media coverage for firms. Consequently, firms respond to this growing demand by providing more transparent ESG disclosure. Finally, a high degree of public media exposure can influence stakeholders' understanding concerning the significance of ESG issues, thereby driving firms to disclose more transparent information about ESG issues to influence that perception. In this context, our study contributes to the literature that aims to specify company-level features influencing voluntary CSR disclosure (Adel, Hussain, Mohamed, & Basuony, 2019; Al Farooque & Ahulu, 2017; Khlif & Souissi, 2010; Reverte, 2009). In line with Reverte (2009), we also use legitimacy to demonstrate that firms enjoying higher visibility (proxied by higher levels of media coverage) primarily increase the extent and transparency of their ESG disclosure; hence, high public media exposure can be instrumentalized to instigate firm's legitimization via higher ESG disclosure transparency.

The second part of our paper also provides contribution to the literature as our arguments and findings have support from the stakeholder theory (Freeman, 1984) and the agency theory (Jensen & Meckling, 1976). In a seminal work, Cornell & Shapiro (1987) discuss that if a company cannot respond properly to stakeholders' expectations, concerns may arise in markets, resulting in undesirable outcomes such as negative stock price movements and loss of profitable opportunities for the company. As disclosure related to ESG issues has become a public demand, we expect managers to react to this demand by disclosing more transparent ESG reports. Based on stakeholder theory, our results are consistent with previous studies (e.g. Byun & Oh, 2018; M. E. Clarkson, 1995; Hillman & Keim, 2001) as we show that presenting transparent ESG reports as a response to stakeholders' demands has a positive impact on firms' performance, proxied by the level of firms' investment efficiency. Information asymmetry and agency problems are known as two sources of market frictions that can cause forms of investment inefficiency, underinvestment and overinvestment (Lara et al., 2016). Based on agency theory, factors that may attenuate agency problems and information asymmetry may also help enhance investment efficiency. In this context, ESG transparency can play a significant role in attenuating information asymmetry, thereby resulting in higher firm investment efficiency. Our results are consistent with previous studies (e.g. Cho et al., 2013; Krüger, 2015) as they show that firms with high quality and quantity CSR disclosures (through transparency in our case), enjoy less agency conflicts and information asymmetry problems.

From a practical perspective, we believe that focusing on ESG transparency can be very interesting for international audiences. An increase has been noted in investors and managers who are concerned about ESG disclosure issues. For instance, the United Nations (UN) has launched an important project known as 'Principles of Responsible Investment' (PRI) that motivates

institutional investors to heavily weight ESG issues when they evaluate firms and projects to invest in (Di Giuli & Kostovetsky, 2014). PRI has been very successful in gaining support from more than 1,360 institutional investors globally, confirming the growing importance of ESG transparency (Di Giuli & Kostovetsky, 2014). In line with the growing importance of ESG issues, major US companies allocated more than \$32 billion on ESG issues in 2012 and this number is growing on an annual basis (Cheng et al., 2014). Finally, based on a UN survey conducted in 2010, more than 94% of CEOs declared that inclusion of ESG issues in their decision making process was "significant" and "very significant" for the prospective success of their company (Cheng et al., 2014). In this context, we believe that understanding the determinants and consequences of ESG transparency as the core of our paper can be very interesting not only for investors but also for policy-makers and regulators when exploring disclosure requirements for transparent and extensive ESG disclosures.

### 2.6.2 Conclusion

Corporations are facing growing pressure to present more transparent disclosure with respect to their governance practices that promote environmental and social sustainability. Firms are increasingly including ESG as part of their core mandates especially so as investors are looking and demanding for more ESG-related disclosures. Former research (Benlemlih & Bitar, 2018; Chih et al., 2008) usually focus on the actual ESG performance of firms rather than the extent of transparency and quantity of ESG disclosure. In this context, our study extends the literature that concentrates on the determinants of firm's ESG transparency (Cucari et al., 2018; Manita et al., 2018; Yu et al., 2018). Specifically, we introduce two variables of audit quality and public media exposure that have positive impact on firms' ESG transparency. Using a Canadian setting, we hypothesize and show that committing to high quality audits is a mechanism that increases the

reliability of voluntary CSR reports and renders those reports more informative and transparent to stakeholders. Our results are robust to different measure of audit quality. In addition, we hypothesize and show that high media exposure encourages companies to provide more transparent ESG disclosures. We believe this is an attempt to positively influence public perception regarding ESG transparency, where, with high media coverage, managers will use transparent ESG disclosure to improve the firm's legitimacy. Our results are considerable, given that we control for firm-level characteristics and we show that audit quality and public media exposure are among the determinants of ESG transparency.

In addition to examining two new determinants of ESG transparency, and based on prior literature (Dhaliwal et al., 2011; Dhaliwal et al., 2012), we demonstrate that ESG transparency supplies influential incremental information that attenuates the information asymmetry existing between firms and stakeholders. Particularly, we show a positive impact that ESG transparency has on firm-level investment efficiency for a sample of listed firms in Canada. Our results are robust to different measures of investment efficiency and estimation methods.

Overall, our results can be of interest to policy- makers and regulators when exploring disclosure requirements for transparent and extensive ESG disclosures. Our findings can also be interesting to investors who wish to invest and allocate capital efficiently by considering and paying more attention to ESG transparency provided by firms. The proxies used for audit quality, media exposure, ESG transparency and investment efficiency are subject to measurement error, this is a common limitation found in most research on corporate disclosure and investment efficiency. Lastly, it can be interesting to explore whether our results are held in more mature markets, in longer time periods or in an emerging market context.

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Industry	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total	Percentage
Materials	19	26	27	34	35	37	43	40	45	42	348	30.5
Industrials	13	16	17	16	22	23	22	23	21	24	197	17.3
Health Care	1	2	2	4	5	5	4	5	5	6	39	3.4
Energy	14	21	27	31	33	36	34	36	37	35	304	26.6
Consumer Staples	3	5	6	6	8	8	7	8	9	11	71	6.2
Consumer Discretionary	3	3	4	4	6	7	9	9	10	9	64	5.6
Information Technology	3	5	5	5	7	9	8	9	9	9	69	6
Communication Services	2	4	5	5	5	6	5	6	6	6	50	4.4
Total	58	82	93	105	121	131	132	136	142	142	1142	100
Percentage	5.1	7.2	8.1	9.2	10.6	11.5	11.6	11.9	12.4	12.4	100	

**Table 1.**Distribution of firms across years and sectors

Variable	Observations	Mean	SD	Minimum	Maximum
LNESG	1142	3.17	0.54	2.12	4.19
LNAUDFEE	1142	6.54	1.10	3.83	10.35
abwca	1142	0.03	0.04	0.00	0.29
LNSIZE	1142	8.11	1.24	4.72	11.29
ROA	1142	3.02	3.02	-44.4	29.55
LEV	1142	2.03	0.95	0.99	6.85
CurrentRatio	1142	1.47	0.17	0.13	3.54
LNFACTIVA	1142	5.91	1.15	0.00	9.73
Indep	1142	78.1	11.77	40.00	100.00
LNBoardSize	1142	2.33	0.26	1.39	2.89
<b>CEOduality</b>	1142	0.13	0.34	0.00	1.00
female	1142	13.65	10.63	0.00	50.00
LOSS	1142	0.21	0.41	0.00	1.00
CashFlow	1142	0.01	0.09	-0.049	0.39
tobin	1142	1.56	0.71	0.43	7.08
Invef	1142	0.55	0.44	0.00	7.33
Inv-under	594	0.58	0.53	0.00	7.33
Inv-over	548	0.32	0.34	0.00	1.97

 Table 2: Descriptive statistics

 Table 3: Pearson's Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) LNESG	1.00									
(2) LNAUDFEE	0.45*	1.00								
(3) <i>abwca</i>	-0.11*	-0.12*	1.00							
(4) LNSIZE	0.57*	0.64*	-0.13*	1.00						
(5) <i>ROA</i>	-0.02	0.01	0.01	0.13*	1.00					
(6) <i>LEV</i>	0.03	0.03	0.01	-0.04	-0.02	1.00				
(7) CurrentRatio	-0.11*	-0.22*	0.38*	-0.14*	-0.13*	-0.01	1.00			
(8) Indep	0.18*	0.09*	-0.03	0.14*	-0.02	0.03	-0.04	1.00		
(9) LNBoardSize	0.37*	0.58*	-0.08*	0.53*	0.03	0.02	-0.10*	0.11*	1.00	
(10) LNFACTIVA	0.46*	0.39*	-0.05	0.46*	-0.06	0.28*	-0.07*	0.16*	0.27*	1.00
(11) CEOduality	-0.10*	-0.05	0.00	0.02	0.04	-0.00	-0.04	-0.13*	-0.15*	-0.06
(12) female	0.25*	0.34*	-0.04	0.34*	0.07*	-0.02	-0.05	0.10*	0.36*	0.11*
(13) <i>LOSS</i>	-0.02	-0.17*	-0.01	-0.22*	-0.65*	0.06*	0.14*	-0.01	-0.13*	0.02
(14) CashFlow	0.06	0.18*	-0.08*	0.08*	0.40*	0.02	-0.04	0.02	0.10*	-0.03
(15) <i>tobin</i>	-0.15*	-0.26*	-0.01	0.03	0.29*	-0.02	0.21*	-0.00	-0.15*	-0.08*
(16) <i>Invef</i>	-0.07*	-0.09	0.09	-0.05	-0.04	-0.01	0.05	-0.02	-0.06*	-0.02

Variables	(11)	(12)	(13)	(14)	(15)	(16)
(11) CEOduality	1.00					
(12) female	-0.14*	1.00				
(13) <i>LOSS</i>	0.02	-0.10*	1.00			
(14) CashFlow	-0.07*	0.14*	-0.33*	1.00		
(15) <i>tobin</i>	0.01	-0.09*	-0.14*	0.15*	1.00	
(16) <i>Invef</i>	-0.01	0.01	0.11*	-0.11*	-0.05	1.00

\* Displays significance at the 0.05 level.

Dependent Va	Dependent Variable: ESG						
transparency (	LNESG)	Model 1	Model 2	Model 3	Model 4	Model 5	
Variable	Exp Sign	Coeff (t-value)	Coeff (t-Value)	Coeff (t-value)	Coeff (t-value)	Coeff ( <i>t-value</i> )	
LNAUDFEE	(+)			0.128***(2.91)		0.121* (1.72)	
abwc	(-)				-0.206*** (-2.97)	-0.199*** (-2.86)	
LNFACTIVA	(+)		0.000** (2.48)	0.000* (1.85)	0.000*** (2.92)	0.000*** (2.82)	
LNSIZE	(+)	0.055** (2.16)	0.045* (1.78)	0.036 (1.03)	0.036 (1.46)	0.035 (0.95)	
ROA	(+)	-0.001 (-1.18)	-0.001 (-0.93)	-0.001 (-0.86)	0.000 (0.49)	0.000 (0.11)	
LEV	(+)	0.000* (1.94)	0.000*** (2.75)	0.000*** (2.89)	0.000** (2.04)	0.000** (2.21)	
CurrentRatio	(+)	-0.000 (-0.52)	-0.000 (-0.58)	-0.000 (-0.05)	0.011** (2.56)	0.008** (2.50)	
Indep	(+)	0.001 (1.18)	0.001 (1.26)	0.001 (1.32)	0.001 (0.34)	0.000 (0.26)	
LNBoardSize	(+)	-0.107 (-0.93)	-0.103 (-0.91)	-0.113 (-1.03)	-0.080 (-0.78)	-0.072 (-0.64)	
CEOduality	(-)	0.009 (0.29)	0.007 (0.15)	-0.006 (-0.16)	-0.020 (-0.86)	-0.027 (-0.79)	
female	(+)	-0.000 (-0.49)	-0.000 (-0.57)	-0.001 (-0.62)	-0.000 (-0.29)	-0.000 (-0.31)	
LOSS	(-)	-0.023 (-1.03)	-0.024 (-0.89)	-0.030 (-1.15)	-0.013 (-0.56)	-0.019 (-0.86)	
CashFlow	(+)	0.243*** (2.73)	0.232* (1.66)	0.175 (1.29)	0.074 (0.73)	0.056 (0.55)	
GFC	(-/+)	.008 (0.73)	.008 (0.91)	.009 (1.09)	.008 (0.52)	.008 (1.24)	
Intercept		2.851*** (8.82)	2.872***(9.10)	3.028***(9.64)	3.013*** (11.19)	3.065*** (12.17)	
Ind. FE.		YES	YES	YES	YES	YES	
Year FE.		YES	YES	YES	YES	YES	
Adj R <sup>2</sup>		0.874	0.877	0.879	0.885	0.894	
Observations		1142	1142	1142	1142	1142	

 Table 4: Regression results of Audit quality and public media exposure on ESG transparency

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation.

\*, \*\* and \*\*\* indicates significance at the 10, 5 and 1% levels, respectively.

Dependent Variable:		Model 1	Model 2	Model 3
Invef		(All)	(Under-investment)	(Over-investment)
Variable	Exp Sign	Coeff ( <i>t</i> -value)	Coeff ( <i>t-value</i> )	Coeff ( <i>t-value</i> )
LNESG	(-)	983*** (-2.77)	-1.939*** (-2.69)	0311 (-1.09)
LNSIZE	(-)	.140 (0.83)	.215 (0.64)	.0153 (0.60)
ROA	(-)	.030 (0.91)	.022 (0.56)	.000 (0.16)
LEV	(-)	000 (-0.06)	.000(.04)	.001 (0.53)
CurrentRatio	(-)	.026 (0.74)	.0145 (0.26)	.0358* (1.81)
tobin	(-)	422 (-1.84)	397 (-0.92)	.0156 (0.47)
Indep	(-)	.002 (0.20)	001(-0.05)	.000 (0.26)
LNBoardSize	(-)	661 (-0.96)	-2.132 (-1.49)	110 (-1.44)
CEOduality	(+)	280 (-0.68)	405 (-0.50)	.009 (0.22)
female	(-)	.053 (1.12)	.114 (1.29)	.001 (1.03)
LOSS	(+)	1.056** (2.44)	1.748** (2.13)	015 (-0.30)
CashFlow	(-)	-4.844*** (-2.75)	-7.06** (-2.01)	342* (-1.89)
GFC	(+)	013 (-0.81)	039 (-0.53)	.002 (0.97)
Intercept		5.253*** (3.14)	7.021*** (2.78)	.866*** (4.10)
Ind. FE.		YES	YES	YES
Year FE.		YES	YES	YES
Adj $R^2$		0.063	0.059	0.119
Observations		1142	594	548

Table 5: Tests examining the relationship between ESG transparency and investment efficiency

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation. \*, \*\* and \*\*\* indicates significance at the 10, 5 and 1% levels, respectively. *Invef represents investment inefficiency, where higher Invef represents greater investment inefficiency.* 

<b>Dependent Variable:</b>			
ESG transparency (LN)	ESG)	Model 1	Model 2
Variable	Exp Sign	Coeff ( <i>t-value</i> )	Coeff (t-Value)
Specialist	(+)	. 192** (2.02)	. 193** (2.08)
LNFACTIVA	(+)		.000** (2.51)
LNSIZE	(+)	.056** (2.23)	.046* (1.85)
ROA	(+)	001 (-1.25)	001 (-0.99)
LEV	(+)	.000**(1.99)	.000** (2.05)
CurrentRatio	(+)	000 (-0.55)	000 (-0.46)
Indep	(+)	.001 (1.15)	.001 (1.23)
LNBoardSize	(+)	120 (-1.04)	116 (-1.03)
CEOduality	(-)	.008 (0.17)	.005 (0.12)
female	(+)	000 (-0.22)	000 (-0.39)
LOSS	(-)	023 (-0.87)	024 (-0.90)
CashFlow	(+)	.248* (1.75)	.236* (1.69)
GFC	(-/+)	.013 (1.04)	.011 (0.78)
Intercept		2.684*** (8.14)	2.705*** (8.37)
Ind. FE.		YES	YES
Year FE.		YES	YES
Adj R <sup>2</sup>		0.875	0.878
Observations		1142	1142

 Table 6: Robustness check: Alternative measure of audit quality (auditor's industry specialization)

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation. \*, \*\* and \*\*\* indicates significance at the 10, 5 and 1% levels, respectively.

Dependent Variable:		Model 1	Model 2	Model 3
Invef		(All)	(Under-investment)	(Over-investment)
Variable	Exp Sign	Coeff (t-value)	Coeff ( <i>t-value</i> )	Coeff (t-value)
LNESG	(-)	575** (-1.97)	-1.138** (-2.01)	.032 (0.96)
LNSIZE	(-)	.090 (0.65)	.264 (0.97)	016 (-0.99)
ROA	(-)	.031 (1.56)	.037 (1.01)	.002 (0.84)
LEV	(-)	000 (-0.14)	000 (-0.07)	.000 (0.26)
CurrentRatio	(-)	.060* (1.89)	.061 (1.28)	.032*** (4.31)
tobin	(-)	173 (-0.87)	172 (-0.48)	008 (-0.33)
Indep	(-)	003 (-0.30)	007 (-0.36)	.000 (0.57)
LNBoardSize	(-)	802 (-1.38)	-1.216 (-1.05)	244*** (-3.67)
CEOduality	(+)	418 (-1.13)	586 (-0.81)	.010 (0.25)
female	(-)	.020 (1.52)	.041 (1.57)	000 (-0.38)
LOSS	(+)	1.232*** (3.04)	2.192*** (2.95)	.011 (.22)
CashFlow	(-)	-5.092*** (-3.23)	-7.970*** (-2.67)	663*** (-3.45)
GFC	(+)	001(-0.11)	024 (-0.91)	.007 (0.69)
Intercept		3.371** (2.31)	4.753* (1.73)	.808*** (4.52)
Ind. FE.		YES	YES	YES
Year FE.		YES	YES	YES
Pseudo $R^2$		.013	.011	.057
Observation		1142	594	548

Table 7: Robustness checks: Use of a truncated regression as an alternative estimation method to test the relation between ESG transparency and Investment Efficiency (equation 3):

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation. \*, \*\* and \*\*\* indicates significance at the 10, 5 and 1% levels, respectively. *Invef represents investment inefficiency, where higher Invef represents greater investment inefficiency.* 

Dependent Variable: Investment efficiency (CAPXRAT)							
Variable	Exp Sign	Coeff ( <i>t-value</i> )					
LNESG	(+)	. 023*** (3.40)					
LNSIZE	(+)	.025** (2.13)					
ROA	(+)	000** (-2.15)					
LEV	(+)	000*** (-3.95)					
CurrentRatio	(+)	.000 (0.85)					
tobin	(+)	.040***(-6.35)					
Indep	(+)	. 000 *** (4.10)					
LNBoardSize	(+)	043 (-1.15)					
CEOduality	(-)	007 (-0.53)					
female	(+)	.000 (0.78)					
LOSS	(-)	. 023*** (3.12)					
CashFlow	(+)	. 250** (2.62)					
GFC	(-)	.619 (1.03)					
Intercept		297** (-2.53)					
Ind. FE.		YES					
Year FE.		YES					
Adj R <sup>2</sup>		0.551					
Observations		1142					

Table 8: Robustness check: Use of an alternative measure for investment efficiency:

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation. \*, \*\* and \*\*\* indicates significance at the 10, 5 and 1 % levels, respectively.

Chapter 3. Environmental and Social Transparency, Financial Markets, and Investment Efficiency: A Virtuous Triangle

# Environmental and Social Transparency, Financial Markets, and Investment Efficiency: A Virtuous Triangle

### Abstract

**Purpose**– This study examines whether a firm's environmental and social (E&S) transparency affects financial analysts' information environment and, ultimately, its investment efficiency.

**Design/methodology/approach**– Focusing on a sample of non-financial and non-utility U.S. firms from the S&P 500 index between 2012 and 2018, we examine if a firm's environmental transparency and social transparency affect financial analysts' information environment and its investment efficiency. Transparency reflects comprehensive scores compiled by Bloomberg. Forecast errors and dispersion proxy for analysts' information environment. Investment efficiency reflects a firm's capital investment relative to its growth. OLS regressions are used for the analysis. **Findings**– Results show that transparency, both environmental and social, relates with smaller forecast errors as well as less forecast dispersion. These negative relationships are accentuated for firms with low financial reporting quality, low media coverage, and weak governance. Moreover, we find that E&S transparency relates with investment efficiency mostly via analysts' information environment, which thus acts as a mediating variable.

**Originality/value**– Our paper shows that E&S transparency mitigates information asymmetry and agency problems by allowing financial analysts to enhance their forecasting abilities (information environment). Furthermore, our results show that E&S transparency help analysts play their information intermediary and monitoring roles since their enhanced forecasts are associated with less firm-level investment inefficiency.

**Keywords**: Social transparency, environmental transparency, analysts' forecast error, analysts' forecast dispersion, investment efficiency
# Environmental and Social Transparency, Financial Markets, and Investment Efficiency: A Virtuous Triangle

## 3.1 Introduction

In recent years, financial markets' participants have become increasingly concerned about Corporate Social Responsibility (CSR) practices, especially with respect to environmental and social (E&S) issues (Benlemlih, Shaukat, Qiu, & Trojanowski, 2018). The advent and growing reach of the United Nations' Principles of Responsible Investment (PRI) initiative among institutional investors around the world well illustrates that trend<sup>11</sup>. Such concerns arise from increasing awareness that a firm's financial future rests on its ability to face the environmental challenges brought about by climate change as well as the need to maintain social acceptability (Zhao & Xiao, 2019). Since, investors are likely to consider a firm's E&S practices in their investment decision-making process, there is a consistent pressure to enhance its transparency about them (Yu, Guo, & Luu, 2018). Building upon that context, our paper investigates if and how environmental transparency and social transparency (E&S transparency thereafter) determines financial analysts' information environment and, ultimately, conditions a firm's investment efficiency.

Our paper rests on the premise that financial analysts play two pivotal roles in financial markets. On one hand, as informational intermediaries, they gather and analyze information from various sources to develop expectations about a firm's financial future that they disseminate to financial markets, thus increasing stock market efficiency and liquidity (Mattei & Platikanova, 2017). On the other hand, they also act as an external monitoring mechanism, questioning managerial actions and decisions in public forum such as conference calls, media comments and

<sup>&</sup>lt;sup>11</sup> At the end of 2018, more than 1,900 investors were PRI signatories, with close to \$90 trillion in assets under management Retrieved from: <u>https://www.unpri.org/annual-report-2018/how-we-work/the-pri-in-numbers</u>

analyst reports and ratings (Mattei & Platikanova, 2017). Hence, from an informational perspective, it is critical to investigate what drivers and conditions have an influence on analysts' information environment, as proxied by their earnings forecast properties. Furthermore, from a monitoring perspective, it is also essential to understand how analysts' develop their expectations and, ultimately, how such expectations influence managers. In this study, we focus on one such potential driver, which arises from the enhanced importance attached to CSR by various stakeholders. More specifically, we investigate if firms that enjoy high levels of E&S transparency suffer less from information asymmetry and agency problems. We argue that this lower level of information asymmetry helps analysts provide more accurate (i.e., less error) and less dispersed earnings forecasts. Moreover, we further argue that such lower level of information asymmetry arising from greater E&S transparency can enhance a firm's investment efficiency, either via analysts' information environment or directly.

