Routledge
Taylor & Francis Group

Accounting and Business Research

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/rabr20

Board attributes and companies' choice of sustainability assurance providers

Kholod Alsahali, Ricardo Malagueño & Ana Marques

To cite this article: Kholod Alsahali, Ricardo Malagueño & Ana Marques (2024) Board attributes and companies' choice of sustainability assurance providers, Accounting and Business Research, 54:4, 392-422, DOI: 10.1080/00014788.2023.2181141

To link to this article: https://doi.org/10.1080/00014788.2023.2181141

Published online: 27 Mar 2023.

Accounting and Business Research, 2024
Vol. 54, No. 4, 392–422, https://doi.org/10.1080/00014788.2023.2181141

Board attributes and companies' choice of sustainability assurance providers

KHOLOD ALSAHALI [a], RICARDO MALAGUEÑO [b*] and ANA MARQUES [b]

[a]*Department of Business Administration, Jubail Industrial College, Jubail, Saudi Arabia;* [b]*Norwich Business School, University of East Anglia, Norwich, UK*

We study whether and how the monitoring quality of the board of directors is associated with the choice of providers of assurance for sustainability disclosures. We also examine whether this relation depends on companies' economic, legal, and social environment. In an international empirical study considering five categories of assurance providers, we find that key board attributes, including board size, frequency of board meetings, CEO separation, proportion of women on the board, and the existence of a sustainability committee affect the type of assurance provider chosen by companies. Overall, companies with higher board monitoring quality are more likely to appoint a Big 4 assurer for their sustainability disclosures. Companies with a sustainability committee are more likely to engage an engineering firm, while firms with more board meetings are more likely to appoint an expert assurer. Moreover, we find that companies based in countries with strong environments are more likely to engage an external assurance provider, particularly a Big 4 assurer or an engineering firm. Overall, our results indicate that international sustainability disclosure assurance choices depend on corporate governance practices, as well as countries' economic, social and legal environment.

Keywords: sustainability disclosure; board of directors; assurance; international business

1. Introduction

We study whether the attributes of the board of directors, which reflect its monitoring quality, affect companies' choice of sustainability assurance provider. We also evaluate whether this relation depends on the economic, legal, and social environment in which companies operate. Our focus on the environment is particularly important to explain organisational search for legitimacy as a process that results from the interaction of multiple actors at a macro level (Suddaby et al. 2017, Deegan 2019).

*Corresponding author. Email: R.Malagueno@uea.ac.uk
Paper accepted by the Special Issue Guest Editors.

In the last decade, companies' production of standalone sustainability reports has increased significantly worldwide (Stolowy and Paugam 2018).[1] Such developments have been followed by considerable growth in the voluntary assurance of sustainability reports by external assurers (Christensen et al. 2021). However, research on the assurance of sustainability reporting is still in its early stages (Hummel et al. 2019). As noted by Maroun (2020) and Cohen and Simnett (2015), the choice of assurance provider is now a relevant area of study, and there are still many opportunities to further investigate the types of assurance providers. Understanding the factors leading to the choice of specific assurance providers and how they change in different settings is important because such a decision may build legitimacy for a firm's sustainability initiatives (Reimsbach et al. 2018, Farooq and De Villiers 2019, Michelon et al. 2019), among other effects.

We use a large international sample to assess the determinants of the choice of assurance provider and consider five different types of assurance providers in our analyses. Specifically, we examine data from an international sample of 2271 firms for the period 2010–2020 and classify assurance providers into five types: (i) Big-4 firms, (ii) accounting firms, (iii) engineering firms, (iv) consulting firms and (v) individual experts. We argue that when the board of directors displays higher monitoring quality, it ensures sustainability reporting reliability by choosing an appropriate assurance provider. We predict that companies with high monitoring quality of their boards of directors and operating in countries with strong economic, legal, and social environments have a higher probability of (i) engaging in sustainability assurance and (ii) choosing Big-4 firms as the assurance providers of their sustainability reports.

An initial analysis reveals that most of the attributes of the board of directors that we consider as proxies for monitoring quality are positively associated with the decision to assure the firm's sustainability reports. Our main results provide evidence that these attributes also determine the choice of assurance provider: the probability of choosing a Big-4 firm is higher in firms with (i) larger board size, (ii) CEO-chairperson separation, (iii) a higher percentage of women on the board and (iv) a higher percentage of independent board members. Additionally, firms have a higher probability of choosing an expert when board meetings are more frequent and choosing an engineering firm when a sustainability committee exists. Using a score based on the initial six attributes provides further evidence that the monitoring quality of the board of directors has a direct impact on the decision to assure sustainability reports, as well as on the choice of assurer.

We next assess the interaction effect of the board of directors' monitoring quality and countries' economic, legal, and social environments on sustainability assurance.[2] Our results indicate that companies with higher monitoring quality of their boards of directors, which operate in stronger economic, legal, and social environments, are more likely to (i) assure their sustainability reports and (ii) choose Big-4 firms as their assurers.

This study makes three important contributions. First, we provide evidence that the link between sustainability disclosures and the decisions that may legitimise them (assurance and the choice of assurer) are context-specific, addressing an aspect that tends to be ignored by researchers and is one of the shortcomings of institutional theory (Deegan 2019). This approach also extends the prior literature by focusing on the choice of assurance provider rather than on the

[1] In the last decade, several events around the world have changed companies' sustainability reporting practices, reinforcing the need to investigate the reliability of such reports (e.g. Christensen et al. 2021).

[2] By assessing the impact of the environment on the relation between the monitoring quality of the board of directors and assurance decisions, we extend the findings of Simnett et al. (2009), who found that companies operating in weak legal environmental countries, or in environmentally risky industries do not necessarily appoint a member of the auditing profession to assure their sustainability reports. However, these authors suggested that the choice of assurance provider is less important than the assurance decision itself, as they found no significant results for this analysis.

determinants of the voluntary assurance of sustainability reports (Kolk and Perego 2009, Martínez-Ferrero and García-Sánchez 2017a). Second, we contribute to the corporate governance literature by providing international evidence that the attributes of the monitoring quality of the boards of directors are associated with companies' sustainability assurance decisions. In this vein, our research responds to calls for a better understanding of the international infrastructure of corporate social responsibility (Pisani et al. 2017), as prior attempts to examine the effects of board characteristics on sustainability assurance have not reflected the current institutional pressures faced by firms (García-Sánchez et al. 2019). Third, we contribute to the sustainability assurance literature by showing that a dichotomous approach to the classification of assurance providers is not enough to capture the nuances associated with companies' choice of assurance provider.

2. Literature review and hypothesis development

2.1. *Legitimacy theory and assurance*

Legitimacy can be seen as a property of an entity, a process, or a perception. Suddaby et al. (2017) argue that in studies that consider legitimacy a property, the focus is narrow, and only the organisation and its external environment are considered, while when researchers consider legitimacy as a process, a broader lens assesses a more macro-level analysis. Thus, once a firm is seen as legitimate, it is still possible that society's expectations (in a broad sense) evolve and that the firm must adjust itself to be perceived by its stakeholders as legitimate. Corporate disclosure may aid companies in their quest for legitimacy. In this sense, Deegan (2019) calls our attention to the fact that the effectiveness with which corporate disclosures work to legitimise an organisation might be context specific, which is an aspect that many researchers have tended to ignore, as previously mentioned by Tilt (2018).

When legitimacy is seen as a process, the key actors involved in constructing legitimacy are 'those whose primary interest is in changing the process by which legitimacy is constructed' (Suddaby et al. 2017). In our study, we consider the board of directors the legitimacy actor. Additionally, to address the shortcoming of legitimacy theory, which Deegan (2019) considered particularly relevant, we assess how the link between the monitoring quality of the board of directors and firms' decisions regarding assurance is moderated by the setting in which the firm operates.

Consistent with the idea that the reliability of sustainability reporting can be improved by assurance, there has been growing reliance on independent assurance (Simnett et al. 2009, Edgley et al. 2010, Jones and Solomon 2010). Assurance is defined by the Global Reporting Initiative (GRI) as those 'activities designed to result in published conclusions on the quality of the report and the information contained within it' (GRI 2006). Empirical evidence shows that assurance statements in sustainability disclosures increase users' confidence and perceptions of information reliability (Hodge et al. 2009, Pflugrath et al. 2011, Fuhrmann et al. 2017). Accordingly, Reimsbach et al. (2018) find that the assurance of sustainability information increases firms' perceived sustainability performance and leads to more investment-related judgement. Thus, sustainability reporting affects the social judgements made on firms, which can be a matter of 'life and death' for an organisation (Bitektine 2011).

While the importance of assurance is generally accepted, the lack of a clear definition of who should assure sustainability reports and the required characteristics results in different types of assurance providers. Furthermore, several decisions in terms of assurance engagements (e.g. materiality) depend on assurance providers' judgement (Canning et al. 2019) and therefore result in differences in the assurance engagement process between different types of assurance

providers (Channuntapipat et al. 2019). The choice of assurance provider is an important decision for a company, as prior studies suggest that it affects stakeholders' perceptions and investors' decisions (Pflugrath et al. 2011, Ferguson and Pündrich 2015, Clarkson et al. 2019). These different perceptions may affect a firm's legitimacy in the eyes of its stakeholders.