Two complementary conceptual perspectives underlie our argument that enhanced E&S transparency translates into less information asymmetry and agency problems, as reflected in financial analysts' information environment, and relates with enhanced firm-level investment efficiency. On one hand, according to information economics and voluntary disclosure theory, E&S transparency provides material and value relevant incremental information that helps firms overcome agency and information asymmetry problems (Eccles, Serafeim, & Krzus, 2011; Hinze & Sump, 2019). On the other hand, consistent with stakeholder theory (Freeman, 1984), we expect E&S transparency to contribute to the enhancement of firm value through accrued reputation capital and the building up of a competitive advantage reflective of its E&S engagement (Yu et al., 2018).

We focus on non-financial and non-utility S&P 500 firms over the period 2012-2018. Our sample comprises 2466 firm-year observations. We investigate three related questions. First, are E&S transparency individually related to financial analysts' information environment, as proxied by forecast error and forecast dispersion? Second, do a firm's governance, financial reporting quality, and media coverage affect the aforementioned relationships? Third, does E&S transparency relate to firm-level investment efficiency and, if so, directly and/or via the analysts' information environment only (partial mediation model/full mediation model)?

Analysts' forecast error and analysts' forecast dispersion are key metrics in terms of capturing information asymmetry between market participants and management (Ali, Liu, Xu, & Yao, 2019; Garrido-Miralles, Zorio-Grima, & García-Benau, 2016; Hinze & Sump, 2019; Mattei & Platikanova, 2017; Wei & Xue, 2015). Following previous studies (e.g., Eccles et al., 2011; Manita, Bruna, Dang, & Houanti, 2018; Yu et al., 2018), we rely on Bloomberg's E&S scores as measures of transparency. Specifically, Bloomberg analysts compile an array of data points to assess E&S dimensions. Bloomberg's analysts assign a weight to each data point based on their importance level and materiality for the specific industry sector. In addition, these scores are tailored for each industry to consider the value relevance of the collected data in each industry sector (Bloomberg, 2013; Xie, Nozawa, Yagi, Fujii, & Managi, 2019). In other words, Bloomberg's transparency scores are both relevant and weighted regarding the significance to their users (e.g., investors and financial analysts) (Eccles et al., 2011; Manita et al., 2018; Yu et al., 2018). Hence, we can infer that these scores take into account both the quantity (in terms of the number of data points) and the quality (with respect to objective and industry-relevant data points) of E&S practices information (Benlemlih et al., 2018).

Our results suggest that E&S transparency is negatively related to financial analysts' forecast error and dispersion. In other words, greater transparency implies less error and dispersion in analyst forecasts. We also find that the relationship between E&S transparency and analysts' forecast error and dispersion is more pronounced for firms (a) with weak governance (measured by Bloomberg's governance score), (b) with low levels of financial reporting quality (measured by the DeFond & Park, (2001) model), and (c) with low levels of media coverage (based on the number of news reports published in the FACTIVA database). These findings suggest that E&S transparency's role as an external monitoring mechanism is strengthened when other monitoring mechanisms such as media coverage, financial reporting quality, and governance are not as strong, implying a substitutional role.

Furthermore, our findings suggest that E&S transparency affects firm-level investment efficiency (as measured by Biddle, Hilary, & Verdi, 2009) mostly via financial analysts' information environment (full mediation model), with the exception of the environmental transparency-forecast accuracy-investment efficiency relation where there is partial mediation. In other words, directly and by their effect on analysts' information environment, E&S transparency contributes to reducing firm-level over-investment and under-investment inefficiencies. These results are robust to alternative specifications.

Our study provides the following contributions. First, we extend the literature that focuses on the consequences of E&S transparency (Cucari, Esposito De Falco, & Orlando, 2018; Manita et al., 2018; Yu et al., 2018) by introducing the novel proximate outcome of analysts' information environment (i.e., more accurate and less dispersed earnings forecasts) as well as a mediated outcome on firm-level investment efficiency. Our findings provide further support on the informational and monitoring roles of financial analysts within financial markets. Second, compared to work relying on CSR performance disclosure (e.g., Benlemlih & Bitar, 2018; Chih, Shen, & Kang, 2008; De Bakker, Groenewegen, & Den Hond, 2005; Waddock & Graves, 1997), E&S transparency exhibits several distinguishing features such as 1) it considers soft information (e.g., policies), 2) it is industry-tailored, 3) it weighs data according to relevance and saliency, 4) it is subject to an authentication process to correct for self-claim and self-report bias, 5) it is multidimensional, 6) it straddles disclosure and performance. In some sense, by focusing on transparency, our paper revisits CSR reporting. To use an analogy, we can refer to the extensive research on corporate financial reporting and on its implications (e.g., Graham, Harvey, & Rajgopal, 2005). However, there is also a distinct line of research on the rating by analysts and transparency of such disclosure and on its implications (e.g., Biddle et al., 2009; Bushee & Noe, 2000; Drake, Myers, & Myers, 2009). Third, to the best of our knowledge, our paper is the first one to provide evidence about the moderating roles of the firm-level characteristics of financial reporting quality, corporate governance, and media coverage on the relationship between CSR transparency and financial analysts' information environment, as proxied by forecast properties. Finally, to the best of our knowledge, our paper is the first one to examine the relationship between E&S transparency as two separate items on firm-level investment efficiency. Our results imply that the high degrees of E&S transparency have remarkable economic influences on capital investment decisions by firms (shown by lower under-investment and over-investment firm-level inefficiencies), mostly as an outcome of their influence on analysts' information environment (mediation model).

The remainder of this study is as follows. Part 2 provides a review of literature and develops our hypotheses. Part 3 includes our sample selection along with our research design. Part 4 presents the empirical results. Part 5 provides additional results, and part 6 concludes.

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## 3.2 Literature review and hypotheses development

### 3.2.1 E&S transparency

There is an increasing call by several stakeholders within our society that firms ought not only be concerned with their profits but also be responsible toward E&S issues (e.g., Cormier, Lapointe-Antunes, & Magnan, 2015; Hammami & Zadeh, 2019; Hamrouni, Uyar, & Boussaada, 2019; Zhao & Xiao, 2019). The creation and widespread adoption of the United Nations PRI clearly illustrates these societal shifts. Accordingly, corporate transparency regarding E&S practices and their implications has become paramount (Li, Li, & Minor, 2016). For instance, based on a survey conducted by the CFA institute, more than 70% of investment professionals consider firms' E&S reports in their investment decision-making process (CFA Institute, 2017). In reaction, the Governance & Accountability Institute shows that the proportion of S&P 1500 firms providing sustainability reports has risen dramatically from less than 19% in 2011 to more than 86% in 2018 (Governance & Accountability Institute, 2018).

However, piercing the corporate veil to gain a fine-grained view of CSR practices and of their implications represents a challenge. Most prior research (e.g., Benlemlih & Bitar, 2018; Cheung, 2016; Chih et al., 2008; De Bakker et al., 2005) relies on self-reported and self-claim disclosure by firms about their own CSR performance, a measure that does exhibit some comparability, reliability, saliency and relevance issues (Lock & Seele, 2016; Moratis, 2017a, 2017b). While commercial information services like MCSI and Thomson Reuters Asset4 try to measure and report firms' performance from E&S angles, their primarily focus is on E&S performance, as reported by the firms, with scant validation (Lock & Seele, 2016; Moratis, 2017a, 2017b).

In this context, transparency refers to high quantity information that provides relevant and valuable insights into a firm's E&S practices (Yu et al., 2018). According to Bloomberg (2013), environmental transparency includes different kinds of environmental information that can be primarily categorized as "hard" components and "soft" components. Hard components cover quantifiable environmental information such as greenhouse gas emissions, water use, waste disposal amount, and energy consumption, among others. Soft components includes firms' environmental policies and initiatives like waste reduction initiatives, energy efficiency policy, and green building policy, among others (Benlemlih et al., 2018). Social transparency broadly captures information such as community relations, diversity, human rights, and employee relations, among others. Such a type of social transparency aids firms in improving their social legitimacy and social reputation (Benlemlih et al., 2018). Previous studies find that transparency is related to lower firm-level idiosyncratic risk (Benlemlih et al., 2018), cost of debt (Hamrouni et al., 2019), and higher firm value (Yu et al., 2018).

#### 3.2.2 Financial analysts' information environment

Financial analysts perform two critical and complementary roles within capital markets. On the one hand, financial analysts rely on a wide range of information sources, both public and private, to assess a firm's future prospects and prepare earnings forecasts. Hence, they play an information intermediary role within capital market (Stuerke, 2005). In our study, we concentrate on two properties of analysts' forecast estimates that are deemed to reflect their information environment (Ali et al., 2019; He, Marginson, & Dai, 2019; Mattei & Platikanova, 2017; Wei & Xue, 2015): (1) analyst forecast error (also called analyst forecast accuracy), and (2) analyst forecast dispersion. Previous research shows that financial analysts consider not only financial information in their forecasting activities but also non-financial information. Such non-financial information is diverse and encompasses management commentary information (Aerts & Tarca, 2014), product-related and business expansion information (He et al., 2019; Nichols & Wieland, 2009), corporate environmental policies (Aerts, Cormier, & Magnan, 2008), customer relationships (Ngobo, Casta, & Ramond, 2012), intellectual capital (Hsu & Chang, 2011), segment reporting level (Heo & Doo, 2018), and product market threats (Mattei & Platikanova, 2017). Furthermore, there is some evidence that analysts are sophisticated and efficient in processing non-financial information such as CSR (Cormier & Magnan, 2014; Dhaliwal, Radhakrishnan, Tsang, & Yang, 2012; Jones, 2007; Mattei & Platikanova, 2017).

In this context, a firm's transparency with respect to its E&S practices is potentially value relevant and can have an impact on analysts' decision-making (Orens & Lybaert, 2013). In other words, by mitigating the uncertainty surrounding the value relevance of a firm's CSR practices and activities, E&S transparency supplements the financial information available to analysts. Hence, analysts have an incentive to consider E&S transparency since it helps them assess a firm's future earnings and its value: in this regard, it is worth pointing out that forecast accuracy is critical in determining an analyst's financial rewards and career advancement (He et al., 2019; Mattei & Platikanova, 2017). Thus, E&S transparency is an integral part of CSR strategies if firms want to ensure that analysts to perform more precise evaluations and to provide more accurate estimates (Orens & Lybaert, 2013).

On the other hand, financial analysts also play a monitoring role (e.g., Chung & Jo, 1996; Jensen & Meckling, 1976). Through their analysis, their questions during earnings conference calls, their media interviews and their reports, analysts scrutinize management's decisions and compensate for potential internal oversight weaknesses. For instance, Lang, Lins, & Miller, (2004) show that greater analyst coverage relates with higher firm value. Moreover, the impact of analyst coverage on firm value is greater when a firm exhibits governance features that suggest internal agency problems (e.g., insider control) or weak investor protection. Focusing on earnings management behavior, Yu (2008) finds that firms which are followed by more analysts tend to engage in less accrual-based earnings management. The takeaway from this research is that financial analysts' scrutiny leads managers to take decisions that are more likely to be efficient in terms of value creation. Since E&S issues now underlie the future prospects of many firms, it would thus be expected that greater transparency in this regard would allow analysts to play their monitoring role more effectively.

### 3.2.3 Hypotheses

We can draw upon stakeholder theory and information economics theory to explain how a firm's transparency about its E&S practices can enhance financial analysts' information environment. Within a stakeholder theory perspective (Freeman, 1984), managerial performance improves due to stakeholders' considerations. Hence, firms ought to be responsible toward both their primary and secondary stakeholders, and should communicate with them appropriately. We can then infer that E&S transparency improves the long-term value of the firm by showing how it is meeting its social responsibility obligations (Hinze & Sump, 2019), fulfilling its environmental commitments (Yu et al., 2018), and enhancing its reputation (Manita et al., 2018). In this regard, firms providing extensive information about their E&S practices appear to be on better terms with their stakeholders (Cho, Lee, & Pfeiffer Jr, 2013; Krüger, 2015). Therefore, since greater transparency provides financial analysts with enhanced insights into a firm's E&S practices and their acceptability among stakeholders, it attenuates uncertainty in their information environment.

Within information economics and agency perspectives, a reduction in information asymmetry can result from the revelation of additional performance metrics about underlying managerial actions (Jensen & Meckling, 1976). The context in which firms currently operate suggests that how managers address E&S issues has become a critical aspect of their responsibilities toward investors. Such a perspective is consistent with evidence that greater transparency about E&S practices helps firms overcome agency and information asymmetry problems (Eccles et al., 2011; Hinze & Sump, 2019). Such reduction in information asymmetry can have several capital markets' benefits. For instance, prior research shows that disclosure about CSR practices can play a substitution role for financial disclosure, particularly in terms of reducing information asymmetry between firms and their stakeholders (Lai, Liu, & Wang, 2014; Lara, Osma, & Penalva, 2016), lowering a firm's cost of capital (Sharfman & Fernando, 2008), and attenuating earnings management (Chih et al., 2008). Consistently, we expect E&S transparency to enrich and substantively enhance financial analysts' information environment, which should lead to more accurate (less error) and less dispersed forecasts (Chang, Dasgupta, & Hilary, 2006). Thus, we put forward the following hypothesis:

H1: There is a negative association between a firm's E&S transparency and financial analysts' information environment<sup>12</sup>, as proxied by forecast error and dispersion.

In their seminal work, Modigliani & Miller (1958) classify investment opportunities based on the net present value (NPV) to the two categories of beneficial (NPV>0) and profitless (NPV<0). In this context, managers should try to raise external financing and also implement beneficial and profit-making projects until their marginal benefits become equivalent to their marginal costs. Two scenarios, known as "underinvestment" and "overinvestment", can then arise that lead to a deviation from the optimal level of a firm's investments in different opportunities (Lai et al., 2014; Lara et al., 2016). These scenarios can occur because of market frictions.

<sup>&</sup>lt;sup>12</sup> Since financial analysts' information environment is proxied by forecast error and forecast dispersion, higher (lower) transparency is expected to reduce (increase) the forecast error and forecast dispersion.

Overinvestment scenarios take place when the firms' resources are wrongly assigned to profitless projects, and managers improvidently invest and allocate firm's resources to unprofitable opportunities (Lara et al., 2016). Conversely, underinvestment scenarios happen when firms pull out of profit-making opportunities due to financial constraints and high costs of capital (Lai et al., 2014).

Prior research recognizes information asymmetry and agency problems as the two main sources of market frictions that could lead to either over or under-investments (Lai et al., 2014; Lara et al., 2016). Therefore, any element that may alleviate the agency problems and information asymmetry concerns may also help improve firms' investment efficiency. In this regard, we expect that financial analysts' monitoring, which is facilitated by E&S transparency, leads firms to mitigate over- or under-investment and is conducive to lower (higher) investment inefficiency (efficiency). We argue that the effectiveness of financial analysts' monitoring is reflected in their information environment, which is enriched by E&S transparency. Hence, the following hypothesis is stated:

H2: Conditional on E&S transparency, there is a positive association between financial analysts' information environment, as proxied by forecast error and dispersion, and firm-level investment inefficiency<sup>13</sup>.

### **3.3 Research Design**

#### 3.3.1 Data and sample selection

Our primary sample comprises all S&P 500 index firms over the period 2012-2018. The sample focuses on large firms because previous studies show that they are more likely to be probed by different stakeholders about their E&S practices and to be subjected to analysts' scrutiny

<sup>&</sup>lt;sup>13</sup> Since financial analysts' information environment is proxied by forecast error and forecast dispersion, greater (less) forecast error and forecast dispersion implies more (less) investment inefficiency.

(Cheng, Ioannou, & Serafeim, 2014; Cowen, Ferreri, & Parker, 1987; He et al., 2019; Manita et al., 2018). Out of the initial sample, consistent with prior CSR research (Cheung, 2016; Hamrouni et al., 2019; Zhao & Xiao, 2019), we remove financial firms (SIC codes 6000-6999; 758 firm-year observations) and utility firms (SIC codes 4900-4999; 251 firm-year observations). Finally, we also omit firms with missing E&S transparency data (25 firm-year observation<sup>14</sup>), yielding a final sample of 2466 firm-year observations (353 unique firms). We collect analyst forecast data from I/B/E/S (Summary Statistics file). We also extract the E&S transparency data as well as governance data from Bloomberg. Finally, all financial variables are extracted from Compustat (financial statement data) and CRSP (stock price data). We mitigate the concern related to outliers by winsorizing each continuous variable at the 1 and 99 percent levels of its distribution.

## 3.3.2 Model specification and variable measures

To estimate the influence of E&S transparency on the analysts' information environment (as proxied by analyst forecast accuracy and dispersion) (hypothesis 1), we estimate the following model based on the previous studies and by the use of the OLS estimator (Cormier & Magnan, 2014; He et al., 2019; Heo & Doo, 2018; Mattei & Platikanova, 2017):

$$ANALYSTS IE_{i,t} = \beta_0 + \beta_1 TRANSPARENCY_{i,t-1} + \beta_2 SIZE_{i,t-1} + \beta_3 SysRisk_{i,t-1} + \beta_4 ROA_{i,t-1} + \beta_5 LEV_{i,t-1} + \beta_6 INTANGIBLES_{i,t-1} + \beta_7 CashFlow_{i,t-1} + \beta_8 CAPEX_{i,t-1} + \beta_9 COVERAGE_{i,t-1} + \beta_{10} SalesGrowth_{i,t-1} + \beta_{11} LOSS_{i,t-1} + \sum \beta_k Industry dummies + \sum \beta_j Year dummies + \varepsilon_{i,t}$$

$$(1)$$

where *ANALYSTS IE* is the analysts' information environment and is equivalent to each of analyst forecast error (*XACCURACY*) and analyst forecast dispersion (*DISPERSION*) for firm *i* at time *t*.

<sup>&</sup>lt;sup>14</sup> We omit 25 firm-year observation because they are missing E&S transparency data (because of database issue).

Higher values of *XACCURACY* denote less accurate earnings forecasts (higher analysts' forecast error), and higher values for *DISPERSION* signify that there is greater disagreement among analysts about future earnings, which is an indicator of lower precision. *TRANSPARENCY* also refers to each of social (*SOCIAL*) and environmental (*ENVIRONMENTAL*) transparency. In this context, we expect  $\beta_1$  to be negative and significant in Equation 1 to support hypothesis 1. All variables are defined in the Appendix 1. Analysts' forecast error originates from the absolute difference between the mean earnings per share forecast and actual earnings per share, where higher values of this indicator denote lower (higher) forecast accuracy (error). We also know that financial analysts may deploy disparate approaches to predict earnings that can be influenced by different types of conditions (He et al., 2019). In this context, analysts' forecast dispersion provides us with precious information about the severity of disagreement in analysts' various opinions regarding the future performance of a firm (Mattei & Platikanova, 2017).

As mentioned before, we measure E&S transparency based on the Bloomberg database. These scores have been created based on the suggestions of the Global Reporting Initiative (GRI)<sup>15</sup>. E&S transparency ratings are calculated based on different sources of information such as corporations' websites, annual reports, CSR and sustainability reports, reports submitted to the government, government statistics, third-party research, and Bloomberg's independent survey asking firms about their E&S practices (Bloomberg, 2013; Xie et al., 2019). Particularly, environmental transparency and social transparency relies on indexes and by the use of an array of data points compiled by Bloomberg's investigators who assess E&S dimensions. Bloomberg's analysts assign a weight to each data point based on their importance level and materiality for the specific industry sector. Appendix 2 shows a sample list of the data points covered under the E&S

<sup>&</sup>lt;sup>15</sup> <u>https://www.globalreporting.org/Pages/default.aspx</u>

categories (Bloomberg, 2013). Within each E&S category, the individual firm score is stated as a percentage, so as to make the score comparable across firms. In addition, these scores are tailored for each industry to consider the value relevance of the collected data in each industry sector (Bloomberg, 2013; Xie et al., 2019). While CSR disclosure provides the foundation of Bloomberg's CSR scores, it is subjected to an extensive authentication and validation process that includes the gathering of additional factual information about a firm's CSR practices and their outcomes. In some sense, we consider that Bloomberg's transparency scores straddle CSR disclosure and CSR performance in a unique way and provides a fine-grained perspective to different stakeholders to assess a firm's E&S practices (Yu et al., 2018). It must be noted that prior research extensively uses these scores (e.g., Arayssi, Dah, & Jizi, 2016; Cucari et al., 2018; Jizi, 2017; Manita et al., 2018; Nollet, Filis, & Mitrokostas, 2016; Yu et al., 2018). In our research design, as it is shown in Equation 1, we lag TRANSPARENCY and control variables by one period to mitigate concerns related to concurrent endogeneity problem (Ahmed & Duellman, 2013). We also include year and industry (based on two-digit SIC code) fixed effects in our model, and we estimate this model with t-statistics clustered at the firm level that is robust to both heteroscedasticity and within-firm serial correlation (Petersen, 2009). Finally, we also consider the likelihood that the determination of analyst forecast error and dispersion, and E&S transparency are closely intertwined. Hence, we assess whether there is an endogeneity among these variables or not by the use of Hausman test (Hausman, 1978). Results<sup>16</sup> suggest that the null hypothesis of no endogeneity is not rejected regarding the analyst forecast error and dispersion with E&S

<sup>&</sup>lt;sup>16</sup> Social transparency and analyst forecast error (t=.86, p-value > .38);

Social transparency and analyst forecast dispersion (t= 1.21, p-value > .22

Environmental transparency and analyst forecast error (t= 1.48, p-value > .13);

Environmental transparency and analyst forecast dispersion (t= .49, p-value > .62)

transparency proxies as the associated *p*-values are not statistically significant. In this context, we can conclude that the use of OLS estimator is convenient for our setting.

We expect the association between analysts' information environment and firm-level investment efficiency to be conditional on E&S transparency (Hypothesis 2). Consistent with this prediction, we adopt a mediating variable approach (e.g., Baron & Kenny, 1986). In other words, we expect E&S transparency to indirectly affect firm-level efficiency via its impact on analysts' information environment (i.e., error and dispersion), the latter being the mediating variable. Such a relation is consistent with a full mediation model. However, in addition to its indirect effect via the analysts' information environment, E&S transparency may also have a direct effect on firm-level investment efficiency, in which case we have a partial mediation model. Such a methodological approach is widely used in research on both CSR (e.g., Huber & Hirsch, 2017; Liao, 2018) and analyst forecasts (e.g., Bentley-Goode, Omer, & Twedt, 2019).

To assess the nature of the mediation model that exists, we need to run three separate OLS regressions. First, the regression as shown in Equation 1 above establishes that there is a direct relation between E&S transparency and analysts' information environment and, thus, a foundation to a mediating model. Second, we perform a regression with the following model (Equation 2), which is based on previous studies (Biddle et al., 2009; Chen, El Ghoul, Guedhami, & Wang, 2017; Chen, Sun, Tang, & Wu, 2011):

$$\begin{aligned} XINVEF_{i,t} &= \beta_0 + \beta_1 ANALYSTS \ IE_{i,t} + \beta_2 \ SIZE_{i,t-1} + \beta_3 \ GOV_{i,t-1} + \beta_4 \ ROA_{i,t-1} + \\ \beta_5 \ LEV_{i,t-1} + \beta_6 \ INTANGIBLES_{i,t-1} + + \beta_7 \ CashFlow_{i,t-1} + \beta_8 \ CURRENT_{i,t-1} + \\ \beta_9 TOBINQ_{i,t-1} + \beta_{10} \ FRQ_{i,t-1} + \beta_{11} \ LOSS_{i,t-1} + \\ &+ \sum \beta_k Industry \ dummies + \sum \beta_j Year \ dummies + \varepsilon_{i,t} \end{aligned}$$
(2)

If  $\beta_1$  is statistically significant and positive, then we can conclude that analysts' information environment serves as a mediating variable in the relation between E&S transparency and firmlevel investment inefficiency (assuming that E&S transparency affects analysts' information environment in Equation 1). Finally, a third regression is performed to validate if the mediating model is partial or full:

$$\begin{aligned} XINVEF_{i,t} &= \beta_0 + \beta_1 ANALYSTS IE_{i,t} + \beta_2 TRANSPARENCY_{i,t-1} + \beta_3 SIZE_{i,t-1} + \\ \beta_4 GOV_{i,t-1} + \beta_5 ROA_{i,t-1} + \beta_6 LEV_{i,t-1} + \beta_7 INTANGIBLES_{i,t-1} + \\ + \beta_8 CashFlow_{i,t-1} + \beta_9 CURRENT_{i,t-1} + \beta_{10} TOBINQ_{i,t-1} + \beta_{11} FRQ_{i,t-1} + \\ \beta_{12}LOSS_{i,t-1} + \sum \beta_k Industry dummies + \sum \beta_j Year dummies + \varepsilon_{i,t} \end{aligned}$$
(3)

If we face a full mediation model regarding the relation between E&S transparency and firm-level inefficiency, we expect the coefficient  $\beta_2$  to be non-statistically significant and  $\beta_1$  to be statistically significant and positive. In a partial mediation model, we expect both coefficients to be statistically significant. *XINVEF* denotes the firm-level investment inefficiency, where higher *XINVEF* represents higher (lower) investment inefficiency (efficiency). *ANALYSTS IE* is equivalent to each of analyst forecast error (*XACCURACY*) and analyst forecast dispersion (*DISPERSION*) for firm *i* at time *t*. *CURRENT* represents the ratio of current assets to current liabilities and *TOBINQ* refers to the firm's Tobin's Q. We collect the firm-level corporate governance quality (*GOV*) data based on the corporate governance score of Bloomberg that is a comprehensive multi-aspect measure of governance quality. This score considers different aspects of corporate governance such as the proportion of independent directors, executive compensations, shareholders' rights, etc. (Bloomberg, 2013). Due to econometric reasons, we normalize the *GOV* score by the use of a natural logarithm. *FRQ*, is measured based on absolute discretionary accruals measure (proposed

by DeFond & Park, (2001) model) multiplied by minus one. The remaining independent variables are defined in Appendix 1.

To calculate *XINVEF*, we follow previous studies (Biddle et al., 2009; Chen et al., 2017; Chen et al., 2011) where *XINVEF* is measured as the absolute value of the residuals from the following model (i.e., Equation 4):

$$Inv_{i,t} = \beta_0 + \beta_1 salesgrowth_{i,t-1} + \varepsilon_{i,t}$$
(4)

*Inv* denotes the net increase in tangible and intangible assets, and is scaled by lagged total assets; *salesgrowth* represents the lagged change rate in sales. For each year and industry (based on two digit SIC codes), the model is estimated in a cross-sectional manner through OLS, and *XINVEF* is computed based on the residuals of the model in Equation 4. Under-investment scenarios (*UNDERXINVEF*) refer to absolute values of negative residuals, and over-investment scenarios (*OVERXINVEF*) refer to positive residuals. The absolute values of these residuals are used to construct our dependent variables (*XINVEF*, *OVERXINVEF*, and *UNDERXINVEF*) in Equations 2 and 3 that reflects the deviation from the expected investment level, where higher values of these absolute values denote to higher (lower) investment inefficiency (efficiency).

## 3.4 Results

### 3.4.1 Descriptive statistics

Table 1 depicts the statistics for the variables in our study. Due to econometric reasons, we normalize the E&S transparency scores by the use of a natural logarithm, and as we can see in Table 1, the average for social (environmental) transparency measure is 3.16 (2.98), and it ranges from 1.20 to 4.46 (0.84 to 4.40). The average of *XACCURACY* and *DISPERSION* variables are .23% and .26% of share price, respectively. On average, 6% of the firm-year observations in our sample suffer losses (*LOSS*). The mean values of the *INTANGIBLES* ratio and *CashFlow* ratios

are 0.24 and 0.10, respectively. A firm, on average, has approximately 25% in *LEVERAGE*, return on assets of 6%, sales growth of 7%, and the systematic risk of 1.09. Finally, about 57% of our sample demonstrates an overinvestment scenario (1404 out of 2466). The average level of the variable *OVERXINVEF* (*UNDERXINVEF*) is 0.75 (0.34), reflecting that over-investment (underinvestment) firms inefficiently invest 0.75 (0.34) percent of the total assets on average in a fiscal year.

#### Insert Table 1

Table 2 shows the correlation matrix for the variables used in our research design related to Equations 1, 2, and 3. Results of Table 2 suggest that there are negative (positive) correlations among E&S transparency measures with analysts' forecast error (accuracy) and dispersion. This negative relation between transparency measures and analysts' forecast error and dispersion presents preliminary evidence that E&S transparency can be influential in improving the quality of analyst information environment, and it is related to lowering analysts' forecast error and dispersion. Lastly, we also consider the likelihood of multicollinearity existence among all of our independent variables. In this context, Variance Inflation Factors (VIF) are calculated. The average of VIF is 1.63 with the maximum value of 2.69 for *CashFlow*, suggesting that collinearity between the independent variables is not particularly substantive and would not therefore bias coefficient standard error estimates in OLS.

Insert Table 2

### 3.4.2 Multivariate results

3.4.2.1 E&S transparency and analysts' information environment

Tables 3 and 4 report the results<sup>17</sup> for our model estimation (Equation 1) to test hypothesis 1. Model 1 in both tables provides the results without our test variables, E&S transparency variables. The results pertaining to analysts' forecast error in Table 3, Models 2 and 3 (columns 3 and 4, respectively) yield negative coefficients for the *ENVIRONMENTAL* and *SOCIAL* variables (-.035 and -.074 respectively) that are significant at the 1% level and in line with our predictions in H1. Hence, E&S transparency is associated with lower (higher) analysts' forecast error (accuracy).

Results reported in Table 4 (pertaining to analysts' forecast dispersion) are also consistent with our predictions in H1. The coefficients for *ENVIRONMENTAL* and *SOCIAL* variables are negative (-.007 and -.010 respectively) and significant at the 1% level in models 2 and 3. These results suggest that higher levels of E&S transparency reduce forecast dispersion. The coefficients for most of the control variables are in line with previous literature. For instance, the coefficient of *LOSS* in all of our models is positive and significant at the 1% level showing that analysts face more difficulty in estimating earnings of firms suffering from loss (Mattei & Platikanova, 2017).

#### Insert Table 3

<sup>&</sup>lt;sup>17</sup> As a robustness check of our regressions results in Equation 1, we also use instrumental variable regressions. We instrument each of *SOCIAL* and *ENVIRONMENTAL* variables and re-run two-stage least squares estimations for our models in Table 3 and 4. Based on previous studies (Cui et al., 2018; Eliwa et al., 2019), we use industry average scores of social transparency (*SOCIAL\_IND*) and environmental transparency (*ENVIRONMENTAL\_IND*) separately as the instruments for *SOCIAL* and *ENVIRONMENTAL* respectively. The obtained findings (untabulated) are qualitatively similar to those reported in Table 3 and 4, and our main results related to H1 still hold. One may argue that our main independent variables (*ENVIRONMENT* and *SOCIAL*) are primarily time-invariant, and most of the variation in these variables are cross-sectional instead of time-series. To alleviate this concern, we use the first difference of *ENVIRONMENT* and *SOCIAL* (i.e., *C\_ENVIRONMENT* and *C\_SOCIAL*) in our models. Untabulated results suggest that our inferences about H1 still hold. Finally, we also consider using firm fixed effects in our regression models in Table 3 and 4 to control for unknown time-invariant firm-specific characteristics, and alleviate endogeneity concern related to the omitted firm-specific attributes. Results (untabulated) suggest that our inference related to H1 still holds by considering this specification.

## Insert Table 4

3.4.2.2 Determination of investment efficiency (mediating variable model)

The evidence provided in Tables 3 and 4 clearly shows that E&S transparency relates with financial analysts' information environment. The next step in the analysis is to assess the relation between analysts' information environment and firm-level investment efficiency (Equation 2)<sup>18</sup>.

Table 5 provides the results of regressions between the financial analysts' information environment proxy variables (*XACCURACY*, *DISPERSION*) and measures of investment inefficiency. Consistent with the financial analysts' poor quality information environment having a positive association with firm-level investment inefficiency, higher analyst forecast errors and dispersion relate with more investment inefficiency. In regressions (1) and (2), the coefficients for both *XACCURACY* (0.012) and *DISPERSION* (0.014) are positive and statistically significant (p < 0.01), implying that higher forecast errors and dispersion lead to more overall firm-level investment inefficiency. Similarly, in regressions (3) and (4), the coefficients for both *XACCURACY* (0.010) and *DISPERSION* (0.017) are positive and statistically significant (p < 0.01), which indicates that firms for which analyst forecasts exhibit more errors and dispersion tend to suffer more from overinvestment inefficiency. Finally, in regressions (5) and (6), the coefficients for both *XACCURACY* (0.016) and *DISPERSION* (0.025) are positive and statistically

<sup>&</sup>lt;sup>18</sup> There is some concern that the investment efficiency measure proposed by Biddle et al., (2009) may lead to biased ordinary least square (OLS) coefficients, as it is truncated at 0 (Li & Liao, 2014). To alleviate this concern and to make our result more robust, we re-estimate our tests with investment efficiency as a dependent variable using truncated regressions (Maddala, 1986; Lewbel & Linton, 2002). Results (untabulated) of truncated regressions are consistent with those reported. We also reperform our regressions with an alternative measure of investment efficiency as our dependent variable, capital expenditure ratio, which is computed by capital expenditure deflated by the lagged book value of assets (Chen et al., 2017; McLean et al., 2012). Results (untabulated) are consistent with those reported. Finally, we also consider using firm fixed effects in our regression models to mitigate omitted variable bias concern. Results (untabulated) of firm fixed effects are consistent with those reported.

significant (p < 0.01), which indicates that firms for which analyst forecasts exhibit higher errors and dispersion tend to suffer more from underinvestment inefficiency.

#### Insert Table 5

Focusing on control variables, results generally indicate that larger firm size (*SIZE*), higher leverage (*LEV*), the extent of a firm's intangible assets (*INTANGIBLES*), a higher current ratio (*CURRENT*), and a loss situation (*LOSS*) are associated with greater investment inefficiency. In contrast, higher financial reporting quality (*FRQ*) tends to be associated with lower investment inefficiency as is higher cash flow (*CashFlow*).

The final step in the mediation analysis is to perform regressions of the relation between both E&S transparency and analysts` information environment with firm-level investment inefficiency. If the effect of E&S transparency on firm-level investment inefficiency is indirect and via analysts` information environment (full mediation model), then the coefficients for *ENVIRONMENTAL* and *SOCIAL* should not be statistically significant while the coefficients for *XACCURACY* and *DISPERSION* should remain significant as per the results shown above. If both sets of coefficients are statistically significant, then we face a partial mediation model. Tables 6 and 7 report the results of these analyses. For brevity, and to avoid repetitions, coefficient results for all control variables are omitted (please refer to Table 5 for details – control variables` coefficients are not materially affected by the addition of either *ENVIRONMENTAL* or *SOCIAL* onto the regression).

Table 6 provides the results on the analysis of the relation between investment inefficiency with forecast accuracy (*XACCURACY*) and environmental (*ENVIRONMENTAL*) or social (*SOCIAL*) transparency. Consistent with results presented on Table 5, the coefficient on *XACCURACY* is positive and statistically significant (p < 0.01) in all regressions, corroborating that E&S transparency has an indirect effect via forecast accuracy, which thus acts as a mediating variable. Hence, greater (lower) forecast error (accuracy) implies more firm-level investment inefficiencies. With respect to environmental transparency (*ENVIRONMENTAL*), there is some marginal (p < 0.10) evidence that it has a direct effect on investment inefficiency, as measured by *XINVEF* and *OVERXINVEF: ENVIRONMENTAL*'s coefficients are negative in these two regressions (-0.016 and -0.021 respectively), which indicates that environmental transparency by a firm attenuates its tendency to overinvest. Overall, the results suggest that environmental transparency mostly affects firm-level investment inefficiency via its effect on analyst forecast error (partial mediation model).

Table 7 provides the results on the analysis of the relation between investment inefficiency with forecast dispersion (*DISPERSION*) and environmental (*ENVIRONMENTAL*) or social (*SOCIAL*) transparency. Consistent with results presented on Table 5, the coefficient for *DISPERSION* is positive and statistically significant (p < 0.01) in all regressions, corroborating that E&S transparency has an indirect effect via analyst forecast dispersion, which thus acts as a mediating variable. Hence, more forecast dispersion implies more firm-level investment inefficiencies. None of the coefficients for *ENVIRONMENTAL* and *SOCIAL* are statistically significant in any of the regressions, thus suggesting that E&S transparency affects firm-level investment inefficiency via its effect on analyst forecast dispersion (full mediation model).

Globally, the evidence presented in Tables 6 and 7 is consistent with E&S transparency having an effect on firm-level investment inefficiency via the financial analysts` information

environment<sup>19</sup>, which acts as a mediating variable. These findings further confirm the information intermediary and monitoring roles of financial analysts.

#### Insert Table 6

### Insert Table 7

## 3.5 Additional results

3.5.1 *Role of corporate governance* 

To assess the role of corporate governance and examine whether the relationship between E&S transparency and analysts' forecast error and dispersion vary with the firm level of corporate governance quality (GOV), we split our panel dataset based on the median of corporate governance quality level to two groups of low GOV firms and high GOV firms. The idea is that the earnings of firms having higher corporate governance quality level are more informative and more credible (Cormier et al., 2015; Cormier, Ledoux, & Magnan, 2011; Cormier & Magnan, 2015; Hope, 2003; Vafeas, 2000; Agyei-Mensah & Buertey, 2019). In this context, higher corporate governance quality can be deployed as a mechanism to reduce information asymmetry and decrease the analyst forecast error and dispersion. We collect the GOV data based on the corporate governance score of Bloomberg that is a comprehensive multi-aspect measure of firm-level corporate governance quality. This score considers different aspects of corporate governance such as the proportion of independent directors, executive compensations, shareholders' rights, etc. (Bloomberg, 2013). Due to econometric reasons, we normalize the GOV score by the use of a natural logarithm. Table 8 reports the results of our analysis about the moderating role of GOV variable in the relationship of transparency (i.e., ENVIRONMENTAL and SOCIAL) with analysts' information environment

<sup>&</sup>lt;sup>19</sup> As a robustness check and provide confirmatory evidence about this proposition that the association between analysts' information environment and firm-level investment efficiency is conditional on E&S transparency, we also use SPSS PROCESS macro (Hayes et al., 2017). Results (untabulated) are qualitatively similar to our mediating variable approach (i.e., Baron and Kenny, 1986).

(i.e., *XACCURACY* and *DISPERSION*). The results in Table 8 consistently indicate a significant negative relationship between E&S and analysts' forecast error and dispersion for weakly governed firms (i.e., Low *GOV*), yet this significance fades away for strongly governed firms. The last row of Table 8 indicates the results of Chow test to investigate the significance of differences in the coefficients between the two mentioned subgroups (i.e., Low *GOV* vs. High *GOV*). The coefficients of *ENVIRONMENTAL* and *SOCIAL* in low *GOV* firms are significantly different from those of high *GOV* firms. In summary, the results indicate a negative and significant relationship between E&S and analysts' forecast error and dispersion, particularly for firms with a weak level of corporate governance, hence, a substitution effect is noted.

### Insert Table 8

## 3.5.2 Role of financial reporting quality

To evaluate whether the relationship between transparency and analysts' forecast error and dispersion vary with the level of financial reporting quality (*FRQ*), we divide our panel dataset based on the median of *FRQ* to two groups of low *FRQ* firms and high *FRQ* firms. Previous studies (Biddle et al., 2009; Chen, Hope, Li, & Wang, 2011) present evidence that high level of *FRQ* can reduce the information asymmetry and agency cost since high *FRQ* firms provide rich information to different stakeholders that can help analysts get more accurate and less dispersed forecasts. In this context, we expect lower informational effects of E&S transparency in higher *FRQ* companies. To compute *FRQ*, we use the absolute discretionary accruals measure proposed by DeFond & Park (2001) model multiplied by minus one (Ittonen, Johnstone, & Myllymäki, 2015; Zerni, Haapamäki, Järvinen, & Niemi, 2012). Higher values for *FRQ* implies higher (lower) financial reporting quality (discretionary accruals). Discretionary accruals are commonly used in the literature as the proxy for financial reporting quality (Chen et al., 2011; Gomariz & Ballesta, 2014;

Hope, Thomas, & Vyas, 2013; Martínez-Ferrero, Garcia-Sanchez, & Cuadrado-Ballesteros, 2015; Ramalingegowda, Wang, & Yu, 2013). Untabulated results<sup>20</sup> show a consistent significant negative relationship between E&S transparency (i.e., *ENVIRONMENTAL* and *SOCIAL*) and analysts' forecast error and dispersion (i.e., *XACCURACY* and *DISPERSION*) for firms having low *FRQ* level. However, the significance disappears for high *FRQ* companies, thus suggesting a substitution effect between E&S transparency and financial reporting quality.

### 3.5.3 *Role of media coverage*

Previous studies show that high media coverage can mitigate information frictions and play an information intermediary role in capital markets (Liu & McConnell, 2013). In other words, since firms are concerned about reputation loss, high media coverage can exert a monitoring role to boost information flow and transparency and attenuate information asymmetry between firms and outside stakeholders (Bushee, Core, Guay, & Hamm, 2010; Drake, Guest, & Twedt, 2014). To create our media coverage variable, we rely on the number of news reports published about each firm that is accessible in the Dow Jones FACTIVA database during the period 2012 to 2018. The FACTIVA database is global in its coverage, incorporating more than eight thousands global publications from great and influential media sources (e.g., The Wall Street Journal, The Guardian, Far Eastern Economic Review, Shanghai Daily, etc.). In this context, we follow previous studies (Cahan, Cahan, Lee, & Nguyen, 2017; Hooghiemstra, Kuang, & Qin, 2015; Qi, Yang, & Tian, 2014; Zhang, Tong, Su, & Cui, 2015). We then manually obtain the number of news reports about a firm in each fiscal year. Based on prior research (Comiran, Fedyk, & Ha, 2018; Liu & McConnell, 2013), we also remove news reports that do not incorporate any informative content

 $<sup>^{20}</sup>$  The results of the Chow test reveal that all of the coefficients for Low *FRQ* companies are significantly different from those of high *FRQ* companies.

to make our investigation more robust. Finally, we normalize our media coverage proxy by taking the natural logarithm transformation of one (1) plus the number of news articles about a firm in a given fiscal year (Comiran et al., 2018; Liu & McConnell, 2013). To examine the role of media coverage (*MEDIACOV*), we split our panel dataset based on the median of *MEDIACOV* to two groups of low *MEDIACOV* firms and high *MEDIACOV* firms. Our untabulated results<sup>21</sup> suggest that the influence of E&S transparency (i.e., *ENVIRONMENTAL* and *SOCIAL*) on analysts' forecast error and dispersion is more pronounced for the subsample of firms with low media coverage, which is consistent with a substitution effect between E&S transparency and media coverage.

## 3.5.4 Effect of E&S transparency on corporate-level investment efficiency

To complement the mediation model results with respect to investment efficiency (reported above in Tables 6 and 7), we replicate them by removing variables proxying for financial analysts' information environment (*XACCURACY* and *DISPERSION*). Results<sup>22</sup> (untabulated) consistently indicate a significant negative (positive) relationship between E&S transparency and firm-level investment inefficiency (efficiency), with the exception of *SOCIAL* which is not statistically significant in the *UNDERXINVEF* regression.

### 3.6 Conclusion

Prior research shows that financial analysts examine not only financial information in their forecasting activities, but they also consider non-financial information (Aerts et al., 2008; Aerts & Tarca, 2014; He et al., 2019; Heo & Doo, 2018; Hsu & Chang, 2011; Mattei & Platikanova, 2017;

<sup>&</sup>lt;sup>21</sup> Results show significant differences between low and high *MEDIACOV* for social transparency in both the forecast accuracy and dispersion tests. However, the results only show significant differences between low and high *MEDIACOV* for environmental transparency in the forecast accuracy tests.

<sup>&</sup>lt;sup>22</sup> Our findings about the negative relationship between E&S transparency and firm-level investment inefficiency are robust to the use of instrumental variable regressions and firm fixed effect specification.

Ngobo et al., 2012; Nichols & Wieland, 2009). In this context, based on stakeholder theory but also on agency theory and information economics, and in line with voluntary disclosure theory (Hinze & Sump, 2019), our study shows that a firm's transparency with respect to its CSR practices, especially environmental and social ones, affects financial analysts' information environment and, ultimately, firm-level investment efficiency. We show that the financial analysts' information environment acts as a mediating variable between transparency and investment efficiency, thus confirming analysts' information intermediary and monitoring roles. Additional investigations show that the effect of transparency on analysts' information environment is more pronounced for firms that are weakly governed, have low media coverage, and have low financial reporting quality, thus suggesting a potential substitution effect between transparency and these firm attributes.

Our findings can be of interest to practitioners, academics, policy makers, and regulators, especially in light of the fact that E&S transparency seem to greatly enhance financial analysts' information environment and ultimately lead firms to attain greater investment efficiency. Thus, capital markets' liquidity and efficiency seem to be positively affected by greater E&S transparency. By providing analysts with an enhanced information environment, E&S transparency allows them to play their intermediary and monitoring roles more effectively, as illustrated by the impact of their forecasts on firm-level investment efficiency.