Different classifications of assurers have been used in previous research. While some studies have used an accounting versus non-accounting classification (e.g. Casey and Grenier 2015, Hummel et al. 2019), others have considered Big-4 versus non-Big-4 providers (e.g. Fernandez-Feijoo et al. 2015, Clarkson et al. 2019). In this study, we classify sustainability assurance providers into five types (Big-4 firms, accounting firms, engineering firms, consulting firms, and expert opinions). Prior auditing studies have suggested that Big-4 firms are high-quality auditors due to their size and strong reputation (Audousset-Coulier 2015, Al-Shaer and Zaman 2019). Thus, we distinguish between Big-4 firms and other accounting firms. The non-accounting group of sustainability assurance providers represents a more diverse group and includes engineering firms, consulting firms and experts (Farooq and De Villiers 2019).[3]

Whereas accounting firms are known for their expertise in reporting and assurance and focus on the credibility and robustness of their assurance methodologies and standards, their understanding of sustainability has been questioned (De Beelde and Tuybens 2015). In this regard, research has indicated that non-accounting firms have better subject matter knowledge (Channuntapipat et al. 2020). Engineering firms are well known for their technical expertise, knowledge of sustainability and understanding of complex processes (e.g. DNV GL). Similar to Big-4 firms, large engineering firms have the potential to enjoy size advantages such as economies of scale (Farooq and De Villiers 2019). Consulting firms are generally smaller than accounting or engineering firms and tend to operate locally, have greater sustainability reporting expertise and have much more profound knowledge of firms' local stakeholders (GRI 2013). An expert opinion is provided by an individual who has subject matter expertise. For example, for many years, the sustainability reports of JTEKT (a Japanese multibillion corporation) were assured by Tamio Yamaguchi, who also assured other companies such as Topcon (a Japanese optical manufactory company) (Yamahuch 2017).

While the literature has identified different factors affecting companies' decisions to voluntarily assure their sustainability reports (Darnall et al. 2009, Simnett et al. 2009, Kolk and Perego 2009, Herda et al. 2014, Martínez-Ferrero and García-Sánchez 2017b, Liao et al. 2018), little is known about companies' decisions to choose among different types of assurance providers. Simnett et al. (2009) found that companies operating in countries with weak legal environments (e.g. Mexico, China, and Turkey) or in environmentally risky industries (e.g. mining, manufacturing, and utilities) do not necessarily appoint a member of the auditing profession to assure their sustainability reports. Additionally, the above authors suggested that the choice of assurance provider is less important than the assurance decision itself. Other studies led to conclusions that are inconsistent with the above findings. For example, Hodge et al. (2009) found weak evidence that non-professional investors find an assurance opinion provided by a professional accounting firm more reliable than one provided by a consulting firm. Moreover, Pflugrath et al. (2011) found that financial analysts from the US perceive accounting firms as more credible assurers, whereas analysts from Australia and the UK show little difference in their perceptions of

[3]Another group of studies has relied on different sources to classify assurance providers. For example, Perego and Kolk (2012) used corporate registrar classification, which includes accounting and consulting firms, certification bodies, academic institutions, stakeholder panels and individuals. The GRI assurance providers' classification considers only an independent third-party assurance type (i.e. accounting, engineering, and consulting).

enhanced credibility between different assurer types. Prior studies have also found that industry sensitivity does not affect companies' decisions to choose either an accounting or non-accounting assurance provider (Peters and Romi 2015, Liao et al. 2018).

2.2. *Board of directors' monitoring quality*

An efficient board of directors should ensure transparency, accountability, and fairness to stakeholders (Aras and Crowther 2008) as they monitor managers' actions. Boards of directors have a say in companies' decisions, including setting a sustainability agenda and allocating resources to ensure companies' sustainability performance (Jo and Harjoto 2011, Jizi 2017). As managers may use sustainability reports as a greenwashing mechanism, delivering an unrealistic, more sustainable image of their firms (Lyon and Maxwell 2011, Walker and Wan 2012), a board of directors presenting high monitoring quality can promote the assurance of the firm's reports as a reliability-enhancing mechanism (Wang et al. 2020), which likely leads to an increase in firms' legitimacy.

Prior studies on corporate governance and auditor choice have determined that effective corporate governance is associated with companies' choice of a high-quality external auditor (Chen and Zhou 2007, Carcello et al. 2011). However, only a few studies examine the effect of governance mechanisms and attributes on companies' decisions to assure sustainability reports and the type of assurance provider. For instance, Peters and Romi (2015) measure sustainability-oriented corporate governance in the US using factors such as the presence of the chief sustainability officer (CSO) on the board and the existence of a sustainability committee, finding evidence that these sustainability-oriented measures affect companies' assurance decisions. Al-Shaer and Zaman (2018) provide evidence that an audit committee is positively associated with sustainability assurance decisions and that both audit committee independence and board size are associated with the choice of a Big-4 assurer. Liao et al. (2018) investigate the effect of boards' attributes on companies' assurance decisions in the Chinese context, finding evidence that companies with large board sizes, more female directors, and a separation of the CEO and chairperson positions are more likely to assure their sustainability reports. Additionally, the above authors find that boards with more female directors are more likely to rely on assurance from auditing firms than those with more male directors.

Although the notion of quality in sustainability assurance is debatable, as the engagement of assurance providers may vary considerably depending on their aim to serve and their conception of sustainability (Channuntapipat et al. 2019), prior studies have assumed that Big-4 firms are perceived as high-quality sustainability assurance providers (Perego 2009, Clarkson et al. 2019), just as they are assumed to be high-quality audit providers. Assurance studies have suggested that Big-4 firms are more likely to protect their reputations (Humphrey et al. 2009, Perego 2009, Clarkson et al. 2019) by providing higher-quality assurance. Previous research has shown that the international presence and reputation of Big-4 firms are important determinants of their choice as assurance providers (Audousset-Coulier 2015).

From a legitimacy point of view, two types of legitimacy may be pursued by the board of directors when choosing Big-4 assurance providers: (i) procedural legitimacy, which is based on favourable evaluations of the soundness of the organisation's procedures and processes (Suchman 1995), and (ii) linkage legitimacy, which is based on the organisation's linkages with highly legitimate social actors in its environment (Baum and Oliver 1991). We argue that boards of directors with higher monitoring quality may choose Big-4 firms as their sustainability assurance providers while seeking legitimacy. Our reasoning assumes that boards of directors with higher monitoring quality are commonly more conservative in their decisions (García Lara et al. 2007) and therefore consider Big-4 assurers a more legitimate choice of sustainability

assurance providers. Such a choice puts the board of directors in a position of being 'better safe than sorry', protecting their firms and their own reputation capital (Fredriksson et al. 2020). Therefore, we state our first hypothesis as follows:

H1: *Companies with high quality board monitoring are more likely to choose Big-4 firms for assurance of their sustainability disclosures*.

2.3. *Environment*

As previously mentioned, legitimacy theory should evolve to consider the context in which firms operate to allow a better understanding of how disclosure is associated with firm legitimacy. When we consider legitimacy as a process, we must use a wide lens to assess the factors impacting such legitimacy. Thus, we consider the environment in which firms operate, as society's expectations about companies' social performance are shaped by institutional, legal, and cultural factors (Aguilera et al. 2007, Gjølberg 2009).

Different studies have indicated that country orientation affects companies' sustainability practices. Williams and Aguilera (2008) suggested that country orientation can influence the importance of sustainability issues in business operations at the country level. Simnett et al.'s (2009) results showed that companies operating in stakeholder-oriented countries are more likely to assure their sustainability reports and choose auditing firms. Additionally, Simnett et al. (2009) found that companies operating in a country with a strong legal environment are more likely to assure their sustainability reports. Moreover, Kolk and Perego (2009) found that companies operating in stakeholder-oriented countries are more likely to assure their reports. However, these studies do not examine the effects of dependencies between the institutional environment and firms' internal attributes on their sustainability practices.

Some corporate governance studies have taken into account the interaction effects with the environment in which the firm operates, albeit in different contexts. For example, Bell et al. (2012) studied foreign initial public offerings (IPOs) and considered how host country institutions moderate the relation between home country legal institutions and the success of foreign IPOs, as well as the relation between board independence and the success of foreign IPOs. Their results indicated that the impact of the dependent variables of interest is 'contingent upon the referent institutional context'. Bell et al. (2014) further extended this line of enquiry by examining market responses to foreign IPOs in the US, identifying the strength of minority shareholder protection in a foreign IPO's home country as a condition affecting the number of governance mechanisms required to achieve a high-value perception by US investors. A related approach is to consider the variation in country-level factors. For example, Krause et al. (2016) examined how the association between cultural power distance and CEO power is mediated by the variance in the former across a firm's geographic markets.

We expand on legitimacy theory and this line of corporate governance studies by examining how the interaction effect between the environment in which a company operates and the board of directors' monitoring quality affects assurance decisions. We build our expectations on the assumption that a strong economic, legal, and social environment protects firms' investors and other stakeholders by increasing firm transparency and accountability (Ke et al. 2015). To assess the environment, we consider the study by Isidro et al. (2020). They examined the association between 72 individual country-level attributes and financial reporting quality, providing evidence of the positive and significant association between different country-level factors and high-quality financial reporting. Unlike prior international studies using a single country environment measure, the factors introduced in the present study provide 'one method to deal with the

observed co-dependencies of countries' economic, political, regulatory, and social characteristics' (Isidro et al. 2020, p. 295). We adopt the factor that 'consists of a mix of economic, legal, and social variables' and predict that companies with boards of directors presenting higher monitoring quality, and operating in countries with strong economic, legal, and social environments, are more likely to engage in sustainability assurance.