Rooted in stakeholder theory and agency theory, our finding suggest that E&S transparency can be beneficial is in line with prior work (e.g., Byun & Oh, 2018; Clarkson, 1995; Hillman & Keim, 2001). However, we add the caveat that for this positive outcome to happen, financial analysts need to play their information intermediary and monitoring roles: by itself, E&S transparency has a limited direct effect on firm-level investment efficiency once analysts' information environment is taken into account.

This study is not without its limitations. The proxies deployed for E&S transparency, corporate governance, financial reporting quality, media coverage, and investment inefficiency are susceptible to measurement error, a common issue. Exploring the relative robustness of different proxies and their differential impacts (sensitivity analyses) in representative inferential contexts could prove to be informative. Finally, the extent to which the findings reported herein generalize to different time periods and country settings (e.g., emerging markets) is an open question.

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Table 1: Descriptive statistics

Variable	Number of	Moon	SD	Minimum	Maximum
variable	observations	Mean	3D	wiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	Maximum
XACCURACY (%)	2466	0.23	0.38	0.00	0.98
DISPERSION (%)	2466	0.26	0.07	0.11	0.36
ENVIRONMENTAL	2466	2.98	0.98	0.84	4.40
SOCIAL	2466	3.16	0.64	1.20	4.46
SIZE	2466	9.80	1.39	5.03	14.77
SysRisk	2466	1.09	0.41	-1.13	2.28
ROA	2466	0.06	0.07	-0.14	0.53
LEV	2466	0.25	0.12	0.03	0.55
INTANBGIBLES	2466	0.24	0.22	0.00	0.69
CAPEX	2466	0.06	0.04	0.00	0.21
COVERAGE	2466	3.04	0.44	0.00	4.15
SalesGrowth	2466	0.07	0.19	-0.13	0.71
CashFlow	2466	0.10	0.07	-0.28	0.63
LOSS	2466	0.06	0.24	0	1
XINVEF	2466	0.57	0.47	0.00	8.69
OVERXINVEF	1404	0.75	0.56	0.00	8.69
UNDERXINVEF	1062	0.34	0.37	0.00	3.08
FRQ	2466	-0.04	0.06	-0.34	-0.00
GOV	2466	3.64	0.78	0.95	4.31
CURRENT	2466	1.92	0.23	0.36	4.89
TOBINQ	2466	2.03	1.36	0.51	40.17

Table 2: Pears	on's Co	orrelation	Matrix
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Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) $XACCURACY$	1.00									
(2) DISPERSION	0.19*	1.00								
(3) ENVIRONMETAL	-0.11*	-0.12*	1.00							
(4) SOCIAL	-0.15*	-0.15*	0.66*	1.00						
(5) <i>SIZE</i>	-0.11*	-0.24*	0.27*	0.26*	1.00					
(6) SysRisk	-0.08*	0.13*	-0.02	-0.02	-0.00	1.00				
(7) <i>ROA</i>	-0.21*	-0.14*	-0.03	-0.03	-0.26*	0.00	1.00			
(8) <i>LEV</i>	0.12*	-0.03	0.06*	0.08*	-0.09*	-0.14*	-0.12*	1.00		
(9) INTANGIBLES	0.00	-0.10*	-0.04*	-0.00	-0.16*	-0.03	0.04*	0.15*	1.00	
(10) CAPEX	0.00	0.22*	0.03*	0.14*	-0.12*	0.03*	-0.01	0.07*	-0.25*	1.00
(11) COVERAGE	0.03	0.14*	0.16*	0.16*	0.31*	0.00	0.00	-0.05*	-0.10*	0.15*
(12) SalesGrowth	0.12*	0.18*	-0.18*	-0.18*	-0.11*	0.02	0.12*	-0.04*	0.08*	0.05*
(13) CashFlow	-0.07*	0.02	0.01	0.00	-0.39*	0.02	0.65*	-0.05*	0.01	0.34*
(14) <i>LOSS</i>	0.33*	0.30*	0.00	0.01	-0.02	-0.00	-0.49*	0.10*	-0.01	0.12*
(15) XINVEF	0.11*	0.16*	-0.09*	-0.07*	0.03*	0.02	-0.04	0.12*	0.08*	-0.02
(16) <i>FRQ</i>	-0.15*	-0.21*	0.12*	0.09*	0.16*	0.06	0.05	-0.10*	0.00	-0.08*
(17) GOV	-0.09*	-0.14*	0.39*	0.46*	0.11*	0.04	0.07*	0.05*	0.01	0.02
(18) CURRENT	0.00	0.02	-0.04	-0.05	0.14*	0.00	0.03	-0.17*	-0.05*	0.04
(19) TOBINQ	0.00	0.03	0.07*	0.04*	-0.18*	-0.04	0.09*	-0.06	-0.08*	0.05
Variables	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	
(11) COVERAGE	1.00									
(12) SalesGrowth	0.00	1.00								
(13) Cash Flow	0.11*	0.04*	1.00							
(14) <i>LOSS</i>	0.05*	-0.08*	-0.18*	1.00						
(15) XINVEF	0.03	-0.16*	-0.07*	0.05*	1.00					
(16) <i>FRQ</i>	0.09*	0.02	0.04*	-0.06*	-0.10*	1.00				
$(17) \tilde{GOV}$	0.06*	-0.04	0.00	-0.08*	-0.12*	0.09*	1.00			
(18) CURRENT	0.00	0.06	0.01	-0.05*	0.18*	0.04	0.00	1.00		
(19) TOBINO	0.00	0.04	0.07*	-0.04*	0.05	0.00	0.03	-0.06	1.00	

 $\ast$  Denotes significance at the 5% level.

	Model 1	Model 2	Model 3	Model 4
Variables	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)
ENVIRONMENTAL		035*** (-2.75)		017* (-1.74)
SOCIAL			074*** (-4.10)	052*** (-3.08)
SIZE	030** (-2.59)	009 (-0.99)	018* (-1.70)	009 (-1.25)
SysRisk	013** (-2.14)	011* (-1.72)	011* (-1.86)	012* (-1.72)
ROA	757** (-2.09)	485* (-1.70)	697** (-2.01)	475* (-1.66)
LEV	026 (-0.40)	044 (-0.81)	.002 (0.04)	041 (-0.79)
INTANGIBLES	040 (-0.69)	.029 (0.58)	043 (-0.77)	.032 (0.64)
CAPEX	190 (-0.51)	080 (-0.21)	052 (-0.14)	070 (-0.18)
COVERAGE	.052 (1.56)	.065* (1.93)	.053* (1.69)	.064* (1.93)
SalesGrowth	.273 *** (3.75)	.243*** (3.35)	.237*** (3.32)	.235*** (3.18)
CashFlow	.066 (0.27)	028 (-0.13)	.062 (0.25)	040 (-0.18)
LOSS	.373 *** (4.33)	.393*** (4.73)	.386*** (4.54)	.394*** (4.75)
Intercept	.398***( 3.22)	.223** (2.16)	.503*** (4.48)	.340*** (3.09)
Ind. FE.	YES	YES	YES	YES
Year FE.	YES	YES	YES	YES
Adi $R^2$	0.217	0.231	0.246	0.252
F-statistics ( <i>p-value</i> )	6.88 (0.00)	7.29 (0.00)	7.71 (0.00)	8.17 (0.00)
Observations	2466	2466	2466	2466

Table 3: Regression results of E&S transparency on analysts' forecast error

Dependent Variable: XACCURACY

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation.

\*, \*\* and \*\*\* indicate significance at the 10, 5 and 1% levels, respectively. *XACCURACY* represents analysts' forecast error, where higher *XACCURACY* signifies higher analysts' forecast error.

	Model 1	Model 2	Model 3	Model 4
Variables	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)
ENVIRONMENTAL		007*** (-2.79)		006** (-2.57)
SOCIAL			010*** (-2.85)	008* (-1.73)
SIZE	018*** (-8.86)	014*** (-6.57)	016*** (-7.71)	016*** (-5.93)
SysRisk	.002*** (3.04)	.002*** (3.20)	.002*** (2.92)	.002*** (2.82)
ROA	154*** (-3.14)	123*** (-2.80)	146*** (-3.03)	107** (-2.51)
LEV	.022* (1.67)	.036** (2.26)	.026* (1.90)	.041** (2.34)
INTANGIBLES	044*** (-4.09)	036*** (-3.18)	043*** (-4.01)	036*** (-2.71)
CAPEX	.220*** (2.69)	.224** (2.31)	.213** (2.34)	.203* (1.96)
COVERAGE	.029*** (4.98)	.028*** (4.47)	.030*** (5.11)	.031*** (3.64)
SalesGrowth	.056*** (5.96)	.045*** (4.41)	.048*** (5.17)	.041*** (3.94)
CashFlow	063 (-1.39)	062 (-1.35)	060 (-1.31)	060 (-1.26)
LOSS	.032*** (3.24)	.033*** (3.20)	.032*** (3.27)	.032*** (2.93)
Intercept	.354*** (15.48)	.328*** (13.86)	.363*** (15.45)	.374*** (4.68)
Ind. FE.	YES	YES	YES	YES
Year FE.	YES	YES	YES	YES
Adj $R^2$	0.468	0.478	0.470	0.484
F-statistics ( <i>p-value</i> )	17.31 (0.00)	17.97 (0.00)	17.64 (0.00)	18.16 (0.00)
Observations	2466	2466	2466	2466

# Table 4: Regression results of E&S transparency on analysts' forecast dispersion

Dependent Variable: DISPERSION

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation.

\*, \*\* and \*\*\* indicate significance at the 10, 5 and 1% levels, respectively. *DISPERSION* represents analysts' forecast dispersion, where higher *DISPERSION* signifies higher analysts' forecast dispersion.

Variable	Dependent Variab	le:				
	XINVEF	XINVEF	OVERXINVEF	OVERXINVEF	UNDERXINVEF	UNDERXINVEF
	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff (t-value)	Coeff (t-value)	Coeff (t-value)	Coeff (t-value)	Coeff (t-value)	Coeff ( <i>t-value</i> )
XACCURACY	.012*** (3.06)		.010*** (2.98)		.016*** (3.16)	
DISPERSION		.014*** (3.02)		.017*** (3.11)		.025*** (3.29)
SIZE	.016*** (2.89)	.013* (1.81)	.019*** (2.85)	.019** (2.01)	.020* (1.73)	.017** (2.38)
GOV	009 (-1.08)	048 (-1.21)	037 (-0.99)	061 (-1.13)	054 (-0.81)	018 (-1.18)
ROA	071 (-0.88)	075 (-0.92)	049 (-1.15)	061 (-0.69)	081 (-1.10)	076 (-1.03)
LEV	.111*** (3.37)	.092** (2.20)	.071** (2.05)	.068** (2.29)	.065** (2.14)	.143*** (2.98)
INTANGIBLES	.217*** (3.18)	.225*** (3.74)	.372*** (3.43)	.473*** (3.89)	.068*** (3.02)	.205*** (2.86)
CURRENT	.022*** (2.98)	.019*** (3.52)	.029*** (3.27)	.027*** (3.41)	.014*** (2.73)	.010*** (2.84)
TOBINQ	000 (-0.97)	000 (-1.07)	000 (-0.71)	002 (-1.21)	001 (-0.83)	000 (-1.32)
FRQ	713*** (-2.86)	-1.001*** (-3.51)	764** (-2.12)	817***(-2.79)	942*** (-3.43)	973*** (-3.68)
CashFlow	421*** (-3.34)	443*** (-2.82)	614*** (-2.69)	603*** (-2.98)	.059 (1.31)	.067 (1.17)
LOSS	.028*** (2.73)	.042*** (3.06)	.051 (1.16)	.059 (1.29)	.034** (2.01)	.029* (1.79)
Intercept	078 (-0.91)	183 (-1.19)	.231 (1.05)	.174 (0.84)	.310 (1.28)	117 (-0.72)
Ind. FE.	YES	YES	YES	YES	YES	YES
Year FE.	YES	YES	YES	YES	YES	YES
Adj R <sup>2</sup>	0.141	0.135	0.156	0.149	0.237	0.250
F-statistics (p-value)	15.46 (0.00)	14.09 (0.00)	12.36 (0.00)	11.35 (0.00)	8.47 (0.00)	9.83 (0.00)
Observations	2466	2466	1404	1404	1062	1062

Table 5: The effect of analysts' forecast error	or and dispersion on	n firm-level investmen	t inefficiency
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Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation.

\*, \*\* and \*\*\* indicate significance at the 10, 5 and 1% levels, respectively. *XINVEF* denotes the firm-level investment inefficiency, where higher *XINVEF* represents higher (lower) investment inefficiency (efficiency). *OVERXINVEF* (UNDERXINVEF) reflects the overinvestment (underinvestment) observations, where higher values denote to higher (lower) investment inefficiency).

Variable	Dependent Variab	le:				
	XINVEF	XINVEF	OVERXINVEF	OVERXINVEF	UNDERXINVEF	UNDERXINVEF
	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff (t-value)	Coeff (t-value)	Coeff (t-value)	Coeff (t-value)	Coeff (t-value)	Coeff (t-value)
ENVIRONMENTAL	016* (-1.79)		021* (-1.86)		008 (-1.23)	
SOCIAL		026 (-1.17)		034 (-0.96)		011 (-1.07)
XACCURACY	.010*** (2.91)	.013*** (2.79)	.011*** (2.72)	.009*** (2.84)	.018*** (3.01)	.014*** (2.93)
All variables in	YES	YES	YES	YES	YES	YES
Equation 2						
Ind. FE.	YES	YES	YES	YES	YES	YES
Year FE.	YES	YES	YES	YES	YES	YES
Adj $R^2$	0.143	0.119	0.205	0.167	0.251	0.289
F-statistics (p-value)	14.84 (0.00)	14.07 (0.00)	12.29 (0.00)	11.42 (0.00)	8.46 (0.00)	10.02 (0.00)
Observations	2466	2466	1404	1404	1062	1062

Table 6: The effects of E&S transparency and analysts' forecast error on firm-level investment inefficiency

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation. \*, \*\* and \*\*\* indicate significance at the 10, 5 and 1% levels, respectively.

Variable	Dependent Variab	le:				
	XINVEF	XINVEF	OVERXINVEF	OVERXINVEF	UNDERXINVEF	UNDERXINVEF
	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff (t-value)	Coeff (t-value)	Coeff (t-value)	Coeff (t-value)	Coeff (t-value)	Coeff (t-value)
ENVIRONMENTAL	018 (-1.29)		024 (-1.37)		011 (-0.94)	
SOCIAL		028 (-0.86)		041 (-1.18)		013 (-1.04)
DISPERSION	.016*** (2.89)	.012*** (2.78)	.015*** (3.07)	.019*** (2.95)	.026*** (2.82)	.023*** (3.14)
All variables in	YES	YES	YES	YES	YES	YES
Equation 2						
Ind. FE.	YES	YES	YES	YES	YES	YES
Year FE.	YES	YES	YES	YES	YES	YES
Adj R <sup>2</sup>	0.141	0.116	0.198	0.168	0.253	0.286
F-statistics (p-value)	14.47 (0.00)	13.84 (0.00)	12.16 (0.00)	11.78 (0.00)	8.58 (0.00)	9.84 (0.00)
Observations	2466	2466	1404	1404	1062	1062

Table 7: The effects of E&S transparency and analysts' forecast dispersion on firm-level investment inefficiency

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation. \*, \*\* and \*\*\* indicate significance at the 10, 5 and 1% levels, respectively.

Variables	Dependent Va	ariable:			Dependent Variab	ole:		
	XACCURACY				DISPERSION			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Coeff ( <i>t</i> -value)	Coeff ( <i>t</i> -value)	Coeff ( <i>t</i> -value)	Coeff ( <i>t-value</i> )	Coeff ( <i>t</i> -value)	Coeff ( <i>t-value</i> )	Coeff ( <i>t</i> -value)	Coeff ( <i>t</i> -value)
	Low GOV	High GOV						
ENVIRONMENTAL	027**(-2.07)	038(-1.57)			006**(-2.01)	019(-1.41)		
SOCIAL			074***(-3.14)	067(-1.21)			018***(-2.74)	001(-0.84)
SIZE	014(-0.92)	018*(-1.83)	025(-1.10)	022*(-1.96)	013***(-4.02)	011***(-3.89)	014***(-4.47)	012***(-5.12)
GOV	019(-0.76)	116***(-2.71)	251(-1.01)	146*(-1.89)	.031(0.55)	030(-0.99)	064(-1.15)	044**(-2.21)
SysRisk	022***(-3.76)	001(-0.75)	019**(-2.20)	001(-0.81)	.001(0.97)	.004***(3.39)	.000(0.81)	.004***(3.89)
ROA	777***(-2.61)	202(-1.15)	-1.44**(-2.12)	192(-0.82)	163***(-3.13)	111*(-1.94)	220***(-4.23)	108*(-1.91)
LEV	124(-1.37)	015(-0.41)	.054(0.54)	016(-0.67)	.007(0.87)	.037(1.45)	005(-0.72)	.038*(1.76)
INTANGIBLES	016(-0.48)	.117*(1.76)	140(-1.39)	.118(1.42)	008(-0.53)	052***(-4.20)	032**(-2.18)	050***(-3.61)
CAPEX	305(-0.65)	.051(0.78)	370(-0.58)	.072(0.44)	.205(1.59)	.253*(1.74)	.184*(1.79)	.272**(2.32)
COVERAGE	.088**(2.54)	.051(1.05)	.061*(1.75)	.049(0.86)	.038***(4.84)	.013(1.29)	.035***(4.34)	.012(1.41)
SalesGrowth	.208***(3.20)	.213***(2.99)	.201**(2.43)	.210**(2.30)	.034**(2.37)	.041*(1.87)	.041***(3.66)	.043***(3.01)
CashFlow	009(-0.83)	236(-0.52)	.452(1.09)	286(-1.28)	005(-0.69)	056(-0.83)	.011(0.61)	065(-1.11)
LOSS	.454***(5.36)	.339***(4.88)	.407***(2.73)	.341***(6.42)	.010(0.93)	.042***(3.25)	.006(0.66)	.043***(2.94)
Intercept	.327(0.46)	146(-0.54)	1.579(1.48)	095(-0.57)	.165(0.70)	.488***(4.52)	.605***(2.69)	.542***(4.70)
Ind. FE.	YES							
Year FE.	YES							
Adj R <sup>2</sup>	0.378	0.207	0.352	0.174	0.520	0.496	0.512	0.494
F-statistics (p-value)	6.07 (0.00)	3.98 (0.00)	5.89 (0.00)	3.73 (0.00)	20.14 (0.00)	16.57 (0.00)	19.69 (0.00)	15.85 (0.00)
Observations	1233	1233	1233	1233	1233	1233	1233	1233
Difference Low- High	.011*	(2.92)	007**	* (3.86)	.013* (	(2.57)	017*	(2.84)

Table 8: Role of governance on the relationship of E&S transparency with analysts' forecast error and dispersion

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation.

\*, \*\* and \*\*\* indicate significance at the 10, 5 and 1% levels, respectively. In the last row, the Wald statistic is depicted in parenthesis.

Appendix 1 Definition of variable

Definition of variables	
Name of variable	Variable definition
Dependent variable = Analysts' forecast properties and investment inefficiency (Source : I/B/ES, Compustat, and CRSP )	
XACCURACY	The absolute difference between the mean earnings per share forecast and the actual earnings per share, divided by the stock price at the beginning of the reporting period. Higher value denote to less (more) accurate forecast (error).
DISPERSION	The standard deviation of the earnings per share forecast, divided by the stock price at the beginning of the reporting period. Higher value implies more (less) dispersed (precise) forecast.
XINVEF	Investment inefficiency measured based on the absolute values of residuals in the investment model (Biddle et al, 2009)
OVERXINVEF	Over-investment inefficiency measured based on the absolute values of positive residuals in the investment model (Biddle et al, 2009)
UNDERXINVEF	Under-investment inefficiency measured based on the absolute values of negative residuals in the investment model (Biddle et al, 2009)
Variable of interest= Disclosure transparency (Source : Bloomberg)	
SOCIAL	Natural logarithm of social transparency score.
ENVIRONMENTAL	Natural logarithm of environmental transparency score.
Firm controls (Source: Compustat and CRSP)	
SIZE	Natural logarithm of total assets in the millions of USD
SysRisk	Systematic risk measured by Equity beta for a given firm for a given fiscal year
ROA	Return on asset measured by the ratio of earnings before interests to total assets
LEV	Leverage measured by the debt to total asset ratio
INTANGIBLES	Intangible assets divided by total assets
CAPEX	The sum of research and development expenses and advertisement expenses, divided by income before extraordinary items, for a given fiscal year
COVERAGE (Source : I/B/E/S)	The natural logarithm of 1 plus the number of analysts that make at least one EPS forecast for a given firm for a fiscal year
SalesGrowth	The difference between the sales for the current fiscal year and the sales for the previous year, divided by the sales for the previous year
CashFlow	Cash flow from operations measured by the ratio of operating cash flow to total assets
LOSS	A dummy that takes the value of one if net income before extraordinary items is negative, and zero otherwise
CURRENT	Ratio of current assets to current liabilities
TOBINQ	Firms' Tobin's Q ratio

FRQ	Absolute values of discretionary accruals measured by DeFond and Park, (2001) model, multiplied by minus one. Higher values denote to higher financial reporting quality
GOV (Source: Bloomberg)	Natural logarithm of corporate governance quality score.
MEDIACOV (Source: Dow Jones FACTIVA)	Natural logarithm of one plus the number of news articles about a firm in a given fiscal year

Appendix 2 Sample of environmental and social data points in Bloomberg

Environmental data points	Social data points
Direct CO2 Emissions	Number of Employees
Travel Emissions	Employee Turnover %
Total GHG Emissions	% Women in Workforce
Particulate Emissions	% Women in Mgt
Total Energy Consumption	% Minorities in Workforce
Renewable Energy Use	% Disabled in Workforce
Water Consumption	Lost Time from Accidents
Electricity Used (MWh)	Workforce Accidents
Total Waste	Fatalities—Contractors
Waste Recycled	Fatalities—Employees
Raw Materials Used	Community Spending
ISO 14001 Certified Sites	SRI Assets Under Management
Environmental Accounting Cost	Health and Safety Policy
Investments in Sustainability	Fair Remuneration Policy
Energy Efficiency Policy	Training Policy
Emissions Reduction Initiatives	Employee CSR Training
Green Building Policy	Equal Opportunity Policy
Environmental Supply Chain Management	Human Rights Policy
Climate Change Policy	UN Global Compact Signatory
Biodiversity Policy	% Employees Unionized
Environmental Quality Management Policy	Employee Training Cost

Chapter 4. Does Environmental and Social Transparency Mitigate Corporate Cash Holdings?

# Does Environmental and Social Transparency Mitigate Corporate Cash Holdings?

## Abstract

The purpose of this paper is to explore how a firm's environmental and social (E&S) transparency relates with its cash holdings. E&S transparency is distinct from either CSR performance or CSR disclosure as it embeds both dimensions via a comprehensive score developed and published by Bloomberg. Essentially, firm-specific scores compiled by Bloomberg capture both the quantity (in terms of the number of data points) and the quality (with respect to objective and industry-relevant data points) of verified E&S information attributed to a firm's E&S practices. Focusing on a large sample of S&P 500 firms, results show that a higher level of E&S transparency implies lower firmlevel cash holdings. The negative relationship is more pronounced for firms suffering from high information asymmetry, with low financial reporting quality, and for those with weak governance. Further analyses document that the two channels and mechanisms by which E&S transparency affect firm-level cash holdings are the cost of debt and financial constraints. Finally, our findings suggest that E&S transparency increases the market value relevance of an additional dollar in cash holdings. Our paper improves our understanding of the effective monitoring and insurance-like roles of E&S transparency in mitigating both information asymmetry (reflected in lower firm-level cash holdings) and agency problems (reflected in the higher marginal value of cash holdings).

**Keywords**: Corporate social responsibility (CSR), environmental transparency, social transparency, cash holdings, cost of debt, financial constraint

## 4.1 Introduction

In this paper, we investigate whether a firm's environmental transparency and social transparency (E&S transparency thereafter), a fundamental aspect of Corporate Social Responsibility (CSR) affects its cash management policy. We assert that E&S transparency acts as a monitoring mechanism that constrains managers' opportunistic behavior regarding the use of corporate cash, thus translating into lower firm-level cash holdings.

US firms considerably increased their cash (i.e., cash and marketable securities) holdings since the early sixties (Bates, Kahle, & Stulz, 2009; Lu, Shailer, & Yu, 2017). As of 2013, Forbes<sup>23</sup> reports that the sum of cash holdings by all US firms (financial and nonfinancial) was estimated at \$5 trillion. More recently, especially as a result of the 2017 Tax Cuts and Jobs Act, corporate cash holdings have decreased somewhat as firms repatriated cash held in their foreign affiliates and increased stock buybacks. However, as of 2018, cash holdings by the largest U.S. nonfinancial firms were estimated to be around \$1.7 trillion<sup>24</sup>. Similar trends can be observed in other developed economies<sup>25</sup>. Such large<sup>26</sup> cash holdings do carry an opportunity cost (e.g., low return and double taxation), but also exacerbate agency problems as cash can be redirected far more easily into personal welfare and pet projects by managers as compared to other assets (Bates et al., 2009; Shin, Kim, Shin, & Lee, 2018).

In this context, prior research suggests that firms facing information asymmetry issues are more likely to hoard cash (García-Teruel, Martínez-Solano, & Sánchez-Ballesta, 2009). A

<sup>&</sup>lt;sup>23</sup> http://www.forbes.com/sites/louiswoodhill/2014/01/01/why-american-companiesareholding-onto-5-trillion-in-cash/

 <sup>&</sup>lt;sup>24</sup> <u>https://www.wsj.com/articles/u-s-corporate-cash-piles-drop-to-three-year-low-11560164400</u>
<sup>25</sup> See, for example, Mansali et al. (2019), Amess, Banerji, & Lampousis (2015) and www.bloomberg.com/professional/blog/european-cash-hoarding-companies-needto-consider-alternative-uses-for-funds/

<sup>&</sup>lt;sup>26</sup> Because of corporate cash holding's economic significance and its related agency and opportunity costs, it is pivotal to investigate what drivers influence the mitigation/exacerbation of firm-level cash holding.

potential explanation is that information asymmetry and agency problems reduce a firm's ability to easily obtain external financing at a low cost, thereby inducing it to rely on internal sources (i.e., cash and cash equivalents). Thus, cash is accumulated to meet unexpected future operational and non-operational necessities (García-Teruel et al., 2009). Any factor that can mitigate the information asymmetry and agency problem also makes access to external financing easier and less costly for a firm, thus reducing its tendency to hold cash.

CSR does have the potential to play that role. In recent years, CSR practices (including both CSR performance and CSR disclosures), particularly those relating to E&S issues, have become salient and the object of much attention by investors and various stakeholders. This significance arises as (a) there are public demand and pressure from different stakeholders to know more about how firms manage E&S issues, and (b) different stakeholders such as equity and debt investors as well as credit rating agencies take into considerations E&S criteria in their decision making process regarding firm-specific investments (Cui, Jo, & Na, 2018; Matsumura, Prakash, & Vera-Munoz, 2014).

However, while information needs about E&S practices and the practices themselves are comprehensive, prior research typically relies on either E&S performance or E&S disclosure as a proxy for E&S practices. The purpose is generally to identify the determinant and consequences of these proxy measures (Benlemlih & Bitar, 2018; Chih, Shen, & Kang, 2008; De Bakker, Groenewegen, & Den Hond, 2005; Waddock & Graves, 1997). Such an approach raises several potential problems<sup>27</sup>. For instance, E&S performance measures primarily capture quantifiable (or hard) information but do not reflect other factual data such as E&S policies and processes, which

 $<sup>^{27}</sup>$  For example, (Matsumura et al., 2014) suggest that firms can be penalized for bad CSR performance, but it is possible that the capital market rewards firms with poor CSR performance that disclose such information. In this line, we can observe a need to have a verified, comprehensive, and trustworthy construct that can capture different aspects of E&S practices information.

are as important (Hinze & Sump, 2019; Yu, Guo, & Luu, 2018). Moreover, E&S performance proxies usually rely on the self-claim and self-report information made by firms, and we often observe no authentication process in the output determination process of these measures (Hinze & Sump, 2019; Lock & Seele, 2016; Moratis, 2017a, 2017b). The issue of dependence upon selfclaimed and self-reported information is also a serious concern regarding E&S disclosure measures (Lock & Seele, 2016; Moratis, 2017a, 2017b). Moreover, while there are some general frameworks such as the Global Reporting Initiative (GRI), the comparability across firms of firm-specific data is also an issue (Yu et al., 2018). Finally, E&S performance is often scattered across an array of sources (i.e., a firm's own disclosure, government or regulatory databases, industry data), with studies typically focusing only on one source (Hinze & Sump, 2019; Lock & Seele, 2016; Moratis, 2017a, 2017b). Closing the loop between E&S performance and E&S disclosure and validating is thus a challenge. Therefore, we believe there is a need for a reliable proxy (e.g., a verified comprehensive construct) to provide a comprehensive picture of E&S practices, which captures reliable and verified data, rather the partial view that performance proxies or disclosure can offer.

To fill this gap, we use Bloomberg's E&S transparency ratings to capture verified information related to both E&S performance and E&S disclosures measures. Bloomberg E&S transparency ratings reflect the quantity of relevant and valuable information about E&S issues as well as both hard and soft information (Bloomberg, 2013; Xie, Nozawa, Yagi, Fujii, & Managi, 2019).

Our study extends the scope of previous research (e.g., Yu et al. 2018) by introducing both environmental and social transparencies as novel determinants of firm-level cash holding. Our argument that enhanced E&S transparency translates into less information asymmetry and agency problems, as captured by firm's lower propensity to hold cash, rests on two primary arguments. First, based on information economics and in line with voluntary disclosure theory (Hinze & Sump, 2019), we believe that E&S transparency provides an informational perspective on the material, value relevant, and incremental current and future costs and benefits a firm will face because of its activities. As such, it alleviates information asymmetry and agency cost problems, thus improving the effective monitoring to which managers are subjected and constraining their opportunistic behavior in the use of cash resources. As a result, equity and debt investors are able to assign higher trust and credibility to transparent firms, and grant them external financing at a lower cost and in an easier manner (Cormier, Aerts, Ledoux, & Magnan, 2009). Hence, it is expected that a transparent firm will exhibit less need to hold cash.

Second, based on a cost-benefit point of view, we believe that E&S transparency leads firms to hold less cash. Firms benefit from cash hoarding to decrease the probability of financial distress and to avail themselves of positive NPV investment opportunities. In this context, there is prior evidence suggesting that a more extensive CSR orientation can help firms to have lower cost of equity (Dhaliwal, Li, Tsang, & Yang, 2014), cash flow volatility (Han & Qiu, 2007), risky cash flow (Opler, Pinkowitz, Stulz, & Williamson, 1999), bankruptcy risk (W. Sun & Cui, 2014), and litigation risk (Hong & Kacperczyk, 2009). Consistently, we expect firms with greater E&S transparency to be less exposed to default risk, aggregate shocks, and financial distress because of the insurance-like protection of transparency (Yu et al., 2018). Hence, such transparent firms need not hold cash to buffer against adverse shocks.

Anecdotal evidence also points toward the possibility that enhanced E&S transparency is associated with lower cash holding. For example, in an effort to build their competitive advantage, Verizon and the Campbell Soup Company<sup>28</sup> launched a project called "ROI" to support their E&S

<sup>&</sup>lt;sup>28</sup> https://www.forbes.com/sites/causeintegration/2015/08/26/doing-good-is-good-business-but-can-you-proveit/#7cfdee82a52d

practices, and to quantify the benefit of their commitment toward E&S matters. Findings suggest that firms enjoying more extensive E&S orientation have lower systematic risk, cost of equity, share price volatility, and lower amount of market losses from crises. These finding are in line with our argument that enhanced transparency help firms to be less risky because of insurance-like roles of E&S transparency (Yu et al., 2018), thus decrease firms' inclination to hold low return cash.

Using 2466 firm-year observations related to non-financial and non-utility S&P 500 firms over the period of 2012-2018, this study explores (1) whether E&S transparency is related to firmlevel cash holding; (2) under which circumstances (from the perspectives of firm-level information asymmetry, financial reporting quality, and corporate governance) do the aforementioned relations become more pronounced; and (3) whether firm-level cost of debt and firm-level financial constraints act as channels and mechanisms by which E&S transparency affect firm-level cash holding.

Our results suggest that the two components of E&S transparency are each individually and negatively related to firm-level cash holding. We also find that the relationship between each E&S transparency and firm-level cash holding is more pronounced for firms (a) exposed to high information asymmetry (measured by the dispersion of financial analysts' earnings forecasts) (b) with weak corporate governance (measured by Bloomberg's governance quality score), (c) with low levels of financial reporting quality (measured by the DeFond & Park, (2001) model). These findings indicate that the role of E&S transparency as an external monitoring mechanism is strengthened when other monitoring mechanisms such as financial reporting quality and governance quality are not as strong, implying a substitution role. Our findings of the relationship between each E&S transparency and firm-level cash holding still hold after a battery of robustness

checks such as alternative measures and specifications of cash holding (e.g., use of excess cash holdings rather than the actual level of cash holdings), use of instrumental variable regression approach, and mitigation of omitted variable bias (e.g., incorporating rollover risk, corporate governance quality, financial reporting quality, and considering firm fixed effects in our primary model).

Further analyses document that the two channels and mechanisms by which E&S transparency affect firm-level cash holdings are the cost of debt (measured by the ratio of a firm's interest expense to its average debt) and financial constraints (measured based on WW index (Zhao & Xiao, 2019)). Findings suggest that higher E&S transparency can help firms to enjoy lower cost of debt and to be less financially constrained, enabling firms to obtain external financing more easily and at a lower cost, thus less need to hoard cash.

Finally, we look at the cash holding problem from investors' perspective, i.e., how investors expect cash to be used. Thus, we investigate the relationship between E&S transparency and the marginal value of cash holding. If E&S transparency plays a monitoring role, we can expect that these supervisory mechanisms mitigate information asymmetry and agency conflict problems that translate into the potential misuse of cash holdings and the related destruction of cash value. In contrast, in a context of E&S transparency, we expect that investors will assign greater value to a firm's cash holding. Our findings suggest that each E&S transparency increases the market value of an additional dollar in cash holding.

Three papers are closely related to our paper. Previous studies suggest that CSR performance is positively associated with the marginal value of cash holding (Arouri & Pijourlet, 2017) and corporate cash holding (Cheung, 2016). Our paper is different from these papers in several ways. For instance, we rely on E&S transparency scores, which are more comprehensive and reliable

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than CSR performance measures as they embed both hard and soft information. In addition, we distinguish between the environmental and social dimensions of CSR while they focus on a single measure which encompasses governance as well, thus further confounding what they exactly measure. Finally, we consider potential factors that moderate the relation between E&S transparency and cash holding and explore two channels by which E&S transparency explicitly affects corporate cash holding. Finally, Lu et al., (2017) find that the issuance of a standalone CSR report is positively related to the marginal value of cash holdings. Our paper goes beyond this dichotomous characterization<sup>29</sup> since all sample observations have E&S transparency scores that exhibit significant heterogeneity across firms and years.

Our study provides the following contributions. First, we extend fairly unexplored literature that focuses on the consequences of E&S transparency (Bernardi & Stark, 2018; Cucari, Esposito De Falco, & Orlando, 2018; Manita, Bruna, Dang, & Houanti, 2018; Yu et al., 2018) by introducing the novel outcome of lower (higher) firm-level cash holding (marginal value of cash holding). We also add to prior research (Aerts, Cormier, & Magnan, 2008; He, Marginson, & Dai, 2019) that tries to present evidence about the materiality and value relevance of non-financial information as we show that higher E&S transparency results in the mitigation of information asymmetry concern (reflected in lower firm-level cash holdings) and agency problem (reflected in higher marginal value of cash holding). This materiality and value relevance of transparency

<sup>&</sup>lt;sup>29</sup> We focus on social and environmental transparency, as proxied by Bloomberg E&S transparency scores, not the issuance of self-report and self-claim standalone CSR reports. We investigate the individual impact of E&S transparency on firm-level cash holding. E&S transparency is a third party assessment, which includes authenticated information about both E&S performance and disclosures, arising from different sources (e.g., third party research, government statistics, Bloomberg independent analyses), which rates how transparent with respect to materiality and value relevance a firm's E&S practices are. To make the distinction clearer, we can make the following analogy. For example, while there is extensive research on corporate financial reporting and on its implications (e.g., Graham et al., 2005). However, there is also an extensive and distinct line of research on the rating by analysts and transparency of such disclosure and on its implications (e.g., Biddle et al., 2009; Bushee and Noe, 2000; Drake et al., 2009).

(especially to capital providers) is important as managers' cognizance of this matter can impact both manager's investment decisions and also their commitment to E&S transparency. In addition, our findings are relevant to standard setters and regulators who underscore the importance of E&S transparency.

Secondly, to best of our knowledge, this paper is the first one that introduces the two channels of cost of debt and financial constraints by which E&S transparency affects firm-level cash holding. Furthermore, this paper is the first one to provide evidence about the moderating roles of the firm-level characteristics of financial reporting quality, corporate governance, and firm-level information asymmetry on the relationship of E&S transparency and cash holding.

In addition, we extend the literature, that aim to identify the determinants of corporate cash holding and value of cash holding as we introduce E&S transparency, which decreases not only firm-level cash holding but also value destruction related to hoarding cash. Previous studies suggest many factors influence cash holdings, such as rollover risk (Harford, Klasa, & Maxwell, 2014), earnings quality (Shin et al., 2018), national culture (Y. Chen, Dou, Rhee, Truong, & Veeraraghavan, 2015), CEO overconfidence (Y.-R. Chen, Ho, & Yeh, 2020), board gender diversity (Atif, Liu, & Huang, 2019), policy uncertainty (Phan, Nguyen, Nguyen, & Hegde, 2019), financial statement comparability (Ahn, Choi, & Yun, 2020), business group membership (Locorotondo, Dewaelheyns, & Van Hulle, 2014), social capital (Habib & Hasan, 2017), corporate brand value (Bharadwaj, Hanssens, & Rao, 2020), product market threats (Hoberg, Phillips, & Prabhala, 2014), and a bundle of other firm-level factors (Amess, Banerji, & Lampousis, 2015). We add to prior literature by introducing the novel non-financial driver that is E&S transparency.

From a practical perspective, the findings of this paper are important for different stakeholders (e.g., debt and equity investors, corporate directors, credit rating agencies) that they

can encourage firms to be more socially and environmentally transparent as we provide tangible evidence about the roles of two novel and effective supervisory mechanisms of E&S transparency in mitigation (improvement) of agency and opportunity cost of cash holding (marginal value of cash holding). In conclusion, the results of our study are in line with the concept that firm transparency (reflected in E&S transparency) can be a crucial element in justifying a firm's cash management policy and, in an overall view, firm policies (Mansali, Derouiche, & Jemai, 2019).

The remainder of the paper is organized as follows. In Section 2, the salient literature is reviewed, and the study's hypotheses are developed. Methodological details are provided in Section 3 before the main empirical results are delineated in Section 4. Section 5 provides additional results, and, finally, conclusions are offered in Section 6 including suggestions for future research in this domain.

# 4.2 Literature review and hypotheses development

### 4.2.1 Firm-level cash holdings

In spite of the agency and opportunity costs (e.g., lower rate of return and double taxation issue) related to the hoarding of cash, the critical question is why firms hold cash. Three theoretical perspectives exist in this regard: 1) trade-off theory (transaction and precautionary motives for holdings cash), 2) pecking order theory, and 3) agency theory (Dittmar & Mahrt-Smith, 2007; Habib & Hasan, 2017). Trade-off theory suggests that the tradeoff between the marginal benefits and costs of holding cash determines a firm's optimal cash level (Opler et al., 1999). The primary cost of cash holdings is the opportunity cost arising from investing in low return cash rather than in other higher return assets (Opler et al., 1999). However, cash hoarding can help firms reduce their transactions costs and default risks, and increase their ability to seize opportunities for positive NPV projects, particularly if external financing is difficult to obtain as a result of

information asymmetry or agency problems (Dittmar & Mahrt-Smith, 2007; Habib & Hasan, 2017; Zhao & Xiao, 2019). Evidence suggest that firms tend to accumulate cash if they are more exposed to liquidity shocks, uncertainties, and risky (uncertain) cash flows (Opler et al., 1999), financial risks (Riddick & Whited, 2009), high volatile cash flows (Han & Qiu, 2007), and high idiosyncratic risk and market-wide risk (Benlemlih, Shaukat, Qiu, & Trojanowski, 2018; Habib & Hasan, 2017).

The pecking order theory (also called financial hierarchy theory) suggests that we do not have any optimal level of cash, and cash only plays the role of a buffer between retained earnings and investment needs (García-Teruel et al., 2009). Based on this theory, firms tend to use internally generated cash before they seek external financing, with debt being the first alternative prior to equity. The logic of this behavior is that information asymmetry raises the cost of external financing relative to internal financing.

Finally, the agency theory perspective on cash holdings proposes that managers hoard cash rather than pay dividends to shareholders (Jensen, 1986). Cash hoarding raises the scale of assets controlled by entrenched and self-interested managers, and allows them to follow their own objectives rather than maximizing shareholders' wealth. For example, former research suggests that firms having higher levels of cash holdings get more involved in value destructive acquisitions (Harford, 1999).

The core argument underlying these theories is that informatively opaque firms, i.e., with information asymmetry or agency issues, find it difficult to obtain external financing at a low cost (Habib & Hasan, 2017). Therefore, any factor (e.g., external monitoring mechanisms of E&S transparency) that can mitigate the asymmetric information problem can also attenuate the inclination of firms to hoard cash.

## 4.2.2 The Need for E&S Transparency

In recent years, we observe increasing concerns from different stakeholders about firms' CSR practices, especially on environmental and social matters (Cormier, Lapointe-Antunes, & Magnan, 2015; Cormier, Ledoux, & Magnan, 2011). In this context, there is a need for extensive and objective information related to E&S matters (i.e., E&S transparency). According to a study presented by the CFA Institute<sup>30</sup>, more than 73% of investment professionals examine and take E&S information into account in their investment decision-making process. Based on a recent survey conducted by the United Nations, 88% of CEOs from more than 98 countries think that their dedication to E&S practices is reflected in tangible effects that are consistent with their firm's financial prosperity of their firms (Eliwa, Aboud, & Saleh, 2019). Finally, according to a Nielsen Global 2015 report about E&S issues, 65% of global customers are eager to pay more for sustainable brands in comparison with 54% in 2013, and that 72% of global millennials are enthusiastic about paying extra for sustainable products in comparison with 49% in 2013 (Eliwa et al., 2019).

In a seminal work, Godfrey (2005) finds that a firm's investment in E&S issues can be seen as a risk management strategy that potentially generates an insurance-like protection for its cash flows. Similarly, Oikonomou, Brooks, & Pavelin (2012) show that more extensive E&S orientation can help firms to create a good relationship with stakeholders such as creditors. Such orientation can be compared to a real option deployed by firms to control their operational costs and input prices. Finally, there is prior evidence that more extensive E&S orientation decreases the information asymmetry between the firm and its stakeholders, and improves the firm

<sup>&</sup>lt;sup>30</sup> https://www.cfainstitute.org/-/media/documents/survey/esg-survey-report-2017.ashx

informational environment reflected in more precise financial analysts' earnings forecasts (Cormier & Magnan, 2014; Hammami & Zadeh, 2019).

A major challenge is the measurement of a firm's transparency as it encompasses several sources of information about its E&S practices and their effects. MCSI and Thomson Reuters Asset4 attempt to estimate and report firms' E&S performance, but only Bloomberg tries to measure and report E&S transparency (Bloomberg, 2013). In this context, transparency refers to the high quantity of relevant and valuable information about E&S practices including both aspects of E&S performance and E&S disclosures (Bloomberg, 2013; Yu et al., 2018). Previous studies (Benlemlih & Bitar, 2018; Chih et al., 2008; Godfrey, 2005; Oikonomou, Brooks, & Pavelin, 2012) mainly concentrate on E&S performance rather than firms' E&S transparency. Regarding E&S performance measures, they primarily capture hard information (i.e., quantifiable information), and they do not sufficiently incorporate soft information (e.g., E&S policies). In addition, these proxies usually rely on the self-claim and self-report information made by firms, and we observe no authentication<sup>31</sup> process in their output determination process (Hinze & Sump, 2019; Lock & Seele, 2016; Moratis, 2017a, 2017b).