Whereas board of directors with higher monitoring quality are more likely to pursue higher levels of legitimacy through assurance, companies operating in countries with a strong economic, legal, and social environment are also under more pressure to show they are transparent and accountable. Consequently, we hypothesise the following:

H2a: *Companies with high quality board monitoring, and operating in countries with strong economic, legal, and social environments, are more likely to engage in sustainability assurance.*

As previously noted, Big-4 firms are commonly associated with higher assurance quality. However, there is evidence that the quality of the audits of Big-4 firms can differ significantly across countries. For example, Ke et al. (2015) argued that China's weak institutional environment 'results in Big-4 firms providing lower-quality audits to companies that are listed only in China'. Moreover, when comparing the audits performed by Big-4 firms in the US to those performed in less litigious (but economically similar) environments in other Anglo-American countries, Khurana and Raman (2004, p. 473) found that it is 'litigation exposure rather than brand name reputation protection that drives perceived audit quality'. Thus, it is possible that the quality or perceived quality of the assurance provided by Big-4 firms also varies across countries. In this scenario, the environment in which both the firm and the assurer are operating becomes crucial. Indeed, it is possible that different environmental factors have different effects, both in terms of direction and intensity.

We posit that when firms operate in strong economic, legal, and social environments, a board of directors with high monitoring quality might expect that the mechanisms embedded in those environments will restrict the variations of quality of the assurance services. In such a setting, these boards of directors will choose as assurers the firms that traditionally are perceived as high-quality assurance providers (i.e. Big-4 providers). Hence:

H2b: *Companies with high quality board monitoring and operating in countries with strong economic, legal, and social environments, are more likely to choose Big-4 firms as the assurance providers of their sustainability disclosures.*

An overview of the research model is presented in Figure 1.

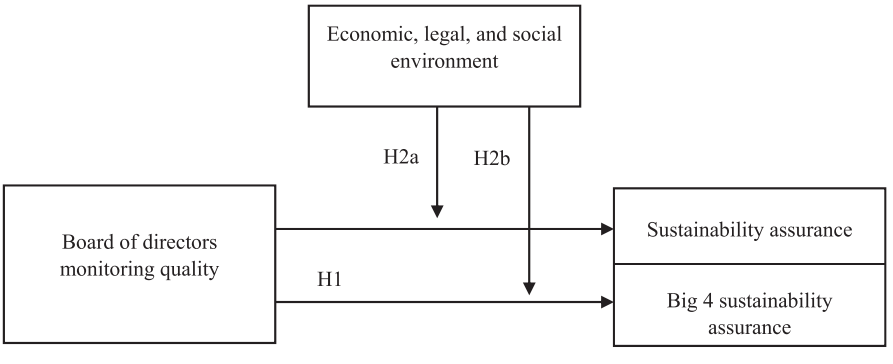

Figure 1. Research model.

3. Sample and methodology

Our initial sample consists of 3864 companies that issued sustainability reports from 2010 to 2020, which we identified via the Thomson Reuters Asset4 database. We collected financial data from the Thomson Reuters Datastream database and those on country factors from Isidro et al. (2020). After merging the datasets, we are left with a sample of 16,912 observations (for 2271 firms). When examining the choice of assurance provider, the sample includes 7650 observations (for 1296 firms). The sample used to test the choice of assurance provider is smaller because it excludes all those observations in which firms choose not to assure their reports.

Since firms can decide on the assurance provider of their sustainability report only after they have decided to assure the report, we use a logistic regression model with four equations to test our hypotheses. First, to test H1, we model companies' decisions regarding whether to assure their reports (equation 1). Second, we model companies' choice of assurance provider (equation 2). To test H2a and H2b, we expand equations 1 and 2 by including interaction effects. The initial model is as follows:

$$\begin{aligned}\text{Assurance} = {} & \alpha + \beta_{1-7} BoD\_Monitoring + \beta_8 Country\_Factor \\ & + \beta_{9-12} Corporate\_Gov + \beta_{13-15} Firm\_Controls + \beta_{16} Mining \\ & + \beta_{17} Manufacturing + \beta_{18} Utilities + \beta_{19} Finance + YearFE\end{aligned} \quad (1)$$

$$\begin{aligned}\text{Assurance\_Provider} = {} & \alpha + \beta_{1-7} BoD\_Monitoring + \beta_8 Country\_Factor \\ & + \beta_{9-12} Corporate\_Gov + \beta_{13-15} Firm\_Controls + \beta_{16} Mining \\ & + \beta_{17} Manufacturing + \beta_{18} Utilities + \beta_{19} Finance + YearFE\end{aligned} \quad (2)$$

3.1. *Dependent variables*

In the first equation, the dependent variable is the log-odds ratio, based on the probability of *Assurance* being coded as 1, which happens when the sustainability report is assured, and 0 otherwise. In the second equation, the variable of interest is *Assurance_Provider*. This variable is initially *Big-4,* an indicator variable, coded as 1 if assurance is provided by a Big-4 firm and 0 otherwise. Additionally, we assess four other types of assurance providers: (i) *Engineering* is an indicator variable, coded as 1 if the assurance is provided by an engineering firm and 0 otherwise; (ii) *Consulting* is an indicator variable, coded as 1 if the assurance is provided by a consulting firm and 0 otherwise; (iii) *Accounting* is an indicator variable, coded as 1 if the assurance is provided by an accounting firm (other than a Big-4 firm) and 0 otherwise; and (iv) *Expert* is an indicator variable coded as 1 if the assurance is provided by an individual expert and 0 otherwise. Figure 2 depicts the different types of assurance providers.

3.2. *Independent and control variables*

The first set of independent variables, which includes six variables, represents the corporate governance attributes of the board of directors that proxy for good monitoring (*BoD Monitoring*). We expect these proxies to be positively associated with the choice of assurer considered by the board of directors to enhance the legitimacy of the firm's disclosures.

First, the size of the board (*BoD_Size*) denotes the number of directors on the board, has been used in prior studies to explain companies' sustainability performance (Rao et al. 2012, Jizi et al. 2014) and is usually associated with a representation of diversified stakeholders' interests (Jizi

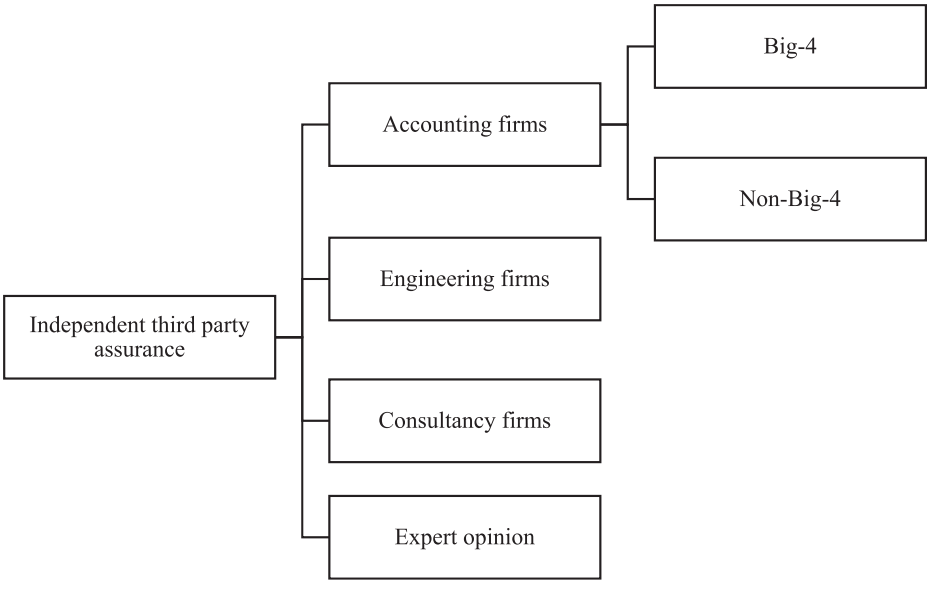

Figure 2. Sustainability assurance providers' classification.

2017). Liao et al. (2018) found that a larger board size among Chinese firms positively affects companies' decisions to assure their sustainability reports. Second, we consider the number of times the board meets per year (*BoD_Meet*). This variable proxies for board activity level and diligence (Vafeas 1999, Carcello et al. 2002, Laksmana 2008), as frequent board meetings improve management monitoring (Masulis et al. 2012). Third, the separation of the CEO and board chairperson positions (*CEO_Sep*) is essential to ensure that the board effectively performs the monitoring function (Cohen et al. 2002) and can lead to better governance over sustainability-related issues (Galbreath 2009). When the CEO holds both positions, the board's independence, accountability, and transparency are reduced (Michelon and Parbonetti 2012). Fourth, we consider the proportion of women on the board (*BoD_Women*). Many studies have examined the impact of gender diversity on boards, finding that it is positively related to sustainability performance (Webb 2004, Ben-Amar et al. 2017) and the choice of an accounting firm as an assurance provider (Liao et al. 2018). Fifth, we use the percentage of independent board members (*BoD_Indep*) to reflect the extent to which board members can control potential unethical conduct (Dah and Jizi 2018), directing companies' resources to improve their sustainability strategies and reporting (Helfaya and Moussa 2017, Jizi 2017). Finally, we consider the existence of a sustainability committee via an indicator variable (*Sust_Comt*), which has been associated with an increase in companies' environmental reporting (Ienciu et al. 2012, Giannarakis 2014). Moreover, Peters and Romi (2015) indicated that the presence of sustainability experts on the environmental committee is positively associated with a company's sustainability assurance decision.

Alternatively, we capture the board of directors' monitoring quality using our own governance score (*Std_6BoD*), which is the result of the sum of the standardised version of the six board attributes described. This alternative specification allows us to assess the robustness of our findings.

We control for other variables that, according to prior research, should be associated with assurance choices and legitimacy issues. First, we include governance variables (Corporate_Gov) that capture two characteristics of the audit committee: financial expertise (*AudC_Exp*) and

independence (*AudC_Indep*). For instance, Al-Shaer and Zaman (2018) found that audit committees add credibility to sustainability reporting through their independence, expertise, and oversight. Second, following the literature that has shown that monitoring can come from either internal or external sources, we consider investors' influence by controlling for the holdings of institutional investors (*Instit_Inv*) and blockholders (*Block_Inv*) (Alsahali et al. 2021). The final set of firm-level controls comprises profitability (*ROA*), size (*Size*), and leverage (*Leverage*). Prior research has associated those variables with assurance practices (Simnett et al. 2009).