Bloomberg's E transparency covers various kinds of E information that can be generally categorized as "hard" and "soft" components. Hard components refer to quantifiable E information like greenhouse gas emissions, water use, waste disposal amount, and energy consumption, among

<sup>&</sup>lt;sup>31</sup> Based on a report published in Forbes, One of the critical demands of stakeholders regarding the information related to CSR practices is "Searching for the Truth". This report suggests, "While corporate transparency and disclosure have long been expected by stakeholders, they are no longer good enough. With fake news, alternative facts, and the ability of social media platforms to spread outright lies globally, corporate stakeholders are not only searching for the truth, but demanding it as a requirement for doing business. Expect to see more emphasis placed on external and third-party auditors and reviewers who will be hired to verify the information being shared by companies as both transparent and accurate."(https://www.forbes.com/sites/timothyjmcclimon/2020/01/02/5-corporate-social-responsibility-trends-to-follow-in-2020/#66b7574f7e69). This authentication approach is observed in Bloomberg E&S transparency scores, but we do not observe such a verification approach in other databases used in previous studies such as Arouri & Pijourlet,(2017), Cheung, (2016), and Lu, Shailer, & Yu, (2017).

others. Soft components capture firms' *E* policies and initiatives like waste reduction initiatives, energy efficiency policy, and green building policy, among others (Benlemlih et al., 2018). Bloomberg's *S* transparency broadly covers information such as community relations, diversity, human rights, and employee relations, among others (Benlemlih et al., 2018).

## 4.2.3 E&S Transparency and Cash holdings

The argument that enhanced E&S transparency translates into less information asymmetry and agency problems, as captured by a firm's lower propensity to hold cash, rests on a number of complementary conceptual perspectives. Firstly, E&S transparency provides material and value relevant information for shareholders<sup>32</sup> and debtholders. For debtholders, E&S transparency reduces the reputational risk arising from borrowers' profiles (Eliwa et al., 2019; Gao, Dong, Ni, & Fu, 2016; Jung, Herbohn, & Clarkson, 2018). For example, Thompson & Cowton (2004) report that more than 70% of British lending institutions rely on a formal firm lending policy, which includes E&S considerations in its decision-making instructions. Based on this argument (Thompson & Cowton, 2004), we can conclude that firms enjoying high (low) levels of E&S transparency expose their creditors to less (more) reputational risk. As a result, E&S transparency helps (prevents) firms to have access to external financing, thus reducing (or increasing) their need to hold cash.

Secondly, previous studies find that a firm's tendency to hold cash intensifies when there is an increase in information asymmetry with its stakeholders (Gao et al., 2016; Harford et al., 2014; Jung et al., 2018). Based on information economics and voluntary disclosure theory (Hinze & Sump, 2019), we believe that E&S transparency enhances stakeholders' access to material, value

<sup>&</sup>lt;sup>32</sup> According to a study presented by the CFA Institute, more than 73% of investment professionals examine and reflect firms' E&S information in their investment decision-making process (<u>https://www.cfainstitute.org/-/media/documents/survey/esg-survey-report-2017.ashx</u>).

relevant, and incremental information about firms' current and future costs and benefits arising from its E&S activities. Hence, E&S transparency alleviates information asymmetry and agency problems, improves the monitoring by investors and constrains manager' opportunistic behavior in the use of cash resources. As a consequence, a firm's increased trust and credibility among investors should enhance its ability to obtain external financing at a lower cost (Cormier et al., 2009).

Thirdly, according to the ethical theory framework, prior research suggests that firms enjoying more extensive CSR orientation are inclined to be more honest, trustworthy, and ethical in their operations, allowing them to build and maintain their reputational capital (Garriga & Melé, 2004). Consistently, we can expect E&S transparency to create and sustain reputational capital, such that equity and debt investors are more likely to provide financing at a reasonable cost to transparent firms with such reputational capital and trustworthiness.

Fourthly, based on the precautionary motive of cash holding, there is extensive prior work showing that uncertainty, captured by various measures of volatility and risk, leads firms to hold more cash (Benlemlih et al., 2018; Chava & Purnanandam, 2010; Habib & Hasan, 2017; Han & Qiu, 2007; Opler et al., 1999; Riddick & Whited, 2009; W. Sun & Cui, 2014). However, there is also prior evidence that firms with a more extensive CSR orientation tend to exhibit a lower cost of equity (Dhaliwal et al., 2014), bankruptcy risk (W. Sun & Cui, 2014), litigation risk (Hong & Kacperczyk, 2009), cash flow volatility and income instability (Branco & Rodrigues, 2006; W. Sun & Cui, 2014). Consistently, we expect firms with greater E&S transparency to be less exposed to default risk, aggregate shocks, and financial distress because of the insurance-like protection of transparency and, therefore, to hold less cash. Accordingly, the first hypothesis for this study is delineated as follows: H1. There is a negative relationship between a firm's environmental transparency (and social transparency) and firm-level cash holding.

We argue that when firms are susceptible to information asymmetry ex ante, cash holding is intensified for them (García-Teruel et al., 2009). In this context, E&S transparency can mitigate the information asymmetry problem between investors and firms as it provides material and value relevant information. Therefore, we expect that the negative relationship between E&S transparency and cash holding is amplified for firms with high firm-wide information asymmetry<sup>33</sup> ex ante (having high agency costs). Accordingly, our second hypothesis is stated as follows:

H2. The relationship between firm's environmental transparency (and social transparency) and firm-level cash holding is stronger for firms with higher firm-wide information asymmetry.

## 4.3 Data and Methodology

#### 4.3.1 Data collection

The initial sample is a balanced panel (Baltagi, 2008) incorporating S&P 500 index firms between 2012-2018. This index represents more than 78% of the entire US equity float-adjusted market capitalization, and thus constitutes a wide-ranging cross-section of the US stock market. The sample is framed in terms of large firms because previous studies have shown that these firms are more likely to be probed by different stakeholders such as creditors and investors with respect to E&S matters (Cheng, Ioannou, & Serafeim, 2014; He et al., 2019; Manita et al., 2018). Following prior research (Dittmar & Mahrt-Smith, 2007; Habib & Hasan, 2017; Q. Sun, Yung, &

<sup>&</sup>lt;sup>33</sup> García-Teruel et al., (2009) argue that firms suffering from a high level of firm-wide information asymmetry rely more on cash because equity and debt investors are less eager to finance these firms because of their restricted ability to evaluate these firms' profile from different perspectives such as credit risk and future cost and benefits. We argue that when firms are susceptible to information asymmetry ex ante, high E&S transparency becomes more crucial because it permits capital providers to evaluate firms' profile with high precision. Conversely, capital providers might care less about E&S transparency when firms are less prone to information asymmetry ex ante.

Rahman, 2012), out of the primary sample, we remove financial (SIC codes 6000-6999; 758 firmyear observations) and utility firms (SIC codes 4900-4999; 251 firm-year observations).

Finally, firms with missing E&S transparency data are also omitted (25 firm-year observations<sup>34</sup>), yielding a final sample of 2466 firm-year observations (353 unique companies). E&S transparency data, as well as governance data, are extracted from Bloomberg. Data for financial variables are taken from Compustat (financial statement data) and CRSP (stock price data). Outlier concerns are mitigated by winsorizing each continuous variable at the 1 and 99 percent levels of its distribution.

#### 4.3.2 Model specification and variable measures

To estimate the influence of E&S transparency on firm-level cash holding, the following OLS model (Equation 1) is estimated based on previous studies (Dittmar & Mahrt-Smith, 2007; Mansali et al., 2019; Opler et al., 1999):

$$\begin{aligned} CashNa_{i,t} &= \beta_0 + \beta_1 Transparency_{i,t-1} + \beta_2 SIZE_{i,t-1} + \beta_3 SysRisk_{i,t-1} + \beta_4 ROA_{i,t-1} + \\ \beta_5 LEV_{i,t-1} + \beta_6 INTANGIBLES_{i,t-1} + + \beta_7 EXP_{i,t-1} + \beta_8 CapitalExp_{i,t-1} + \beta_9 IntCov_{i,t-1} + \\ \beta_{10} SalesGrowth_{i,t-1} + \beta_{11} CashFlow_{i,t-1} + \beta_{13} LOSS_{i,t-1} + \beta_{14} MTB_{i,t-1} + \beta_{15} Dividend_{i,t-1} + \\ \beta_{16} InfoAsy_{i,t-1} + \sum \beta_k Industry dummies + \sum \beta_j Year dummies + \varepsilon_{i,t} \end{aligned}$$

Where *CashNa* captures firm-level cash holding for firm *i* at time *t*. We measure cash holding variable using the ratio of cash and marketable securities to net asset (Atif et al., 2019; Cheung, 2016; Dittmar & Mahrt-Smith, 2007; Mansali et al., 2019; Opler et al., 1999). *Transparency* refers to social (*SOCIAL*) and environmental (*ENVIRONMENT*) transparency ratings. In this context,  $\beta_1$ 

<sup>&</sup>lt;sup>34</sup> We drop 25 firm-year observation because they are missing E&S transparency data (because of database issue), which is proper form as we are not testing the impact of the presence of disclosures (or lack thereof), but rather the impact of the E&S transparency, hence comparing high ranked transparency with lower ranked transparency. In any case, our analyses could not be performed for these observations as transparency is our key explanatory variable.

is expected to be negative and significant in Equation 1 to support hypothesis 1. For further details concerning variable definitions, see the Appendix 1.

Bloomberg E&S transparency ratings are created based on the suggestions from the Global Reporting Initiative (GRI)<sup>35</sup>. According to the clarifications made by Bloomberg, the E&S transparency scores are calculated based on different sources of information such as corporations' websites, annual reports, CSR and sustainability reports, third-party research, reports submitted to the government, government statistics, and Bloomberg's independent survey asking firms about their E&S practices (Bloomberg, 2013; Xie et al., 2019). Therefore, E&S transparency scores extend beyond a firm's own self-reporting as they are calculated based on different sources of information, and we observe an authentication process about the validity of E&S information that is not usually observed in E&S performance and disclosure measures.

The separate E&S transparency scores are extracted according to firms' E&S practice indexes and by the use of an array of data points compiled by Bloomberg's analysts who assess E&S dimensions (Bloomberg, 2013; Xie et al., 2019). Bloomberg's analysts assign a weight to each data point based on their importance level and materiality for the specific industry sector. A sample list of the data points covered under the E&S categories is presented in Appendix 2 (Benlemlih et al., 2018; Bloomberg, 2013). Moreover, within each E&S category, the individual firm score is stated as a percentage, so as to make the score comparable across firms. Finally, to consider the value relevance of the collected data in each industry sector, the scores are industry-specific tailored<sup>36</sup> (Bloomberg, 2013; Xie et al., 2019). In other words, Bloomberg transparency

<sup>&</sup>lt;sup>35</sup> https://www.globalreporting.org/Pages/default.aspx

<sup>&</sup>lt;sup>36</sup> For instance, 'Phones Recycled' is only used to rate telecommunications firms. Likewise, 'Gas Flaring' is relevant in calculating scores for oil and gas firms, with firms in other sectors not being penalized for lacking it. The data points are also weighted (based on a proprietary weighting scheme) in terms of importance within each category, so that 'Green House Gas emissions', for example, would be weighted more heavily than other data points within the environment category. Hence, these scores are both relevant as well as weighted in terms of importance to their users (Bloomberg, 2013, Benlemlih et al., 2018).

scores are both relevant and weighted regarding the significance to their users (Eccles, Serafeim, & Krzus, 2011; Hammami & Zadeh, 2019; Manita et al., 2018; Yu et al., 2018). Hence, we can infer that these scores take into account both the quantity (in terms of the number of data points) and the quality (with respect to objective and industry-relevant data points) of corporations' E&S practices information (Benlemlih et al., 2018; Hammami & Zadeh, 2019). By way of corroborating this, it is useful to emphasize that these scores are extensively used in the literature to capture the levels of E&S transparency (Arayssi, Dah, & Jizi, 2016; Cucari et al., 2018; Jizi, 2017; Manita et al., 2018; Nollet, Filis, & Mitrokostas, 2016; Yu et al., 2018).

Moving on, as shown in Equation 1, *Transparency* and control variables are lagged by one period to mitigate concerns related to concurrent endogeneity (Petersen, 2009). Year and industry (based on two-digit SIC code) fixed effects are also included, and the model is estimated with t-statistics, which are clustered at the firm level and robust to both heteroscedasticity and within-firm serial correlation (Petersen, 2009). Finally, we assess whether there is endogeneity among these variables via a Hausman test (Hausman, 1978).

Results<sup>37</sup> suggest that the null hypothesis of no endogeneity is not rejected in any respect and, as such, proceeding with OLS estimators is deemed to be appropriate.

#### 4 **Empirical results**

#### 4.4.1 Descriptive statistics

Table 1 shows descriptive statistics for the modeled variables. For inferential purposes, *SOCIAL* and *ENVIRONMENT* variables reflect natural logarithm transformations. According to

<sup>&</sup>lt;sup>37</sup> Social transparency (*SOCIAL*) and firm-level cash holding (t= 1.37, p-value > 0.17); Environmental transparency (*ENVIRONMNET*) and firm-level cash holding (t= 0.94, p-value > 0.33);

Table 1, the average *SOCIAL* (*ENVIRONMENT*) is 3.16 (2.98), and ranges from 1.20 to 4.46 (0.84 to 4.40). The average value of *CashNa* variable is 0.10 implying that the average ratio of cash and marketable securities to net asset is 10%, with a standard deviation of 24%, which suggests a large amount of cross-sectional variation. On average, 6% of the firm-year observations in the sample suffer losses (*LOSS*). Finally, a firm, on average, has approximately 25% in *LEVERAGE*, return on assets of 6%, sales growth of 7%, systematic risk of 1.09, and market to book ratio of 4.17. Table 2 depicts a bivariate correlation matrix for the modeled variables as per Equation 1. Results in Table 2 suggest that there are negative correlations between each E&S transparency measures and the firm-level cash holding variable. This presents preliminary evidence that each E&S transparency can be influential in mitigating the firm-level cash holding.

\*\*\* Table 1 Approximately Here \*\*\* \*\*\* Table 2 Approximately Here \*\*\*

# 4.4.2 Regression results

Table 3 shows the results from estimating Equation 1, pursuant of testing hypotheses 1 and  $2.^{38}$  Model 1 in Table 3 depicts the results of the individual roles of each E&S transparency on mitigating the firm-level cash holding. As we can see, the coefficients for the *ENVIRONMENT* and *SOCIAL* variables (-.005 and -.008 respectively) are significant at the 5% level and 10% level, and are in line with H1. Regarding the economic significance of our findings, based on models 3 and 4 of Table 3, one standard deviation increase in *ENVIRONMENT* (*SOCIAL*) is associated with a 0.0069 (0.0083) decrease in *CashNa*, representing a 6.9% (8.3%) decrease over the sample's average *CashNa*, suggesting that our findings are also economically meaningful.

To test H2, we interact *InfoAsy* with *ENVIRONMENT* (model 3) and *SOCIAL* (model 4) so that the incremental effect on cash holding (due to firm-level information asymmetry) can be

<sup>&</sup>lt;sup>38</sup> None of the variance inflation factor for any of the variables exceeds 10, suggesting that multi-collinearity is not an issue in the regressions.

examined. To measure<sup>39</sup> *InfoAsy*, we use the dispersion of financial analysts' forecast that can be a relevant proxy for the firm-level information asymmetry (Cui et al., 2018; Li & Zhao, 2008). Results show negative coefficients for the interaction terms, *ENVIRONMENT* \* *InfoAsy* and *SOCIAL* \* *InfoAsy* (-.035 and -.028 respectively) that are significant at the 5% and 1% level, and are in line H2. These results suggest that each E&S transparency effects on firm-level cash holding are more pronounced when firms exhibit more information asymmetry ex ante.

The coefficients for most of the control variables are consistent with norms and expectations according to the extant literature (Atif et al., 2019; Dittmar & Mahrt-Smith, 2007; Habib & Hasan, 2017; Mansali et al., 2019). For instance, the coefficients of *LEV* and *SIZE* are negative and significant across all models showing that highly leveraged firms and larger firms tend to hold less cash. Firms may utilize cash holdings to reduce their debt constraints, thus we could expect a negative coefficient on leverage (*LEV*). In addition, cash holdings are lower for larger firms (*SIZE*) due to economies of scale and, thus, a negative coefficient was expected (Atif et al., 2019; Dittmar & Mahrt-Smith, 2007; Habib & Hasan, 2017; Mansali et al., 2019).

One may argue that our main independent variables (*ENVIRONMENT* and *SOCIAL*) are primarily time-invariant, and most of the variation in these variables are cross-sectional instead of time-series. In this context, with respect to the econometrics perspective, these highly persistent variables may generate spurious regression. To alleviate this concern, we use the first difference of *ENVIRONMENT* and *SOCIAL* (i.e., *C\_ENVIRONMENT* and *C\_SOCIAL*) in our model in Equation

<sup>&</sup>lt;sup>39</sup> We do not use bid-ask spread as an information asymmetry proxy as this measure is an accepted measure of liquidity costs in exchange-traded securities and of the size of the transaction cost, and therefore it is not completely clear whether the bid–ask spread measure alone is fully capturing a firm's information asymmetry (Li and Zhao, 2008).

1. Untabulated results suggest that our inferences about H1 and H2 still hold. Finally, our findings are robust to the use of change analysis approach<sup>40</sup>.

\*\*\* Table 3 Approximately Here \*\*\*

# 4.5 Additional Analyses

# 4.5.1 Robustness check

4.5.1.1 Alternative measure of firm-level cash holding

In our main analysis, we use the ratio of cash and marketable securities to net asset as a measure of firm-level cash holding. We re-estimate our analysis using the ratio of cash and marketable securities to total sales (*CashSale*) (Dittmar & Mahrt-Smith, 2007; Habib & Hasan, 2017), with results shown on Table 4. As we can see in model 1 of Table 4, results suggest a negative relationship between each of *ENVIRONMENT* and *SOCIAL* variables with *CashSale* (-.008 p<0.1, -0.001 p<0.1, respectively) which are in line with H1. The results in model 3 and model 4 are also in line with H2, implying the role of information asymmetry to strengthen the negative relationship of each E&S transparency and firm-level cash holding.<sup>41</sup>

\*\*\* Table 4 Approximately Here \*\*\*

# 4.5.1.2 Instrumental variable regression

As a robustness check of our regressions results in Equation 1, we use instrumental variable regressions<sup>42</sup>. We instrument each of *SOCIAL* and *ENVIRONMENT* variables and re-run two-stage

 $<sup>^{40}</sup>$  To reduce the potential for omitted variable bias, we also use a first difference cash model (left and right sides of Equation 1) in which changes in firm characteristics are controlled for within the model structure to provide stronger evidence for our findings. Untabulated results suggest that our continue to hold by the use of this specification.

<sup>&</sup>lt;sup>41</sup> Untabulated results indicate that our findings related to H1 and H2 are robust to the ratio of cash and marketable securities to total assets, and natural logarithm of cash and marketable securities divided by net assets as the other alternative measures of firm-level cash holding, implying that a specific measure of cash holdings does not drive our main findings.

<sup>&</sup>lt;sup>42</sup> The idea is that one may argue that environmental transparency (social transparency) is likely to be endogenous. For example, some unobserved variables that are omitted from the model but drive environmental transparency (social transparency), are correlated with the error terms in our model (i.e., Equation 1). To deal with the endogeneity issue, we use the instrumental variable estimation (two-stage least squares) method to estimate the empirical model.

least squares estimations for our models in Table 3. Based on previous studies (Cui et al., 2018; Eliwa et al., 2019), we use industry average scores of social transparency (*SOCIAL\_IND*) and environmental transparency (*ENVIRONMENT\_IND*) separately as the instruments for *SOCIAL* and *ENVIRONMENT* respectively. It is sensible to expect that industry-level E (S) transparency to be positively correlated with the firm-level E (S) transparency (our endogenous variables). However, it is unlikely that the firm-level cash holding affects industry-level E (S) transparency. It is also highly unlikely that the industry-level E (S) transparency affects cash holding other than through the firm-level E (S) transparency, thus, satisfying the essential requirements of the instruments. The results of the two-stage least squares regressions are reported in Table 5. The obtained findings are qualitatively similar to those reported in Table 3, and our main results related to H1 and H2 in Table 3 still hold.

# \*\*\* Table 5 Approximately Here \*\*\*

#### 4.5.2 The channels by which E&S transparency affect firm-level cash holding

In this part, we try to provide further insight into why each component of E&S transparency attenuates firm-level cash holding by focusing on two channels, which reflect a firm's ability to raise outside financing, i.e., the cost of debt and financial constraint.

4.5.2.1 E&S transparency and cost of debt.

We consider that lending entities incorporate E&S transparency in their borrowers' creditworthiness process and lending decisions (Du, Weng, Zeng, Chang, & Pei, 2017), thus making financing easier and lowering the need to hold cash. Accordingly, we can expect that transparency can reduce the cost of debt charged by creditors. In other words, credit providers view E&S transparency as a self-regulation mechanism that mitigates potential future regulatory costs, leading to lower firm-level cost of debt for borrowers (Du et al., 2017).

The cost of debt (*CoD*) is calculated as the ratio of a firm's interest expense to its average debt (Eliwa et al., 2019; Gray, Koh, & Tong, 2009). Prior findings suggest evidence that each E&S transparency is more correlated to accounting-based measures than to market-based measures of cost of debt (Orlitzky, Schmidt, & Rynes, 2003).

Results for model 4 of Table 6 suggest a negative and significant relationship between each of *ENVIRONMENT* and *SOCIAL* variables with *CoD* (-.004 p<0.01, -0.001 p<0.1, respectively), which are in line with our proposition about the negative relationship between each E&S transparency and cost of debt.

\*\*\* Table 6 Approximately Here \*\*\* 4.5.2.2 E&S transparency and financial constraints

As it is clear from the precautionary motive of cash holding, cash holding is intensified when firms are financially constrained (Bharath, Sunder, & Sunder, 2008; Hasan, Hoi, Wu, & Zhang, 2017). In that context, higher E&S transparency captures the firm's commitment to and engagement with stakeholders on the basis of mutual trust and cooperation (Andriof, Waddock, Husted, & Rahman, 2017; T. M. Jones, 1995). Superior stakeholder engagement may directly limit the likelihood of short-term opportunistic behavior (Eccles, Ioannou, & Serafeim, 2012), and it also represents a more efficient form of contracting with key stakeholders that could lead to enhanced revenue or profit generation, which in turn is rewarded by the markets by making firms less financially constrained (T. M. Jones, 1995). Previous studies also show that firms facing high firm-wide information asymmetry are more prone to be financially constrained (Cheng et al., 2014; Zhao & Xiao, 2019). However, E&S transparency can extend the availability of credible and value relevant information about the firm's strategies, and reduce informational asymmetry, with could lead to lower capital constraints.
In addition, each E&S transparency helps firms to create an affirmative social image, improve corporate reputation, alleviate the impact of negative news, hence reducing business risk, and making the firm better prepared to cope with a crisis (Cheng et al., 2014; Zhao & Xiao, 2019). A good reputation helps firms attract investment, lower financial costs, have better access to finance, and further improve long-term financial performance (Cheng et al., 2014; Zhao & Xiao, 2019).