To test H2a and H2b, we include in our models an interaction effect between our board monitoring quality score and *Country_Fact_High*, an indicator variable coded as one when the value of the country factor is higher than the median, and zero otherwise. The country factor that we refer to is from Isidro et al. (2020) and consists of a mix of economic, legal, and social variables. Thus, when this indicator variable is coded as one, we believe the country has a strong economic, legal, and social environment. Specifically, we use the first country-level factor identified in Isidro et al. (2020).[4] Using a country-level factor is a superior alternative to considering only one country-level variable, as the former allows us to account for several country-level variables concurrently, without problems of codependencies between the set of variables on which it is based. As disclosed in Appendix C of Isidro et al. (2020), factor 1 reflects 35 individual country-level variables, ranging from control of corruption to religiousness, and considering several country-level variables, such as trust, regulatory quality, and media, that one would expect to be directly related to assurance. We expect to find a positive association between the interaction variable *Country_Fact_High* and (i) the decision to assure sustainability reports and (ii) the choice of a Big-4 firm as the assurance provider.

To control for possible industry effects, we consider 2-digit Standard Industrial Classification (SIC) codes, which classify industries into nine categories. Following Simnett et al. (2009), we control for mining, manufacturing, utilities, and finance industries.[5] A list of all the variables and their definitions is provided in the Appendix.

4. Descriptive statistics and findings

4.1. *Descriptive statistics*

Table 1 presents the descriptive statistics for all variables, which are winsorised at the 1st and 99th percentiles to reduce the effects of outliers. Observations that correspond to cases in which firms assure their sustainability reports represent almost 53% of the initial sample. Big-4 firms account for 56% of the assured reports, while engineering and consulting firms account for almost 19 and 14%, respectively. Accounting firms and individual experts assure only approximately five percent each. The average board of directors has 11 members and meets nine times per year. Approximately 65% of observations are cases that separate the position of CEO from that of board chairperson. On average, 19% of companies' board members are women. Approximately 62% of board members are independent, and 81% of companies have a sustainability committee.

Table 2 Panel A presents the descriptive statistics by country. The assurance of sustainability reports and use of Big-4 firms vary considerably among countries, highlighting the importance of

[4]The values we use are presented in Panel B of Table 4 (see, Isidro et al. 2020).
[5]The nine categories are (1) Agriculture, Forestry, & Fishing, (2) Mining, (3) Construction, (4) Manufacturing, (5) Transportation & Public Utilities, (6) Wholesale Trade, (7) Retail Trade, (8) Finance, Insurance, & Real Estate, and (9) Services. The results of considering all nine industries are consistent with those discussed in our manuscript.

Table 1. Variables' descriptive statistics.

	N	Mean	Std. Dev.	p25	Median	p75
Assurance	16,912	0.527	0.499	0.000	1.000	1.000
Big-4	7,650	0.562	0.496	0.000	1.000	1.000
Engineering	7,650	0.186	0.389	0.000	0.000	0.000
Consulting	7,650	0.143	0.351	0.000	0.000	0.000
Accounting	7,650	0.051	0.219	0.000	0.000	0.000
Expert	7,650	0.041	0.198	0.000	0.000	0.000
GOV_Score	16,912	65.080	25.135	46.805	71.910	86.560
BoD_Size	16,912	10.942	3.354	9.000	11.000	13.000
BoD_Meet	16,912	9.350	4.459	6.000	8.000	11.000
CEO_Sep	16,912	0.652	0.476	0.000	1.000	1.000
BoD_Women	16,912	0.192	0.127	0.100	0.182	0.278
BoD_Indep	16,912	0.621	0.246	0.444	0.652	0.833
Sust_Comt	16,912	0.814	0.389	1.000	1.000	1.000
Country_Factor	16,912	0.320	0.698	0.362	0.470	0.687
AudC_Exp	16,912	0.822	0.382	1.000	1.000	1.000
AudC_Indep	16,912	0.870	0.225	0.750	1.000	1.000
Instit_Inv	16,912	0.484	0.287	0.237	0.448	0.734
Block_Inv	16,912	0.305	0.223	0.121	0.262	0.471
ROA	16,912	0.045	0.083	0.012	0.041	0.077
Size	16,912	15.291	1.602	14.242	15.338	16.415
Leverage	16,912	0.217	0.161	0.089	0.199	0.315
Mining	16,912	0.081	0.272	0.000	0.000	0.000
Manufacturing	16,912	0.370	0.483	0.000	0.000	1.000
Utilities	16,912	0.148	0.355	0.000	0.000	0.000
Finance	16,912	0.186	0.389	0.000	0.000	0.000

Table 1 provides summary statistics for companies' assurance decision and assurance provider types. In addition, the table provides summary statistics for variables used in the model. Detailed definitions of the variables are in the Appendix. The sample contains 2,271 firms that issued a sustainability report during the period from 2010 to 2020.

considering country-level variables in the analysis of the choice of assurance provider. Almost 24% of our observations are from firms in the US, where almost 31% of companies assure their sustainability reports, 21% of which are assured by Big-4 firms. This result can be compared with that of Canada, where a slightly higher percentage of sustainability reports are assured, but 73% of these assured reports are assured by Big-4 firms (well above average). Japan presents a very different scenario, as 72% of the reports among firms in the country are assured, but only 31% of these assured reports are assured by Big-4 firms. Table 2 Panel B presents the descriptive statistics by industry. The assurance of sustainability reports is relatively consistent across industries, ranging from 44% to 59%. The assurance provided by Big-4 firms is 63% in the utilities industry but only 51% in the manufacturing industry.

Table 3 presents the Pearson correlation matrix. There are positive and significant correlations between *Big-4* and *BoD_Size*, *BoD_Meet*, *CEO_Sep*, *BoD_Women* and *Bod_Indep*, which provide initial evidence supporting H1. Moreover, there are positive and significant correlations between (i) *Assurance* and (ii) *Big-4* and *Country_Factor*. The small pairwise correlation coefficients among the control variables suggest that multi-collinearity is not a major concern in our data.[6] To further assess multicollinearity in our regressions, we compute variance inflation factors (VIFs) and find that all values are below 2.5 and thus within acceptable levels.

[6]The correlation between *BoD_Indep* and *AudC_Indep* is well above the pairwise correlations among other variables (0.61) but is still within the acceptable range.

Table 2. Panel A. Descriptive statistics by country

Country	*N*	Assurance	Big-4	Engineering	Consulting	Accounting	Expert
Argentina	5	0.000	0.000	0.000	0.000	0.000	0.000
Australia	990	0.454	0.748	0.083	0.132	0.007	0.002
Austria	108	0.685	0.769	0.031	0.062	0.123	0.015
Belgium	160	0.569	0.828	0.138	0.011	0.011	0.000
Brazil	98	0.592	0.691	0.182	0.036	0.036	0.036
Canada	859	0.363	0.728	0.151	0.117	0.004	0.000
Chile	10	0.600	0.250	0.000	0.750	0.000	0.000
Denmark	148	0.520	0.985	0.000	0.000	0.000	0.000
Finland	250	0.752	0.743	0.047	0.146	0.000	0.064
France	915	0.880	0.748	0.037	0.004	0.116	0.003
Germany	653	0.646	0.905	0.036	0.019	0.033	0.006
Greece	77	0.831	0.566	0.377	0.019	0.019	0.019
Hong Kong	474	0.519	0.210	0.117	0.617	0.042	0.009
India	462	0.699	0.529	0.424	0.036	0.011	0.000
Indonesia	190	0.358	0.049	0.197	0.311	0.443	0.000
Ireland	144	0.590	0.508	0.286	0.143	0.048	0.000
Israel	37	0.676	0.111	0.056	0.056	0.444	0.333
Italy	291	0.818	0.919	0.068	0.014	0.000	0.000
Japan	1,026	0.721	0.310	0.093	0.214	0.033	0.346
Malasya	304	0.299	0.390	0.439	0.073	0.085	0.012
Mexico	33	0.606	1.000	0.000	0.000	0.000	0.000
Netherlands	291	0.756	0.891	0.036	0.000	0.052	0.021
New Zealand	116	0.250	1.000	0.000	0.000	0.000	0.000
Philippines	111	0.450	0.000	0.581	0.186	0.000	0.233
Portugal	74	0.770	0.904	0.096	0.000	0.000	0.000
Singapore	237	0.346	0.500	0.129	0.343	0.029	0.000
South Africa	872	0.562	0.624	0.082	0.213	0.037	0.005
Spain	334	0.805	0.847	0.077	0.055	0.000	0.000
Sweden	465	0.619	0.965	0.004	0.031	0.000	0.000
Switzerland	475	0.514	0.570	0.341	0.058	0.000	0.027
Taiwan	391	0.875	0.221	0.547	0.232	0.000	0.000
Thailand	240	0.475	0.316	0.074	0.074	0.505	0.000
United Kingdom	2,014	0.550	0.465	0.248	0.233	0.044	0.009
United States	4,058	0.305	0.214	0.450	0.215	0.084	0.024

Table 2 Panel A provides summary statistics by country for companies' assurance decision and assurance provider types. The sample contains 2,271 firms that issued a sustainability report during the period from 2010 to 2020.

Table 2. Panel B. Descriptive statistics by industry

Industry	*N*	Assurance	Big-4	Engineering	Consulting	Accounting	Expert
Mining	1,363	0.491	0.610	0.189	0.135	0.049	0.012
Manufacturing	6,262	0.552	0.512	0.249	0.115	0.046	0.062
Utilities	2,501	0.591	0.628	0.145	0.117	0.060	0.030
Finance	3,152	0.540	0.580	0.151	0.170	0.049	0.036
Other	3,634	0.442	0.569	0.123	0.205	0.056	0.024

Table 2 Panel B provides summary statistics by industry for companies' assurance decision and assurance provider types. The sample contains 2,271 firms that issued a sustainability report during the period from 2010 to 2020.

Table 3. Correlation matrix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
(1) Assurance	1.00																								
(2) Big-4	**0.05**	1.00																							
(3) Accounting	0.01	**−0.54**	1.00																						
(4) Engineering	**−0.05**	**−0.46**	**−0.20**	1.00																					
(5) Consulting	0.01	**−0.26**	**−0.11**	**−0.09**	1.00																				
(6) Expert	−0.01	**−0.23**	**−0.10**	**−0.08**	**−0.05**	1.00																			
(7) GOV_Score	**0.04**	**0.06**	**0.08**	−0.02	−0.01	**−0.28**	1.00																		
(8) BoD_Size	**0.25**	**0.11**	**−0.08**	**−0.10**	**0.04**	**−0.04**	**−0.04**	1.00																	
(9) BoD_Meet	**0.08**	**0.03**	**−0.07**	**−0.05**	−0.01	**0.18**	**−0.09**	**−0.04**	1.00																
(10) CEO_Sep	**0.04**	**0.09**	**−0.07**	**0.03**	**−0.02**	**−0.09**	0.01	**−0.10**	**0.05**	1.00															
(11) BoD_Women	**0.15**	**0.25**	**−0.08**	**−0.14**	0.00	**−0.22**	**0.25**	**0.06**	**−0.02**	**0.03**	1.00														
(12) BoD_Indep	**−0.12**	**0.06**	**0.09**	**−0.03**	**−0.02**	**−0.23**	**0.52**	**−0.21**	**−0.07**	**−0.06**	**0.32**	1.00													
(13) Sust_Comt	**0.30**	0.00	**0.03**	−0.02	**−0.02**	**−0.03**	**0.21**	**0.18**	**0.02**	0.01	**0.06**	**−0.02**	1.00												
(14) Country_Factor	**0.03**	**0.15**	**−0.14**	**−0.02**	**−0.10**	**0.06**	**0.16**	**−0.10**	**0.07**	0.00	**0.21**	**0.18**	−0.01	1.00											
(15) AudC_Exp	**−0.07**	**0.05**	**0.06**	0.00	−0.01	**−0.25**	**0.40**	0.01	**−0.18**	**−0.02**	**0.22**	**0.36**	0.01	0.01	1.00										
(16) AudC_Indep	**−0.11**	**−0.08**	**0.15**	**0.06**	**−0.02**	**−0.16**	**0.41**	**−0.18**	**−0.10**	**−0.02**	**0.10**	**0.61**	0.01	**−0.08**	**0.28**	1.00									
(17) Instit_Inv	**−0.20**	**−0.14**	**0.17**	**0.09**	−0.01	**−0.08**	**0.37**	**−0.18**	**−0.14**	**−0.16**	**0.16**	**0.50**	**−0.05**	**0.22**	**0.27**	**0.35**	1.00								
(18) Block_Inv	**−0.06**	**0.04**	**−0.05**	0.0	**0.04**	**−0.12**	**−0.22**	**0.03**	**−0.12**	**0.11**	**−0.08**	**−0.28**	**−0.09**	**−0.35**	**0.03**	**−0.15**	**−0.26**	1.00							
(19) ROA	**0.02**	**−0.05**	**0.03**	**0.04**	**0.05**	**−0.03**	0.01	**−0.03**	**−0.17**	**−0.02**	**0.04**	0.01	**0.02**	**−0.07**	**0.02**	**0.04**	**0.03**	0.01	1.00						
(20) Size	**0.31**	**0.11**	0.00	**−0.20**	0.01	**0.03**	**0.13**	**0.45**	**0.05**	**−0.18**	**0.09**	**0.03**	**0.28**	**0.11**	**−0.06**	**−0.07**	**−0.02**	**−0.24**	**0.05**	1.00					
(21) Leverage	0.01	**0.04**	**0.03**	**−0.07**	0.01	**−0.04**	**0.09**	−0.01	0.01	**−0.04**	**0.09**	**0.11**	0.01	**0.03**	**0.08**	**0.06**	**0.14**	0.00	**−0.12**	**−0.02**	1.00				
(22) Mining	**−0.02**	**0.03**	0.00	−0.01	0.00	**−0.04**	**0.11**	**−0.12**	−0.01	**0.06**	**−0.12**	**0.06**	**0.05**	**−0.05**	**0.04**	**0.08**	**−0.06**	**0.04**	**−0.13**	**−0.17**	**−0.05**	1.00			
(23) Manufacturing	**0.04**	**−0.08**	**0.13**	**−0.07**	−0.02	**0.08**	**−0.07**	−0.01	**−0.07**	**−0.09**	**−0.06**	**−0.04**	**0.03**	**0.10**	**−0.09**	**−0.08**	**0.06**	**−0.10**	**0.12**	**0.12**	**−0.07**	**−0.23**	1.00		
(24) Utilities	**0.05**	**0.06**	**−0.05**	**−0.03**	0.02	**−0.03**	−0.01	**0.11**	**0.02**	**0.02**	**0.02**	**−0.04**	**0.02**	**−0.07**	0.00	**−0.04**	**−0.11**	**0.11**	**−0.02**	**0.05**	**0.25**	**−0.12**	**−0.32**	1.00	
(25) Finance	0.01	0.02	**−0.04**	**0.04**	0.00	−0.01	0.00	**0.10**	**0.14**	**0.06**	**0.07**	**0.04**	**−0.04**	**−0.04**	**0.03**	**0.03**	**−0.02**	**−0.07**	**−0.10**	**−0.07**	**−0.11**	**−0.14**	**−0.37**	**−0.20**	1.00

Table 3 provides a correlation matrix for all variables in our model. Detailed definitions of the variables are in the Appendix. The sample contains 2271 firms that issued a sustainability report during the period from 2010 to 2020. **Bold** for $p<0.05$.

4.2. *Main tests*

Table 4 Panel A presents the regression results for the impact of the selected board attributes on companies' assurance decisions and the choice of Big-4 firms as assurance providers. The first two columns present the results of estimating the first equation, where column 1 includes the individual board of directors' attributes of interest and column 2 considers the score we create (*Std_6BoD*).[7] As predicted, most of the variables of interest (board size, board meetings, CEO-chairperson separation, women on the board, and the existence of a sustainability committee) are positively and significantly associated with companies' decisions to assure their sustainability reports. The only unexpected result is that board independence is negatively and significantly associated with assurance decisions. In column 2, we find that our governance score is positively and significantly associated with the decision to assure sustainability reports. Thus, overall, good monitoring practices are associated with firms choosing to assure their reports.

Columns 3 and 4 present the results of estimating the second equation when we consider Big-4 firms. Column 3 presents the association between board attributes and companies' decisions to engage with Big-4 assurance providers. There is a positive and significant association between companies' decisions to engage with Big-4 assurance providers and (i) board size, (ii) CEO-chairperson separation, (iii) the percentage of women on the board and (iv) board independence. Thus, four out of the six attributes considered support H1, and we conclude that board attributes are significant for assurance decisions and the choice of Big-4 firms. Moreover, it is important to recognise that not all the examined attributes have similar impacts. In column 4 we report a positive and significant association between companies' *Std_6BoD* and their choice of Big-4 firms, further supporting H1.

The positive and statistically significant coefficients estimated for the country-level factor indicate that firms operating in countries with strong economic, legal, and social environments are more likely to provide assurance and to choose Big-4 firms as their assurance providers. This result is found both when we consider the governance attributes separately and when we consider our standardised score, indicating robustness.

Finally, we report that the four industries we consider individually (*mining, manufacturing, utilities,* and *finance*) have a higher probability of assurance than do the remaining industries, with *mining* having the highest coefficient (possibly because it is an environmentally sensitive industry), revealing the existence of strong industry-level effects. However, such consistency of results is not found in regard to the choice of a Big-4 firm as the assurance provider. In fact, we find that while mining companies have a higher probability of choosing Big-4 firms as their assurance providers than do other sectors, in the case of manufacturing firms, the opposite is true (i.e. Big-4 firms have a lower probability of being selected).

Table 4 Panel B presents the results for board attributes and companies' choice of different types of assurance providers (other than Big-4 providers). As in Panel A, we present the results for the individual board of directors' attributes and for our governance score. These results indicate that when we carefully classify assurance providers, there is a wide variety of determinants. First, we find that an engineering firm is more likely to be chosen if there is a sustainability committee. Engineering firms are recognised for their technical subject matter expertise and their understanding of complex sustainability processes (Farooq and De Villiers 2019, Alsahali and Malagueño 2022). As sustainability committees oversee the development and implementation of sustainability strategies and policies, assurance providers with higher technical information

[7]Estimations are performed with robust standard errors.