To examine the channel that higher E&S transparency is negatively related to firm-level financial constraint, based on previous studies (Whited & Wu, 2006), we initially measure the Whited and Wu (*WW*) index of financial constraint as follows (Whited & Wu, 2006) (Equation 2):

$$WW_{i,t} = -0.091 \times CF_{i,t} - 0.062 \times DIV + 0.021 \times LTD_{i,t} - 0.044 \times TA + 0.102 \times ISG_{j,t}$$
$$-0.035_{i,t} \times SG_{i,t}$$
(2)

Where *CF* is the net cash flow from operations; *DIV* is a dummy variable equaling 1 if firm *i* pays out a cash dividend in year *t* and 0 otherwise; *LTD* is the ratio of long-term debt to the book value of the total assets; *TA* is the natural log of the total assets; *ISG* is the average industry sales growth calculated based on two-digit industry codes, and *SG* is the firms' sales growth. A larger value of *WW* implies higher degree of financial constraint. We calculate the *WW* index value for each firmyear observation, and in each fiscal year, we rank firms according to the *WW* index. Firms in the top quartile of the annual distribution of the *WW* score are regarded as financially constrained firms, and we assign the financial constraint (*FC*) variable to 1 and otherwise zero. Previous studies (Bao, Chan, & Zhang, 2012; Zhao & Xiao, 2019), use a similar approach of applying *WW* index to capture the effect of financial constraints.

Table 7 shows the results of our analysis on the relationship between each E&S transparency and financial constraint. Results from logit regressions shown on Table 7 suggest a negative and significant relationship between *FC* and both *ENVIRONMENT* (model 2) and *SOCIAL* (model 3) (-0.801 p<0.01, -0.990 p<0.01, respectively), which are in line with our expectation. Untabulated results also suggest that our inference about the relationship between each E&S transparency and firm-level financial constraint is robust to alternative proxies of financial constraints such as *KZ* (Baker, Stein, & Wurgler, 2003) and *SA* indexes (Hadlock & Pierce, 2010).

\*\*\* Table 7 Approximately Here \*\*\*

#### 4.5.3 Moderating roles

#### 4.5.3.1 Role of corporate governance (GOV)

To evaluate the role of corporate governance and explore whether the relationship between each E&S transparency and firm-level cash holding varies with the firm-level corporate governance quality (*GOV*), we add *GOV* variable to our model in Equation 1. We also interact *ENVIRONMENT* with *GOV* and *SOCIAL* with *GOV*. The idea is that corporate governance influences the firm-level cash holding by controlling the information asymmetry and agency cost that arises from the agency conflict between management and stakeholders (Cormier et al., 2015).

*GOV* is operationalized using corporate governance scores from Bloomberg (a comprehensive multi-aspect measure of firm-level corporate governance quality). This score considers different aspects of corporate governance such as the proportion of independent directors, executive compensations, and shareholders' rights (Bloomberg, 2013). *GOV* is normalized using the natural logarithm transformation. Results on Table 8 show that the coefficients of interaction terms in models 2 and 5 (i.e., *ENVIRONMENT* \* *GOV*, *SOCIAL* \* *GOV*)

are positive and significant ( 0.002 p < 0.05 and 0.003 p < 0.1, respectively), implying a substitution effect<sup>43</sup> for *GOV* in the relationship between E&S transparency and cash holding.

\*\*\* Table 8 Approximately Here \*\*\*

# 4.5.3.2 Role of financial reporting quality (FRQ)

To assess the role of financial reporting quality (FRQ) and examine whether the relationship between each E&S transparency and firm-level cash holding varies with the firm-level FRQ, we add FRQ variable to our model in Equation 1. We also interact *ENVIRONMENT* with FRQ and *SOCIAL* with FRQ. Previous studies present evidence that high FRQ can decrease information asymmetry and agency costs since high FRQ firms provide rich information to different stakeholders, including capital providers (Biddle, Hilary, & Verdi, 2009; F. Chen, Hope, Li, & Wang, 2011). In other words, when a firm's annual report incorporates doubtful hard information (e.g., low financial reporting quality), capital providers are inclined to look to soft information (e.g., E&S transparency) to decrease information asymmetry, and thus mitigate the risk on capital contracting (Jung et al., 2018). In this context, E&S transparency gains supreme importance, and it can be influential in the information asymmetry and agency cost reduction, and limiting opportunistic firm behavior (Benlemlih et al., 2018). In this context, we expect a lower informational effect of E&S transparency for higher *FRQ* companies.

To compute FRQ, the absolute discretionary accruals measure proposed by DeFond & Park (2001), multiplied by minus one is used. Higher FRQ denote to higher (lower) financial reporting quality (discretionary accruals). Discretionary accruals are commonly applied in the literature as a

<sup>&</sup>lt;sup>43</sup> The substitution effect between *GOV* and environmental transparency (social transparency) is not complete because the sum of coefficients *ENVIRONMENT* and *ENVIRONMENT* \* *GOV* (*SOCIAL* and *SOCIAL* \* *GOV*) is different from zero (p<0.05).

proxy for financial reporting quality (Ittonen, Johnstone, & Myllymäki, 2015; Zerni, Haapamäki, Järvinen, & Niemi, 2012). Given the moderate sample size of this study, *FRQ* is measured based on the (DeFond & Park, 2001) model rather than cross-sectional models (e.g., (J. J. Jones, 1991)) based on good practice guidelines (Ittonen et al., 2015; Zerni et al., 2012).

Table 8 reports results concerning the moderating role of *FRQ* on the relationship between each E&S transparency and firm-level cash holding. Coefficients of interaction terms in models 3 and 6 of Table 8 (i.e., *ENVIRONMENT* \* *FRQ*, *SOCIAL* \* *FRQ*) are positive and significant (0.005 p<0.1 and 0.007 p<0.1, respectively), indicating the substitution effect<sup>44</sup> of *FRQ* in the relationship between E&S transparency and cash holding.

#### 4.5.4 Omitted variable bias

In a seminal work, Harford et al. (2014) find that rollover risk as a key determinant is positively related to corporate cash holding, and therefore, managers have this tendency to create internal funds (i.e., holding cash) to make the rollover process smoother. To mitigate potential problems arising from correlated omitted variable, we re-estimate the regression in Equation 1, incorporating rollover risk variable (*Rollover*). Based on prior studies, we measure this risk by using the percentage of long-term debt due for repayment in the next year (Chiu, Wang, Wu, & Lin, 2017; Paul & Zhou, 2018). The logic is that a higher amount (i.e., percentage) of long-term debt due in the next year implies a greater need for rolling over and, by extension, a higher rolling over risk (Chiu et al., 2017; Paul & Zhou, 2018). As we can see in Table 8, results (i.e., all models in Table 8) indicate that the relation between each E&S transparency and firm-level cash holdings remains qualitatively similar.

<sup>&</sup>lt;sup>44</sup> The substitution effect between *FRQ* and environmental transparency (social transparency) is not complete because the sum of coefficients *ENVIRONMENT* and *ENVIRONMENT* \* *FRQ* (*SOCIAL* and *SOCIAL* \* *FRQ*) is different from zero (p<0.05).

In an additional analysis, we also consider using firm fixed effects in our regression models to control for unknown time-invariant firm-specific characteristics, and alleviate endogeneity concern related to the omitted firm-specific attributes. Results (untabulated) suggest that our inference related to each H1, H2, and moderating variables still hold by considering this specification. In this line, our robustness checks provide further assurance regarding our findings and corresponding implications.

#### 4.5.5 E&S transparency and excess cash holdings

As a robustness check, we also investigate the relationship between each E&S transparency and excess cash holdings rather than the actual level of cash holdings in order to mitigate concerns related to the measurement of the "normal" level of cash (Iona, Leonida, & Ventouri, 2017).

To measure excess cash, we follow previous studies, and we estimate excess cash holdings ratio (*ExcessCashNa*) for each firm-year observation as the positive residuals<sup>45</sup> of the excess cash holdings model (Belkhir, Boubaker, & Derouiche, 2014; Dittmar & Mahrt-Smith, 2007; Opler et al., 1999; Shin et al., 2018). To explore the relationship between each E&S transparency and firm-level excess cash holdings, we estimate Equation 1 by considering our new dependent variable (*ExcessCashNa*). Our untabulated results are qualitatively similar to the results tabulated in Table 3, implying that our findings are robust to the use of firm-level excess cash holding as an alternative measure (specification) of firm-level cash holding.

#### 4.5.6 E&S transparency and marginal value of cash holdings

<sup>&</sup>lt;sup>45</sup> We also consider two scenarios about the excess cash holding proxy. The first scenario is that we also keep the negative residuals of excess cash holding model (Belkhir et al., 2014; Dittmar and Mahrt-Smith, 2007), and do not omit these negative residuals in our estimation model in Equation 1 (Gao et al., 2013). The second scenario is that we replace the negative residuals of excess cash holding model with zero, and estimate our regression model in Equation 1, incorporating the positive residuals and zero ones as our firm-level excess cash holding variable (Gao et al., 2013). We obtain qualitatively similar results (untabulated) when we consider each of these two scenarios.

As an additional analysis, we examine the concern related to cash holdings from investors' perspective, i.e., how investors expect cash to be used. The marginal value of corporate cash holding is critical, given that the chief purpose of management system is the shareholder wealth maximization (Fama & French, 1998; Shin et al., 2018). Hence, we investigate the relationship between each E&S transparency and marginal value of cash holding. In a seminal paper, Myers & Majluf (1984) show that a dollar of cash held by a firm may be valued at more than a dollar by its investors. In addition, agency theory proposes that self-interested and entrenched managers will misallocate firms' resources at the expense of investors (Drobetz, Grüninger, & Hirschvogl, 2010; Jensen & Meckling, 1976; Myers & Majluf, 1984). A firm's cash hoardings are specifically at risk as cash is a liquid asset that can be simply evaluated and exploited by managers with less scrutiny. Previous studies find that investors value a firm's cash holdings at a sizeable discount when they predict that managers are likely to misuse firms' resources for their private benefit (Drobetz et al., 2010; Louis, Sun, & Urcan, 2012). For example, Drobetz et al. (2010) show that the value of cash holdings is lower (higher) for firms with greater (less) information asymmetry. To analyze the impact of E&S transparency on the value of cash holding, we define the following model in Equation 3 based on previous studies (use of OLS estimators) (Dittmar & Mahrt-Smith, 2007; Fama & French, 1998; Shin et al., 2018):

$$V_{i,t} = \beta_{0} + \beta_{1} E_{i,t} + \beta_{2} Dif E_{i,t} + \beta_{3} Dif E_{i,t+1} + \beta_{4} Dif NA_{i,t} + \beta_{5} Dif NA_{i,t+1} + \beta_{6} RD_{i,t} + +\beta_{7} Dif RD_{i,t} + \beta_{8} Dif RD_{i,t+1} + \beta_{9} I_{i,t} + \beta_{10} Dif I_{i,t} + \beta_{11} Dif I_{i,t+1} + \beta_{13} D_{i,t} + \beta_{14} Dif D_{i,t} + \beta_{15} Dif D_{i,t+1} + \beta_{16} Dif V_{i,t+1} + \beta_{17} Cash_{i,t} + \beta_{18} Transpancy_{i,t-1} + \beta_{19} (Cash_{i,t} \times Transpancy_{i,t-1}) + \sum \beta_{k} Industry dummies + \sum \beta_{j} Year dummies + \varepsilon_{i,t}$$
(3)

Where  $Dif X_{i,t}$  denotes to a past one-year change in  $X_{i,t}$  for firm *i* at time *t*, and  $Dif X_{i,t+1}$  refers to a future one-year change in  $X_{i,t}$ . Our dependent variable  $(V_{i,t})$  is the firm's market value, which is calculated as the market capitalization plus total liabilities. *E* is the earnings before interest and taxes (EBIT), *RD* is R&D expenses, *I* denotes to interest expense, and *D* is the total dividends paid. *Cash* is the cash and marketable securities, *NA* refers to net asset, *Transparency* refers to each social (*SOCIAL*) and environmental (*ENVIRONMENT*) transparency ratings. All the variables are scaled by  $NA_{i,t}$ . We include an interaction term between *Transparency* and *Cash* in order to capture the effect of each E&S transparency on the marginal value of cash holdings.

Results on Table 9 for models 3 and 4 show that the interaction terms between E&S transparency (i.e., *ENVIRONMENT* \* *Cash*, *SOCIAL*\* *Cash*) are positive and significant (0.931 p<0.01 and 0.781 p<0.01, respectively), implying that investors consider higher value of cash holding for firms enjoying higher levels of each E&S transparency. These findings are in line with our proposition that each E&S transparency increases the market value of an additional dollar in cash holdings as they provide incremental information that facilitates the monitoring of investment choices, which induces the more efficient use of cash holdings by managers.

Untabulated results suggest that our inference about the positive relationship between each E&S transparency with marginal value of cash holding is robust to the use of excess cash holding instead of the actual level of cash holding.

\*\*\* Table 9 Approximately Here \*\*\*

### 4.6 Conclusion and discussion

Our study explores how each firm-level E&S transparency can affect firm-level cash holding. Based on a sample of non-financial and non-utility US S&P 500 firms between 2012-2018, negative and significant relationships between firm-level cash holdings and each of environmental transparency and social transparency (otherwise referred as E&S transparency) are revealed. Our results are robust to alternative measures of cash holding, use of instrumental variable regression approach, and mitigation of omitted variable bias. These negative relationships

are more pronounced for firms that exhibit information asymmetry ex ante, are weakly governed, and have low financial reporting quality. We also explore the relationship between E&S transparency and two channels and mechanisms by which E&S transparency affects firm-level cash holding, i.e., firm-level cost of debt and firm-level financial constraints. Results show that higher E&S transparency can help firms to enjoy lower cost of debt and to be less financially constrained, discouraging firms from holding cash.

We also look at the cash holding problem from the investors' perspective, i.e., how investors expect cash to be used. Thus, we investigate the relationship between each E&S transparency and marginal value of cash holding. Based on the conflict-resolution view and stakeholder theory (Freeman, 1984), our findings suggest that E&S transparency increases the market value of an additional dollar in cash as it provides incremental information that facilitates the monitoring of investment choices, inducing more efficient use of cash holdings by managers.

This study is not without its limitations, and addressing these could be fruitful for future research. The proxies deployed for each E&S transparency, cash holding, corporate governance, financial reporting quality, information asymmetry, cost of debt, and financial constraints, and excess cash holding are susceptible to measurement error, which is a commonplace restriction existing in most of CSR and corporate cash holding studies. Nevertheless, exploring the relative robustness of different proxies and their differential impacts (sensitivity analyses) in representative inferential contexts could prove to be informative. Finally, the extent to which the findings reported herein generalize to different time periods and country settings (e.g., emerging markets) is an open question.

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Table 1.	
Descriptive	statistics

Variable	Number of observations	Mean	SD	Minimum	Maximum
CashNa	2466	0.10	0.24	0.00	0.58
ENVIRONMENT	2466	2.98	0.98	0.84	4.40
SOCIAL	2466	3.16	0.64	1.20	4.46
SIZE	2466	9.80	1.39	5.03	14.77
SysRisk	2466	1.09	0.41	-1.13	2.28
InfoAsy (%)	2466	0.26	0.07	0.11	0.36
ROA	2466	0.06	0.07	-0.14	0.53
LEV	2466	0.25	0.12	0.03	0.55
INTANGIBLES	2466	0.24	0.22	0.00	0.69
EXP	2466	0.06	0.04	0.00	0.21
CapitalExp	2466	0.05	0.12	0.02	0.14
IntCov	2466	16.36	18.72	6.93	19.14
SalesGrowth	2466	0.07	0.19	-0.13	0.71
CashFlow	2466	0.10	0.07	-0.28	0.63
LOSS	2466	0.06	0.24	0	1
MTB	2466	4.17	2.20	0.85	41.06
Dividend	2466	0.79	0.38	0	1

luix										
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1.00										
-0.15*	1.00									
-0.11*	0.66*	1.00								
-0.22*	0.27*	0.26*	1.00							
0.07*	-0.02	-0.02	-0.00	1.00						
0.18*	-0.03	-0.03	-0.26*	0.00	1.00					
-0.21*	0.06*	0.08*	-0.09*	-0.14*	-0.12*	1.00				
-0.13*	-0.04*	-0.00	-0.16*	-0.03	0.04*	0.15*	1.00			
0.08*	0.03*	0.14*	-0.12*	0.03*	-0.01	0.07*	-0.25*	1.00		
0.16*	-0.02	-0.05	-0.07*	0.00	-0.09	0.06	0.04	-0.07*	1.00	
0.19*	-0.06	-0.14	0.17	-0.01	0.32*	-0.29*	-0.03*	0.02	0.07	1.00
0.08*	-0.04*	-0.07*	-0.11*	0.02	0.12*	-0.04*	0.08*	0.05	0.02*	0.06*
0.24*	0.06*	0.09*	-0.39*	0.02	0.45*	-0.05*	0.04	0.34	0.09	0.29*
0.02	0.00	0.01	-0.02	-0.00	-0.49*	0.10*	-0.01	0.12*	0.05	-0.10*
0.09*	0.13	0.07	0.11*	-0.03	0.11*	-0.04*	0.06*	0.00	0.11*	0.06*
-0.18*	0.21*	0.27*	0.32*	-0.05*	-0.03	0.02	-0.09*	-0.05*	0.01	-0.02
0.10*	-0.13*	-0.15*	-0.24*	0.13*	-0.14	-0.03	0.10	0.22*	0.04	0.00
(12)	(13)	(14)	(15)	(16)	(17)					
1.00										
0.04*	1.00									
-0.08*	-0.18*	1.00								
0.05*	0.14*	-0.00	1.00							
-0.23*	-0.14*	-0.11*	-0.06*	1.00						
0.18*	0.02	0.30*	0.00	-0.37*	1.00					
	(1) 1.00 -0.15* -0.11* -0.22* 0.07* 0.18* -0.21* -0.13* 0.08* 0.16* 0.19* 0.08* 0.24* 0.02 0.09* -0.18* 0.10* (12) 1.00 0.04* -0.23* 0.18*	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	(1)         (2)         (3) $1.00$ -0.15* $1.00$ $-0.15^*$ $1.00$ -0.11* $-0.11^*$ $0.66^*$ $1.00$ $-0.22^*$ $0.27^*$ $0.26^*$ $0.07^*$ $-0.02$ $-0.02$ $0.18^*$ $-0.03$ $-0.03$ $-0.21^*$ $0.06^*$ $0.08^*$ $-0.13^*$ $-0.04^*$ $-0.00$ $0.08^*$ $0.03^*$ $0.14^*$ $0.16^*$ $-0.02$ $-0.05$ $0.19^*$ $-0.06$ $-0.14$ $0.08^*$ $-0.04^*$ $-0.07^*$ $0.24^*$ $0.06^*$ $0.09^*$ $0.02$ $0.00$ $0.01$ $0.09^*$ $0.13$ $0.07$ $0.18^*$ $0.27^*$ $0.15^*$ (12)         (13)         (14) $1.00$ $0.04^*$ $1.00$ $0.04^*$ $1.00$ $-0.08^*$ $0.05^*$ $0.14^*$ $-0.00$ $0.05^*$ $0.14^*$	Intx           (1)         (2)         (3)         (4)           1.00         -0.15*         1.00         -0.15*         1.00           -0.11*         0.66*         1.00         -0.22*         0.27*         0.26*         1.00           -0.22*         0.27*         0.26*         1.00         -0.26*         -0.00         0.18*         -0.03         -0.03         -0.26*           -0.21*         0.06*         0.08*         -0.09*         -0.16*         0.09*         -0.16*           -0.08*         0.03*         0.14*         -0.12*         0.16*         -0.02         -0.05         -0.07*           0.16*         -0.02         -0.05         -0.07*         -0.11*         0.24*         0.06*         0.09*         -0.39*           0.19*         -0.06         -0.14         0.17         0.08*         -0.07*         -0.11*           0.24*         0.06*         0.09*         -0.39*         0.02         0.00         0.01         -0.02           0.02         0.00         0.01         -0.02         0.02*         0.27*         0.32*           0.10*         -0.13*         -0.15*         -0.24*         -0.24*         -0.04*	Intx           (1)         (2)         (3)         (4)         (5)           1.00         -0.15*         1.00         -0.11*         0.66*         1.00           -0.22*         0.27*         0.26*         1.00         -0.26*         0.00           0.07*         -0.02         -0.02         -0.00         1.00           0.18*         -0.03         -0.03         -0.26*         0.00           -0.21*         0.06*         0.08*         -0.09*         -0.14*           -0.13*         -0.04*         -0.00         -0.16*         -0.03           0.08*         0.03*         0.14*         -0.12*         0.03*           0.16*         -0.02         -0.05         -0.07*         0.00           0.19*         -0.06         -0.14         0.17         -0.01           0.08*         -0.04*         -0.07*         -0.11*         0.02           0.24*         0.06*         0.09*         -0.39*         0.02           0.02         0.00         0.01         -0.02         -0.05*           0.10*         -0.13*         -0.15*         -0.24*         0.13*           0.10*         -0.18*         1.00	Image: constraint of the second se	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

Table 2. Pearson's elation matrix

\* denotes significance at the 5% level.

Dependent Variable:				
CashNa	Model 1	Model 2	Model 3	Model 4
Variables	Coeff ( <i>t-value</i> )			
ENVIRONMENT	005** (-2.09)	004* (-1.74)	007*** (-3.36)	
SOCIAL	008* (-1.96)	009* (-1.80)		013*** (-3.07)
InfoAsy		.095** (2.17)	.108*** (2.94)	.087*** (3.02)
ENVIRONMENT * InfoAsy			035** (-2.16)	
SOCIAL * InfoAsy				028* (-1.89)
SIZE	003*** (-3.18)	005*** (-3.34)	.006*** (-3.01)	004*** (-3.11)
SysRisk	003 (-0.38)	.003 (0.44)	003 (-0.27)	.003 (0.53)
ROA	.027** (2.24)	.025** (2.31)	.029** (2.16)	.032** (2.12)
LEV	036*** (-2.74)	032** (-2.18)	037*** (-2.81)	032** (-2.46)
INTANGIBLES	024 (-1.14)	016 (-0.57)	023 (-1.07)	020 (-0.89)
EXP	.002 (0.68)	.003 (0.79)	.002 (0.51)	.004 (0.82)
CapitalExp	.056*** (2.87)	.034*** (3.04)	.058*** (3.19)	.040*** (2.96)
IntCov	.005 (0.88)	.009 (0.71)	.004 (0.97)	.008 (0.69)
SalesGrowth	.021* (1.87)	.026 (1.43)	.017 (1.09)	.019 (1.37)
CashFlow	.018* (1.92)	.027 (1.61)	.018** (2.12)	.021** (2.19)
LOSS	003 (-0.79)	003 (-0.81)	003 (-0.58)	003 (-0.75)
MTB	.000*** (2.82)	.000*** (2.72)	.000*** (2.94)	.000*** (2.79)
Dividend	007* (-1.90)	008** (-2.13)	005** (-2.24)	004** (-2.18)
Intercept	.119*** (7.48)	.134*** (8.22)	.127*** (7.51)	.115*** (8.61)
Ind. FE.	YES	YES	YES	YES
Year FE.	YES	YES	YES	YES
$\operatorname{Adj} R^2$	0.239	0.258	0.287	0.276
F-Statistics (P-value)	9.18 (0.00)	10.84 (0.00)	12.28 (0.00)	11.71 (0.00)
Observations	2466	2466	2466	2466

Table 3.Regression results for social and environmental transparency on firm-level cash holding

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation.