Table 4. Panel A. Corporate board attributes and the choice of Big-4 assurance provider

Dependent variable	Assurance	Assurance	Big-4	Big-4
Std_6BoD		0.191***		0.177***
		[0.008]		[0.012]
BoD_Size	0.062***		0.045***	
	[0.007]		[0.009]	
BoD_Meet	0.021***		−0.001	
	[0.004]		[0.006]	
CEO_Sep	0.299***		0.379***	
	[0.040]		[0.055]	
BoD_Women	2.266***		3.469***	
	[0.173]		[0.247]	
BoD_Indep	−1.251***		0.740***	
	[0.118]		[0.152]	
Sust_Comt	1.272***		−0.068	
	[0.053]		[0.093]	
Country_Factor	0.156***	0.049*	0.430***	0.534***
	[0.030]	[0.029]	[0.043]	[0.041]
AudC_Exp	−0.055	−0.131***	0.041	0.235***
	[0.054]	[0.050]	[0.069]	[0.065]
AudC_Indep	0.360***	−0.606***	−0.668***	−0.460***
	[0.112]	[0.092]	[0.144]	[0.127]
Instit_Inv	−1.340***	−1.674***	−1.720***	−1.554***
	[0.080]	[0.075]	[0.123]	[0.117]
Block_Inv	−0.532***	−0.344***	0.390***	0.661***
	[0.097]	[0.093]	[0.137]	[0.132]
ROA	0.847***	0.936***	−0.349	0.107
	[0.243]	[0.234]	[0.364]	[0.349]
Size	0.349***	0.368***	0.115***	0.102***
	[0.015]	[0.013]	[0.021]	[0.019]
Leverage	0.353***	0.308**	0.590***	0.496***
	[0.124]	[0.122]	[0.187]	[0.183]
Mining	0.623***	0.527***	0.470***	0.352***
	[0.077]	[0.074]	[0.111]	[0.110]
Manufacturing	0.376***	0.354***	−0.142*	−0.173**
	[0.049]	[0.048]	[0.073]	[0.072]
Utilities	0.381***	0.296***	0.128	0.075
	[0.063]	[0.062]	[0.091]	[0.090]

Finance	0.388***	0.269***	0.037	−0.046
	[0.063]	[0.061]	[0.086]	[0.084]
Year_2011	0.210**	0.226***	0.038	0.083
	[0.083]	[0.081]	[0.124]	[0.125]
Year_2012	0.417***	0.471***	−0.075	0.040
	[0.083]	[0.081]	[0.121]	[0.121]
Year_2013	0.633***	0.676***	−0.077	0.092
	[0.083]	[0.081]	[0.119]	[0.119]
Year_2014	0.635***	0.664***	0.051	0.294**
	[0.084]	[0.081]	[0.120]	[0.120]
Year_2015	0.763***	0.771***	0.111	0.445***
	[0.085]	[0.082]	[0.123]	[0.122]
Year_2016	0.801***	0.788***	0.027	0.440***
	[0.085]	[0.082]	[0.125]	[0.123]
Year_2017	0.945***	0.940***	0.005	0.413***
	[0.085]	[0.082]	[0.122]	[0.120]
Year_2018	1.844***	1.837***	−0.241*	0.225*
	[0.099]	[0.096]	[0.125]	[0.123]
Year_2019	1.821***	1.855***	0.062	0.544***
	[0.097]	[0.094]	[0.127]	[0.124]
Year_2020	0.343***	0.171**	0.494***	0.981***
	[0.088]	[0.083]	[0.169]	[0.169]
Constant	−7.665***	−5.073***	−2.614***	−1.342***
	[0.263]	[0.250]	[0.375]	[0.362]
Pseudo R-squared	0.22	0.19	0.11	0.10
Log pseudo likelihood	−9177.79	−9496.21	−4651.43	−4729.72
Wald Chi-square	3435.53	3210.71	943.09	846.69
P- Chi-square	0.00	0.00	0.00	0.00
N	16,912	16,912	7650	7650

Table 4 Panel A presents the results of logistic regressions examining the association between board attributes and (i) companies' decision to assure sustainability report and (ii) their choice of Big-4 assurance provider. The analysis is performed on a sample of 2271 firms that issued a sustainability report during the period from 2010 to 2020. Detailed definitions of all variables are in the Appendix. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 4. Panel B. Corporate board attributes and the choice of different types of assurance providers

Dependent variable	Engineering	Engineering	Consulting	Consulting	Accounting	Accounting	Expert	Expert
Std_6BoD		−0.112***		−0.124***		0.003		−0.209***
		[0.016]		[0.017]		[0.024]		[0.031]
BoD_Size	−0.069***		−0.008		0.038**		−0.041**	
	[0.012]		[0.012]		[0.016]		[0.020]	
BoD_Meet	−0.007		−0.026***		0.009		0.100***	
	[0.008]		[0.009]		[0.013]		[0.013]	
CEO_Sep	−0.245***		0.009		−0.164		−0.558***	
	[0.067]		[0.077]		[0.115]		[0.138]	
BoD_Women	−2.249***		−3.271***		0.3		−5.571***	
	[0.317]		[0.331]		[0.515]		[0.829]	
BoD_Indep	0.019		−0.545***		0.106		−1.397***	
	[0.200]		[0.201]		[0.377]		[0.367]	
Sust_Comt	0.349***		0.16		−0.434**		−0.795***	
	[0.132]		[0.131]		[0.183]		[0.211]	
Country_Factor	−0.654***	−0.676***	0.125**	0.018	−0.638***	−0.625***	0.634***	0.335***
	[0.054]	[0.052]	[0.055]	[0.050]	[0.076]	[0.073]	[0.165]	[0.128]
AudC_Exp	0.282***	0.181**	−0.075	−0.174**	−0.167	−0.121	−0.577***	−1.286***
	[0.099]	[0.090]	[0.091]	[0.088]	[0.148]	[0.142]	[0.174]	[0.139]
AudC_Indep	1.284***	1.445***	0.864***	0.734***	−0.797**	−0.841***	−0.650**	−1.338***
	[0.232]	[0.208]	[0.198]	[0.181]	[0.314]	[0.256]	[0.299]	[0.233]
Instit_Inv	1.631***	1.690***	1.184***	1.024***	0.409	0.397	−0.528	−1.168***
	[0.150]	[0.142]	[0.163]	[0.159]	[0.259]	[0.255]	[0.385]	[0.378]
Block_Inv	−0.533***	−0.751***	0.144	0.041	−0.092	−0.02	−1.652***	−2.598***
	[0.185]	[0.179]	[0.181]	[0.178]	[0.267]	[0.258]	[0.356]	[0.333]
ROA	−1.104**	−1.076**	0.645	0.419	3.069***	2.751***	3.604**	0.992
	[0.550]	[0.547]	[0.584]	[0.552]	[1.004]	[0.969]	[1.406]	[1.323]
Size	0.074***	0.061**	−0.365***	−0.356***	0.087**	0.128***	−0.014	−0.009
	[0.027]	[0.024]	[0.029]	[0.026]	[0.044]	[0.041]	[0.055]	[0.049]
Leverage	0.28	0.312	−1.549***	−1.552***	0.43	0.456	0.399	0.35
	[0.225]	[0.223]	[0.256]	[0.250]	[0.392]	[0.390]	[0.610]	[0.614]
Mining	0.306**	0.439***	−0.969***	−0.838***	−0.032	−0.1	−0.108	−0.187
	[0.143]	[0.143]	[0.151]	[0.149]	[0.233]	[0.232]	[0.453]	[0.430]
Manufacturing	0.859***	0.874***	−0.751***	−0.690***	−0.265*	−0.269*	0.514**	0.509**
	[0.099]	[0.098]	[0.094]	[0.093]	[0.153]	[0.152]	[0.206]	[0.200]

Utilities	0.293**	0.317**	−0.519***	−0.433***	−0.023	−0.013	0.413	0.273
	[0.125]	[0.123]	[0.124]	[0.122]	[0.186]	[0.184]	[0.272]	[0.271]
Finance	0.235**	0.240**	−0.310***	−0.240**	−0.094	−0.049	0.551**	0.612**
	[0.117]	[0.117]	[0.109]	[0.106]	[0.192]	[0.185]	[0.267]	[0.258]
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.11	0.10	0.11	0.1	0.05	0.05	0.33	0.27
Log pseudo likelihood	−3262.32	−3294.22	−2790.42	−2829.92	−1459.28	−1465.62	−883.24	−959.73
Wald Chi-square	625.53	600.64	689.11	584.78	191.57	174.92	626.75	497.32
P- Chi-square	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N	7,650	7,650	7,650	7,650	7,650	7,650	7,650	7,650

Table 4 Panel B presents the results of logistic regressions examining the association between board attributes and companies' choice of different types of assurance providers. The analysis is performed on a sample of 1,296 firms that issued an assured sustainability report during the period from 2010 to 2020. Detailed definitions of all variables are in the Appendix. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

may be deemed better suited for their firms. Another important insight is that firms have a higher probability of choosing an expert as the assurance provider when their number of board meetings is higher. A high number of meetings may signal that there are problems to be discussed (Vafeas 1999), which may lead to the increased need for an expert.

Furthermore, firms operating in countries with stronger economic, legal, and social environments are more likely to choose an expert assurer. Thus, in these environments, the Big-4 are not the only preferred type of assurer. Finally, regarding industry effects, we find that a mining firm has a higher probability of choosing an engineering company as its assurer, which may be due to its need to understand the technical aspects of mining operations.

Next, we separately assess observations from stakeholder- and shareholder-oriented countries. The untabulated results for observations from stakeholder-oriented countries are similar to those reported in Panel A of Table 4. When we analyse the observations from shareholder-oriented countries, the determinants of engaging in sustainability assurance are also similar to the findings reported in Panel A of Table 4. However, when we assess the decision to choose a Big-4 firm as the assurer, we find significant differences between the two subsamples, as only two characteristics of the board of directors (CEO-chairperson separation and women on the board) are positively and significantly associated with the choice of Big-4 firms. Moreover, the association between the country factor and the decision to assure and choose a Big-4 firm is negative. When we expand our subsample analysis by considering other types of assurance providers, we also find significant differences between the two sets of results (observations from stakeholder- versus shareholder-oriented countries), confirming our belief that country-level variables are essential for understanding the sustainability assurance market.[8]

The results of testing H2 are shown in Table 5, as we assess whether there is an interaction effect between the board of directors' monitoring quality and the environment in which firms operate. The results in Panel A show positive and significant coefficients for the interaction variable, indicating that in countries with strong environments, both the decision to assure and to hire a Big-4 firm as an assurer become more likely as firms' board monitoring quality increases. Thus, the results are consistent with our expectations and support our second hypothesis.

In Panel B, we extend our analysis to other types of assurers. As in Panel B of Table 4, none of the coefficients of *Stds_6BoD* is positive and significant. Additionally, consistent with the previous findings, we find that operating in a country with a developed environment increases the probability of a company hiring an expert to provide sustainability assurance. The coefficients estimated for the interaction variables indicate that in countries with a strong environment, as board monitoring increases, (i) the likelihood of choosing an engineering firm as an assurer also increases and (ii) the likelihood of choosing a consulting or an accounting firm decreases. Thus, there are both complementarity and substitution effects between the two variables included in the interaction. In this panel, we also obtain clearer insights into how the choice of assurer is affected by the industry in which firms operate. In fact, the four industries we individually assess

[8]While our international sample allows us to have a holistic understanding of the sustainability assurance service, it is possible that certain countries and specific regional legislations may influence the findings. Hence, we conduct a number of additional tests to check the robustness of our results. First, we rerun our main models excluding countries with less than 30 observations. Second, we rerun our main models excluding EU countries and South Africa. We do this in different ways: (a) excluding EU countries for all years in the sample, (b) excluding EU countries for the period 2018–2020 (years of EU directive implementation), (c) excluding South Africa for all years in the sample, and (d) excluding both EU countries for the period 2018–2020 and South Africa. The results show qualitatively similar effects in testing our hypotheses. The full details are available from the authors upon request.

Table 5. Panel A. Board monitoring quality and the environment: assurance and provider

Dependent variable	Assurance	Big-4
Std_6BoD	0.180***	0.161***
	[0.009]	[0.013]
Country_Fact_High	0.068**	0.524***
	[0.029]	[0.041]
Std_6BoD×Country_Fact_High	0.037***	0.054***
	[0.010]	[0.015]
AudC_Exp	−0.127**	0.230***
	[0.050]	[0.065]
AudC_Indep	−0.646***	−0.509***
	[0.093]	[0.128]
Instit_Inv	−1.653***	−1.525***
	[0.075]	[0.117]
Block_Inv	−0.330***	0.664***
	[0.093]	[0.132]
ROA	1.086***	0.116
	[0.285]	[0.444]
Size	0.368***	0.100***
	[0.013]	[0.019]
Leverage	0.300**	0.500***
	[0.122]	[0.183]
Mining	0.530***	0.359***
	[0.074]	[0.111]
Manufacturing	0.359***	−0.179**
	[0.048]	[0.072]
Utilities	0.298***	0.063
	[0.062]	[0.090]
Finance	0.282***	−0.038
	[0.061]	[0.085]
Year_2011	0.224***	0.081
	[0.081]	[0.125]
Year_2012	0.468***	0.034
	[0.081]	[0.121]
Year_2013	0.671***	0.083
	[0.081]	[0.119]
Year_2014	0.661***	0.283**
	[0.081]	[0.120]
Year_2015	0.765***	0.429***
	[0.082]	[0.122]
Year_2016	0.781***	0.423***
	[0.082]	[0.124]
Year_2017	0.933***	0.395***
	[0.082]	[0.120]
Year_2018	1.831***	0.205*
	[0.096]	[0.123]
Year_2019	1.847***	0.521***
	[0.094]	[0.125]
Year_2020	0.161*	0.948***
	[0.083]	[0.170]
Constant	5.044***	−1.262***
	[0.250]	[0.362]
Pseudo R-squared	0.19	0.10
Log pseudo likelihood	−9489.83	−4723.31

(*Continued*)

Table 5. Continued.

Dependent variable	Assurance	Big-4
Wald Chi-square	3220.43	856.3
P- Chi-square	0.00	0.00
N	16,912	7,650

Table 5 Panel A presents the results of logistic regressions examining the association between board attributes and their interaction with the firms' environment, with (i) companies' decision to assure sustainability report and (ii) their choice of Big-4 assurance provider. The analysis is performed on a sample of 2,271 firms that issued a sustainability report during the period from 2010 to 2020. Detailed definitions of all variables are in the Appendix. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 5. Panel B Board monitoring quality and the environment: assurance and provider

Dependent variable	Engineering	Consulting	Accounting	Expert
Std_6BoD	−0.119***	−0.106***	0.008	−0.199***
	[0.016]	[0.018]	[0.024]	[0.042]
Country_Fact_High	−0.678***	0.004	−0.616***	0.308**
	[0.052]	[0.050]	[0.073]	[0.125]
Std_6BoD×Country_Fact_High	0.040**	−0.066***	−0.076***	−0.02
	[0.018]	[0.020]	[0.027]	[0.054]
AudC_Exp	0.176*	−0.169*	−0.111	−1.281***
	[0.090]	[0.089]	[0.143]	[0.138]
AudC_Indep	1.417***	0.804***	−0.826***	−1.312***
	[0.208]	[0.186]	[0.259]	[0.247]
Instit_Inv	1.721***	0.987***	0.367	−1.153***
	[0.144]	[0.160]	[0.256]	[0.376]
Block_Inv	−0.747***	0.035	−0.049	−2.582***
	[0.180]	[0.178]	[0.260]	[0.337]
ROA	−1.040**	0.334	3.252***	0.54
	[0.462]	[0.387]	[0.767]	[0.997]
Size	0.059**	−0.354***	0.142***	−0.009
	[0.024]	[0.026]	[0.041]	[0.049]
Leverage	0.313	−1.553***	0.55	0.316
	[0.223]	[0.250]	[0.387]	[0.616]
Mining	0.437***	−0.853***	−0.091	−0.197
	[0.144]	[0.148]	[0.235]	[0.431]
Manufacturing	0.870***	−0.686***	−0.272*	0.513**
	[0.098]	[0.093]	[0.152]	[0.201]
Utilities	0.305**	−0.417***	0.02	0.279
	[0.124]	[0.122]	[0.184]	[0.270]
Finance	0.238**	−0.251**	−0.01	0.598**
	[0.116]	[0.105]	[0.185]	[0.256]
Year FE	Yes	Yes	Yes	Yes
Pseudo R-squared	0.10	0.10	0.05	0.27
Log pseudo likelihood	−3291.28	−2824.7	−1456.98	−959.77
Wald Chi-square	602.31	582.77	189.09	501.22
P- Chi-square	0.00	0.00	0.00	0.00
N	7650	7650	7650	7650

Table 5 Panel B presents the results of logistic regressions examining the association between board attributes and their interaction with the firms' environment, with (i) companies' decision to assure sustainability report and (ii) their choice of different types of assurance providers assurance provider. The analysis is performed on a sample of 2,271 firms that issued a sustainability report during the period from 2010 to 2020. Detailed definitions of all variables are in the Appendix. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

have a higher likelihood of choosing an engineering firm as an assurer, while an individual expert has a higher likelihood of being chosen by manufacturing and finance firms.

4.3. *Robustness tests*

Prior studies investigating companies' decisions to issue sustainability reports and provide assurance over their reports suggest that such decisions are sequential (Simnett et al. 2009). These authors used a sequential logit model and suggested that companies' choice of accounting firms as an assurance providers might be affected by the sequential nature of the decisions. In our model, we test companies' assurance decisions and their choice of assurance provider without taking this issue into account. To eliminate any concerns that our results for the choice of assurer are affected by the sequential nature of the decision, we adopt a sequential logit model to test whether such results are consistent with those presented in Panel A of Table 4. Table 6 shows that the results remain unaffected when using the sequential logit model.

The presence of endogeneity in a research model can lead to incorrect inferences. To address this issue, we next use the lagged values (i.e. the value of $(t-1)$) of all board attributes and other explanatory variables in our models. Table 7 Panel A presents the results for the assurance decision and choice of a Big-4 assurance provider using the lagged values of the independent variables. Panel B presents the determinants of choosing other types of assurance providers using the lagged values of the independent variables. Both sets of results in Table 4 are consistent with our hypotheses.

Finally, we rerun our models with *GOV_Score,* an overall governance score, instead of *Stds_6BoD*. This overall governance score, from Asset 4, captures a company's capacity to direct and control its rights and responsibilities to generate long-term shareholder value, accounting for board functions, board structure, compensation policy, vision and strategy, and shareholder rights. The untabulated results show that this score is positively associated with the decision to assure sustainability reports and with the choice of Big-4 assurer. These results are consistent with H1 and indicate that a more precise measure of board monitoring (as we create) can be used.

5. Discussion

In this study, we expand sustainability assurance research by investigating the effect of different board of director attributes commonly associated with monitoring quality and the combined effect of this monitoring quality and legal, economic, and social environments in which firms operate on firms' decision to assure their sustainability report and hire a Big-4 assurer. Complementarily, we assess how these attributes impact the choice of four other types of assurance providers. Overall, we find evidence of a positive association between the attributes of boards of directors, companies' decisions to assure their sustainability reports, and the likelihood of choosing a Big-4 assurer. Additionally, we find that companies with boards of directors with high monitoring quality and that operate in countries with strong economic, legal, and social environments are more likely to engage in sustainability assurance and choose Big-4 assurers.