Tal	ble	4.
		•••

Dependent Variable:				
CashSale	Model 1	Model 2	Model 3	Model 4
Variables	Coeff ( <i>t</i> -value)	Coeff ( <i>t</i> -value)	Coeff ( <i>t-value</i> )	Coeff ( <i>t-value</i> )
ENVIRONMENT	008* (-1.93)	009* (-1.77)	007*** (-3.83)	
SOCIAL	001* (-1.84)	003 (-1.39)		005** (-2.29)
InfoAsy		.031** (2.23)	.024*** (3.31)	.017*** (2.78)
ENVIRONMENT * InfoAsy			052** (-2.28)	
SOCIAL* InfoAsy				046** (-2.19)
SIZE	005** (-2.14)	008*** (-3.28)	008*** (-3.39)	008*** (-3.05)
SysRisk	.008 (0.32)	.005 (0.47)	.002 (0.23)	.009 (0.41)
ROA	.061* (1.81)	.052 (1.57)	.054* (1.93)	.072* (1.87)
LEV	085** (-2.23)	093** (-2.38)	097** (-2.43)	101** (-2.27)
INTANGIBLES	016 (-0.51)	012 (-0.59)	019 (-0.41)	020 (-0.73)
EXP	.000 (0.92)	.000 (0.52)	.000 (0.76)	.000 (0.59)
CpitalExp	.137** (2.29)	.154** (2.17)	.146* (1.87)	.129** (2.38)
IntCov	.000 (0.91)	.000 (0.77)	.000 (0.84)	.000 (0.69)
SalesGrowth	021*** (-2.86)	008*** (-3.17)	017*** (-3.34)	008*** (-3.06)
CashFlow	.104 (1.33)	.087 (1.04)	.096 (1.13)	.011 (1.49)
LOSS	010 (-0.72)	009 (-0.61)	007 (-0.78)	008 (-1.01)
MTB	.000* (1.81)	.000** (2.29)	.000* (1.89)	.000 (1.56)
Dividend	016*** (-2.84)	012** (-2.27)	019** (-2.18)	010** (-2.23)
Intercept	.171*** (11.61)	.162*** (8.97)	.187*** (9.59)	.201*** (10.28)
Ind. FE.	YES	YES	YES	YES
Year FE.	YES	YES	YES	YES
Adj $R^2$	0.273	0.289	0.303	0.308
F-Statistics (P-value)	7.48 (0.00)	7.82 (0.00)	8.41 (0.00)	8.72 (0.00)
Observations	2466	2466	2466	2466

Regression results for social and environmental transparency on alternative measure of firm-level cash holding

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation.

# Table 5.

	First Stage		*	Ç	
	(Instrument)				
Variables	Coeff (t-value)	Coeff (t-value)			
ENVIRONMENT_IND	0.026*** (2.93)		-		
SOCIAL_IND		0.037*** (3.18)			
All variables in the main	YES	YES			
test					
Ind. FE.	YES	YES			
Year FE.	YES	YES			
Adj R <sup>2</sup>	.401	.442			
Observations	2466	2466			
	Second-Stage				
	Regression				
	Model 1	Model 2	Model 3	Model 4	
ENVIRONMENT	-0.004** (-2.24)	-0.010* (-1.81)	007** (-2.42)		
SOCIAL	-0.003* (-1.87)	-0.007* (-1.95)		005** (-2.27)	
InfoAsy		0.081** (2.19)	0.074** (2.33)	0.093** (2.35)	
ENVIRONMENT * InfoAsy			-0.019* (-1.91)		
SOCIAL * InfoAsy				-0.026* (-1.82)	
All variables included	YES	YES	YES	YES	
Ind. FE.	YES	YES	YES	YES	
Year FE.	YES	YES	YES	YES	
Adj R <sup>2</sup>	.247	.269	.295	.284	
Observations	2466	2466	2466	2466	

Instrumental variable regression results for the effects of social and environmental transparency on firm-level cash holding

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation.

Table 6.Regression results for social and environmental transparency on firm-level cost of debt

Dependent Variable:				
CoD	Model 1	Model 2	Model 3	Model 4
Variables	Coeff ( <i>t</i> -value)	Coeff ( <i>t</i> -value)	Coeff ( <i>t-value</i> )	Coeff ( <i>t</i> -value)
ENVIRONMENT		006*** (-4.61)		-004*** (-2.77)
SOCIAL			002*** (-3.94)	-001* (-1.83)
SIZE	001*** (-6.65)	003*** (-5.37)	002*** (-7.01)	001*** (-4.79)
SysRisk	005 (-0.27)	000 (-0.33)	.001 (0.23)	000 (-0.29)
ROA	007** (-2.11)	004 (-1.57)	006** (-1.97)	005** (-2.01)
LEV	.043*** (11.83)	.039*** (9.75)	.049*** (10.17)	.036*** (8.68)
INTANGIBLES	.000 (0.29)	000 (-0.60)	000 (-0.44)	001 (-0.81)
EXP	003 (-0.51)	004 (-0.76)	005 (-0.81)	006 (-0.85)
CapitalExp	.012 (0.84)	.007 (0.72)	.010 (0.68)	.008 (0.99)
IntCov	001*** (-2.91)	000*** (-2.80)	000** (-2.27)	000*** (-2.99)
SalesGrowth	.003 (1.11)	.006 (0.71)	.001 (0.67)	.006 (0.84)
CashFlow	.006 (1.23)	.002 (0.95)	.008 (1.57)	.007 (1.63)
LOSS	.003 (1.17)	.001* (1.74)	.006 (0.93)	.001* (1.89)
MTB	000 (-0.68)	000 (-0.54)	002 (-0.44)	000 (-0.39)
Dividend	001*** (-2.90)	002*** (-2.83)	003** (-2.16)	001** (-2.37)
Intercept	078*** (-16.91)	071*** (-13.49)	060*** (-21.13)	074*** (-18.09)
Ind. FE.	YES	YES	YES	YES
Year FE.	YES	YES	YES	YES
Adj $R^2$	.519	.538	.562	.584
F-Statistics (P-value)	51.17 (0.00)	52.70 (0.00)	54.72 (0.00)	57.03 (0.00)
Observations	2466	2466	2466	2466

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation.

Dependent Variable:		± •		
FĈ	Model 1	Model 2	Model 3	Model 4
Variables	Coeff (Z-value)	Coeff (Z-value)	Coeff (Z-value)	Coeff (Z-value)
ENVIRONMENT		801*** (-3.01)		912*** (-2.80)
SOCIAL			990*** (-2.92)	746* (-1.79)
SIZE	-2.91*** (-3.66)	-2.61*** (-3.36)	-2.81*** (-3.21)	-2.68*** (-3.14)
SysRisk	.062 (1.63)	.085 (1.49)	.059 (1.58)	.087 (1.38)
ROA	-4.64** (-2.39)	-3.21* (-1.67)	-3.85** (-2.01)	-3.30* (-1.71)
LEV	1.98*** (3.14)	2.09*** (3.26)	2.32*** (2.92)	2.04*** (3.19)
INTANGIBLES	-1.65 (-1.55)	-1.59 (-1.49)	-1.47* (-1.79)	971* (-1.73)
EXP	-3.03 (-1.26)	-2.98 (-1.22)	-2.97 (-1.30)	-2.75 (-0.99)
CapitalExp	.335 (0.93)	.486 (0.61)	.397 (0.78)	.371 (0.82)
IntCov	004*** (-2.68)	010*** (-3.04)	006*** (-2.81)	002*** (-2.96)
SalesGrowth	890*** (-3.10)	811*** (-2.99)	765** (-2.23)	793** (-2.12)
CashFlow	-1.97*** (-2.73)	-1.87** (-2.27)	-2.16*** (-2.69)	-2.04*** (-2.77)
LOSS	.378 (1.13)	.386 (1.21)	.423 (1.41)	.363 (1.29)
MTB	015* (-1.78)	015* (-1.84)	014* (-1.82)	016* (-1.86)
Dividend	-1.44** (-2.08)	-1.29*** (-2.75)	-1.37** (-2.01)	-1.51** (-2.29)
Intercept	1.22*** (3.06)	3.62*** (4.64)	4.55*** (4.24)	3.07*** (4.52)
Ind. FE.	YES	YES	YES	YES
Year FE.	YES	YES	YES	YES
Pseudo $R^2$	.186	.221	.214	.237
Wald-Statistics ( <i>p-value</i> )	345.66 (0.00)	374.10 (0.00)	398.25 (0.00)	422.19 (0.00)
Area under ROC curve	.781	.836	.823	.859
Observations	2466	2466	2466	2466

Table 7.Logit regression results for social and environmental transparency on firm-level financial constraint

Notes: *Z*-statistics are in parenthesis. Standard errors are clustered at the firm level and are robust to both heteroscedasticity and within-firm serial correlation. \*, \*\*, and \*\*\* indicate significance at the 10, 5, and 1% levels, respectively.

# Table 8.

	unspurency with	inini ievei easii	nonanng			
Dependent Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
CashNa						
Variables	Coeff (t-Value)	Coeff (t-value)	Coeff (t-value)	Coeff (t-value)	Coeff ( <i>t</i> -value)	Coeff (t-value)
ENVIRONMENT	004***(-3.04)	-005***(-3.19)	003***(-2.95)			
SOCIAL				015***(-2.89)	012***(-2.77)	010***(-2.94)
InfoAsy	.088***(2.85)	.079***(2.78)	.092***(2.94)	.085***(2.80)	.081***(2.87)	.087***(3.01)
GOV	009**(-2.17)	007**(-2.22)	006**(-2.07)	008*(-1.86)	007*(-1.92)	005*(-1.83)
ENVIRONMENT * GOV		.002**(2.13)				
SOCIAL * GOV					.003*(1.84)	
FRQ	061***(-3.01)	056***(-2.74)	052***(-3.19)	070***(-3.09)	065***(-2.96)	-059***(-2.83)
ENVIRONMENT * FRQ			.005*(1.74)			
SOCIAL * FRQ						.007*(1.90)
Rollover	.031***(3.34)	.030***(2.97)	.034***(3.47)	.026***(3.11)	.028***(3.26)	.029***(3.04)
SIZE	007***(-2.88)	006***(-3.05)	008***(-3.18)	007***(-2.97)	005***(-3.09)	007***(-3.22)
SysRisk	.000(0.59)	.000(0.68)	.000(0.84)	.000(0.76)	.000(0.93)	.000(1.02)
ROA	.018**(2.19)	.020**(2.26)	.024**(2.20)	.022**(2.32)	.019**(2.23)	.016**(2.36)
LEV	026***(-2.71)	028**(-2.39)	032***(-2.92)	030***(-3.02)	029***(3.18)	031***(-3.08)
INTANGIBLES	019(-0.72)	009(-0.69)	005(-0.38)	007(-0.49)	005(-0.84)	004(-0.75)
EXP	.001(0.74)	.001(0.69)	.001(0.92)	.002(0.69)	.001(0.78)	.002(1.01)
CapitalExp	.035***(3.24)	.039***(2.91)	.030***(3.11)	.033***(2.99)	.036***(3.06)	.031***(3.20)
IntCov	.002(0.91)	.001(0.37)	.003(0.79)	.000(0.58)	.000(0.69)	.000(0.73)
SalesGrowth	.017(1.51)	.019(0.93)	.015(0.68)	.022(1.01)	.017(1.28)	.020(0.88)
CashFlow	.024(1.04)	.017(0.98)	.027(1.23)	.029(1.37)	.033(1.16)	.039(1.29)
LOSS	002(-0.79)	000(-0.57)	000(-0.95)	001(-1.06)	002(-0.71)	004(-0.88)
MTB	.000(0.48)	.000(0.73)	.000(0.89)	.000(0.57)	.000(0.65)	.000(0.61)
Dividend	006**(-2.16)	007*(-1.84)	003*(-1.90)	005(-1.54)	006*(-1.79)	005*(-1.87)
Intercept	.142***(9.89)	.113***(8.08)	.186***(7.79)	.107***(8.83)	.128***(9.29)	.110***(7.97)
Ind. FE.	YES	YES	YES	YES	YES	YES
Year FE.	YES	YES	YES	YES	YES	YES
Adj R <sup>2</sup>	.313	.324	.317	.297	.306	.310
F-Statistics (P-value)	13.96(0.00)	14.68(0.00)	14.39(0.00)	12.85(0.00)	13.14(0.00)	13.47(0.00)
Observations	2466	2466	2466	2466	2466	2466

Roles of corporate governance quality, financial reporting quality and refinancing (rollover) risk on the relationship of environmental (social) transparency with firm-level cash holding

Notes: *t-statistics* are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation.

Dependent Variable:				
Market value (V)	Model 1	Model 2	Model 3	Model 4
Variables	Coeff (t-value)	Coeff ( <i>t-value</i> )	Coeff ( <i>t-value</i> )	Coeff ( <i>t-value</i> )
ENVIRONMENT		.011* (1.79)	.014** (2.28)	
SOCIAL		.014 (1.34)		.016 (1.53)
Cash	.216*** (3.01)	.299*** (3.30)	.238*** (2.98)	.261*** (3.26)
ENVIRONMENT * Cash			.931*** (2.79)	
SOCIAL * Cash				.781*** (3.19)
All variables in the	YES	YES	YES	YES
valuation model (Equation 5)				
Ind. FE.	YES	YES	YES	YES
Year FE.	YES	YES	YES	YES
Adj $R^2$	0.189	0.195	0.201	0.192
F-Statistics (P-value)	26.09 (0.00)	27.17 (0.00)	28.14 (0.00)	26.54 (0.00)
Observations	2466	2466	2466	2466

Regression results for social and environmental transparency on marginal value of cash holdings

Notes: t-statistics are corrected at the firm level and are robust to both heteroscedasticity and within-firm serial correlation.

\*, \*\*, and \*\*\* indicate significance at the 10, 5, and 1% levels, respectively.

Table 9.

# Appendix Variable definitions

variable definitions	
Name of variable	Variable definition
Dependent variable = Rollover risk (Source: Compustat)	
CashNa	Ratio of cash and marketable securities to net asset (Compustat items: che/(at-che)
CashSale	Cash and marketable securities divided by total sales.
Variable of interest= E&S transparency (Source : Bloomberg)	
SOCIAL	Natural logarithm of social transparency score.
ENVIRONMENT	Natural logarithm of environmental transparency score.
Firm controls (Source: Compustat and CRSP)	
SIZE	Natural logarithm of total assets in the millions of USD.
SysRisk	Systematic risk measured by Equity beta for a given firm for a given fiscal year.
ROA	Return on asset measured by the ratio of earnings before interests to total assets.
LEV	Leverage measured by the debt to total asset ratio.
INTANGIBLES	Intangible assets divided by total assets.
EXP	Sum of research and development expenses and advertisement expenses, divided by income before extraordinary items, for a given fiscal year.
CapitalExp	Capital expenditure divided by total assets.
IntCov	Interest coverage is calculated as total operating income deflated by total interest expense.
SalesGrowth	The difference between the sales for the current fiscal year and the sales for the previous year, divided by the sales for the previous year.
CashFlow	Cash flow from operations measured by the ratio of operating cash flow to total assets.
LOSS	A dummy that takes the value of one if net income before extraordinary items is negative, and zero otherwise.
МТВ	Market to book ratio measured by the market value of equity divided by book value of equity.
Dividend	Dummy variable that takes the value of one if the firm pays dividends.

	Level of information asymmetry. The standard
	deviation of the financial analysts' earnings per
InfoAsy (Source : I/B/ES (Summary Statistics	share forecast, divided by the stock price at the
file) and CRSP)	beginning of the reporting period. Higher
	values denote more dispersed forecasts and
	higher information asymmetry.

# Appendix 2 Sample of environmental and social data points in Bloomberg

Environmental data points	Social data points
Direct CO2 Emissions	Number of Employees
Travel Emissions	Employee Turnover %
Total GHG Emissions	% Women in Workforce
Particulate Emissions	% Women in Mgt
Total Energy Consumption	% Minorities in Workforce
Renewable Energy Use	% Disabled in Workforce
Water Consumption	Lost Time from Accidents
Electricity Used (MWh)	Workforce Accidents
Total Waste	Fatalities—Contractors
Waste Recycled	Fatalities—Employees
Raw Materials Used	Community Spending
ISO 14001 Certified Sites	SRI Assets Under Management
Environmental Accounting Cost	Health and Safety Policy
Investments in Sustainability	Fair Remuneration Policy
Energy Efficiency Policy	Training Policy
Emissions Reduction Initiatives	Employee CSR Training
Green Building Policy	Equal Opportunity Policy
Environmental Supply Chain Management	Human Rights Policy
Climate Change Policy	UN Global Compact Signatory
Biodiversity Policy	% Employees Unionized
Environmental Quality Management Policy	Employee Training Cost

# **Chapter 5: Conclusion**

Corporations are facing growing pressure to have more commitment about environmental, social and governance (ESG) issues. In this line, firms are increasingly including ESG practices as part of their core mandates especially so as investors and capital providers are looking and demanding for more ESG transparency. For instance the United Nations (UN) has launched an important project known as "Principles of Responsible Investment" (PRI) that motivates institutional investors to heavily weight ESG issues when they evaluate firms and projects to invest in (Di Giuli & Kostovetsky, 2014). PRI has been very successful in gaining support from more than 1,360 institutional investors globally, confirming the growing importance of ESG transparency (Di Giuli & Kostovetsky, 2014). In line with the growing importance of ESG issues, major US companies allocated more than \$32bn on ESG issues in 2012 and this number is growing on an annual basis (Cheng et al., 2014). As we see the importance of ESG matter, it becomes crucial for us to understand what determinates and consequences of firms' transparency about ESG issues are.

To address the significance of ESG matters, in the first essay, we introduce two novel determinants of ESG transparency (i.e., audit quality and public media exposure). Based on a sample of publicly listed Canadian firms in the S&P/TSX Index of the Toronto Stock Exchange., our results show that audit quality and public media exposure are two main drivers of ESG transparency, hence, commitment to high quality audits and exposure to high public media coverage drive firms to be more transparent about ESG issues. Finally, as a consequence of ESG transparency, we find a negative association between ESG transparency and firm–level investment inefficiency.

In our opinion, understanding the impact that audit quality has on Canadian firms' ESG transparency is important, as ESG information enhances transparency, improves stakeholders' capabilities of evaluating the nonfinancial dimensions of firms' practices, and more importantly, the market pays a premium to invest in companies with ESG initiatives.

The second essay examine whether the transparency of E&S information affects financial analysts' forecast properties that reflect their information set. Focusing on a sample of non-financial and non-utility U.S. firms from the S&P 500 index, results suggest that the level of transparency vis-à-vis both E&S information is negatively related to analysts' forecast errors as well as forecast dispersion. These negative relationships become more pronounced for firms with low financial reporting quality, low media coverage, and for those with weak governance. Finally, it is shown that the each E&S transparency is negatively related to corporate-level investment inefficiency, mostly via analysts` information environment, which thus acts as a mediating variable.

Overall, the findings of second essay can be interesting for practitioners, academics, policy makers, and regulators in their discernment of the individual role that E&S transparency might have in both financial analysts' forecast properties and firm-level investment efficiency. In this context, due to insufficient analytical skills, it might be difficult for investors to assess the implications of E&S transparency for firms' future prospects; hence, financial analysts as information intermediaries can play a crucial role in incorporating E&S transparency into their forecasts. Furthermore, given our findings that E&S transparency decreases analysts' forecast error and dispersion, we may conclude that E&S transparency are helpful to improve the capital market efficiencies, therefore, E&S transparency should be encouraged by both firms and policymakers. Our results about the relationship of E&S and corporate investment efficiency imply that

transparency can be effective in decreasing the likelihood of investing in unprofitable investment opportunities probably chosen with some ill-intentioned aims. In addition, rooted in stakeholder theory and agency theory, our findings are in line with former works (e.g. Byun & Oh, 2018, Clarkson, 1995, Hillman & Keim, 2001) as our results imply that E&S transparency as responses to stakeholders' demands are positively related to firms' performance proxied by the level of firms' under-investment and over-investment inefficiencies. Therefore, investors need to be more cautious to devote capital more efficiently by examining the E&S transparency presented by firms. Finally, we show that the financial analysts' information environment acts as a mediating variable between transparency and investment efficiency, thus confirming analysts` information intermediary and monitoring roles.

In the third essay, we investigate how a firm's (E&S) transparency relates with its cash holdings. Focusing on a large sample of S&P 500 firms, results show that a higher level of E&S transparency implies lower firm-level cash holdings. The negative relationship is more pronounced for firms suffering from high information asymmetry, with low financial reporting quality, and for those with weak governance. Further analyses document that the two channels and mechanisms by which E&S transparency affect firm-level cash holdings are the cost of debt and financial constraints. Finally, our findings suggest that E&S transparency increases the market value relevance of an additional dollar in cash holdings.

Generally, the findings reported and explored in third essay could be useful for firms, practitioners, academics, policy makers, regulators, and capital providers seeking to understand the individual roles of each E&S transparency might play in terms of the mitigation of firm-level cash holding, cost of debt, financial constraint, and overall business risk reduction strategy of a firm. Furthermore, given the finding that each E&S transparency decreases the information

asymmetry, it can be concluded that transparency is helpful for improving capital market efficiencies. From a practical perspective, the findings of this paper are important for different stakeholders (e.g., investors and capital providers) that they can encourage firms to be more socially and environmentally transparent as we provide tangible evidence about the roles of two novel and effective supervisory mechanisms of E&S transparency in mitigation (improvement) of agency and opportunity cost of cash holding (marginal value of cash holding). In conclusion, the results of third essay are in line with the concept that firm transparency (reflected in E&S transparency) can be a crucial element in justifying a firm's cash management policy and, in an overall view, firm policies (Mansali et al., 2019).

This dissertation is not without its limitations, and addressing these could be fruitful for future research. The proxies deployed for each E&S transparency, audit quality, media coverage, financial analysts' earnings forecast error and dispersion, investment efficiency, cash holding, corporate governance, financial reporting quality, information asymmetry, cost of debt, financial constraints, and excess cash holding are susceptible to measurement error, which is a commonplace restriction existing in most of CSR studies. Nevertheless, exploring the relative robustness of different proxies and their differential impacts (sensitivity analyses) in representative inferential contexts could prove to be informative. Finally, the extent to which the findings reported herein generalize to different time periods and country settings (e.g., emerging markets) is an open question.