Drawing on legitimacy theory, our study expands the prior literature by using a large and recent international sample to (i) re-examine how the board of directors' monitoring quality impacts a firm's decision to assure its sustainability report, (ii) comprehensively investigate how the attributes of the board of directors impact the choice of assurance provider, and (iii) examine the impact of country-level characteristics. Thus, we contribute to the literature that brings together legitimacy and corporate governance and the dependencies between organisational attributes and institutions.

Table 6. Corporate board attributes and the choice of Big-4 assurance provider (sequential logit model).

Degree	Coefficient	Standard Error	*Z* value	P>z
Part 1: Assurance				
BoD_Size	0.062	0.007	9.200	0.000***
BoD_Meet	0.021	0.004	4.730	0.000***
CEO_Sep	0.300	0.054	7.510	0.000***
BoD_Women	2.266	1.680	13.000	0.000***
BoD_Indep	−1.251	0.033	−10.990	0.000***
Sust_Comt	1.272	0.189	24.040	0.000***
Country_Factor	0.156	0.034	5.340	0.000***
AudC_Exp	−0.056	0.051	−1.030	0.303
AudC_Indep	0.356	0.156	3.320	0.001***
Instit_Inv	−1.342	0.021	−16.870	0.000***
Block_Inv	−0.529	0.056	−5.560	0.000***
ROA	1.029	0.555	3.560	0.000***
Size	0.350	0.021	23.450	0.000***
Leverage	0.358	0.176	2.860	0.004***
Mining	0.621	0.144	8.060	0.000***
Manufacturing Manufacturing	0.376	0.072	7.600	0.000***
Utilities	0.384	0.092	6.050	0.000***
Finance	0.393	0.090	6.370	0.000***
Part 2: Big-4				
BoD_Size	0.034	0.008	4.370	0.000***
BoD_Meet	0.001	0.005	0.290	0.773
CEO_Sep	0.386	0.074	7.670	0.000***
BoD_Women	3.523	7.364	16.190	0.000***
BoD_Indep	0.466	0.221	3.350	0.001***
Sust_Comt	0.004	0.088	0.050	0.964
Country_Factor	0.354	0.055	9.200	0.000***
AudC_Exp	0.021	0.066	0.310	0.759
AudC_Indep	−0.565	0.075	−4.300	0.000***
Instit_Inv	−1.701	0.020	−15.580	0.000***
Block_Inv	0.251	0.157	2.060	0.040**
ROA	−0.317	0.273	−0.590	0.557
Size	0.121	0.021	6.440	0.000***
Leverage	0.396	0.251	2.390	0.017**
Mining	0.415	0.153	4.130	0.000***
Manufacturing Manufacturing	−0.101	0.059	−1.540	0.123
Utilities	0.062	0.086	0.780	0.434
Finance	0.033	0.081	0.480	0.634

Table 6 presents the results of sequential logistic regressions examining the association between board attributes and (i) companies' decision to assure sustainability reports and (ii) their choice of Big-4 assurance provider. The analysis is performed on a sample of 2,271 firms that issued a sustainability report during the period from 2010 to 2020. Detailed definitions of all variables are in the Appendix. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

We provide evidence that boards of directors' monitoring quality, proxied by board attributes, is positively associated with sustainability assurance practices. For example, unlike Liao et al. (2018), who found a positive association between the number of women on the board and accounting assurance (both by Big-4 and non-Big-4 firms) in China, the statistical analyses of our international sample indicate that the number of women on the board is positively and significantly associated only with the choice of Big-4 firms. This finding suggests that a higher percentage of women on the board increases their influence on the decision-making process related to the choice of assurance provider and that women are more likely

Table 7. Panel A. Corporate board attributes and the choice of Big-4 assurance provider (lagged independent variables)

Dependent variable	Assurance	Assurance	Big-4	Big-4
Std_6BoD $_{(t-1)}$		0.168***		0.159***
		[0.010]		[0.014]
BoD_Size $_{(t-1)}$	0.064***		0.040***	
	[0.008]		[0.009]	
BoD_Meet $_{(t-1)}$	0.016***		−0.007	
	[0.005]		[0.007]	
CEO_Sep $_{(t-1)}$	0.301***		0.382***	
	[0.045]		[0.059]	
BoD_Women $_{(t-1)}$	1.983***		3.276***	
	[0.202]		[0.272]	
BoD_Indep $_{(t-1)}$	−1.250***		0.580***	
	[0.131]		[0.165]	
Sust_Comt $_{(t-1)}$	1.057***		−0.049	
	[0.060]		[0.100]	
Country_Factor	0.164***	0.069**	0.468***	0.567***
	[0.034]	[0.032]	[0.045]	[0.044]
Firm-level controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Pseudo R-squared	0.17	0.15	0.11	0.10
Log pseudo likelihood	−7080.89	−7284.67	−3986.6	−4047.19
Wald Chi-square	2097.32	1882.69	800.16	725.19
P- Chi-square	0.00	0.00	0.00	0.00
N	12,693	12,693	6,575	6,575

Table 7 Panel A presents the results of logistic regressions examining the association between lagged board attributes and (i) companies' decision to assure sustainability reports and (ii) their choice of Big-4 assurance provider. The analysis is performed on a sample of 2,271 firms that issued a sustainability report during the period from 2010 to 2020. Detailed definitions of all variables are in the Appendix. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table 7. Panel B. Corporate board attributes and the choice of different types of assurance providers (lagged independent variables)

Dependent variable	Engineering	Engineering	Consulting	Consulting	Accounting	Accounting	Expert	Expert
Std_6BoD $_{(t-1)}$		−0.090***		−0.122***		−0.001		−0.217***
		[0.017]		[0.018]		[0.027]		[0.034]
BoD_Size $_{(t-1)}$	−0.066***		−0.009		0.050***		−0.046**	
	[0.013]		[0.013]		[0.017]		[0.022]	
BoD_Meet $_{(t-1)}$	−0.003		−0.029***		0.015		0.104***	
	[0.009]		[0.010]		[0.014]		[0.016]	
CEO_Sep $_{(t-1)}$	−0.193***		−0.048		−0.238*		−0.590***	
	[0.072]		[0.084]		[0.122]		[0.162]	
BoD_Women $_{(t-1)}$	−1.971***		−3.209***		0.136		−5.501***	
	[0.347]		[0.383]		[0.550]		[1.015]	
BoD_Indep $_{(t-1)}$	0.226		−0.570**		0.06		−1.292***	
	[0.219]		[0.222]		[0.398]		[0.423]	
Sust_Comt $_{(t-1)}$	0.236*		0.269*		−0.435**		−0.921***	
	[0.135]		[0.142]		[0.193]		[0.240]	
Country_Factor	−0.698***	−0.707***	0.147**	0.039	−0.638***	−0.642***	0.537***	0.256*
	[0.058]	[0.055]	[0.060]	[0.055]	[0.078]	[0.075]	[0.178]	[0.139]
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.11	0.1	0.12	0.11	0.05	0.05	0.32	0.26
Log pseudo likelihood	−2810.05	−2834.09	−2310.71	−2342.6	−1298.96	−1307.34	−684.32	−742.86
Wald Chi-square	533.78	509.78	605.73	528.78	200.04	179.41	505.09	404.21
P- Chi-square	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N	6,575	6,575	6,575	6,575	6,575	6,575	6,575	6,575

Table 7 Panel B presents the results of logistic regressions examining the association between lagged board attributes and companies' choice of different types of assurance providers. The analysis is performed on a sample 1,296 firms that issued a sustainability report during the period from 2010 to 2020. Detailed definitions of all variables are in the Appendix. ***p<0.01, **p<0.05, *p<0.10.

to choose a more conservative assurance provider. Additionally, our results show that the existence of a sustainability committee increases the likelihood of companies engaging in voluntary assurance. This result unveils new trends in the decision-making process of sustainability committees, as prior evidence obtained from data gathered at the beginning of the last decade (i.e. 2012) found a negative association between the existence of a sustainability committee and the decision to assure sustainability reports (Al-Shaer and Zaman 2018). Furthermore, this study expands the previous literature on the moderating effects of countries' institutional differences on the relationship between board attributes and strategic decision-making (Oehmichen et al. 2017). We show that a strong economic, legal, and social environment reinforces the effects of better monitoring quality of the board on the choice of assurance provider as a mechanism for legitimacy.

Finally, we provide evidence that the use of a dichotomous approach to the classification of assurance providers leads to an incomplete understanding of firms' choices. There is a clear difference in the perceived value of Big-4 firms versus that of other types of accounting firms in regard to sustainability assurance. This finding is consistent with the auditing literature, which differentiates Big-4 firms from other accounting firms (Audousset-Coulier 2015). Our results suggest that this differentiation between Big-4 and other types of accounting firms can be extended to the sustainability assurance market. Therefore, the choice of a Big-4 assurance provider is not just due to its expertise in financial audits but also influenced by its perceived high quality, well-known brand name and global reach.

Regarding non-accounting firms (i.e. engineering and consulting firms, and experts), the results are inconsistent among the three types of assurers we have considered. This lack of consistency suggests that each type of assurer is perceived differently by the boards of directors. Thus, grouping these diverse types of assurers under the heading of 'non-accountant' is not appropriate, and may lead to mixed results across studies, or even incorrect conclusions. Based on our findings, we suggest that future research examine the important of engineering firms in the assurance services market.

6. Conclusions

Sustainability reports are powerful devicesthrough which firms can develop and improve legitimacy. While prior research has indicated that assurance choices are central to the perceptions of the legitimacy of sustainability initiatives, studies addressing such choices have mainly focused on the determinants of voluntary assurance rather than on the choice of assurance provider (e.g. Liao et al. 2018, Wang et al. 2020). Our first set of results fills this gap, providing evidence that the attributes of the board of directors that reflect their monitoring quality are associated with the choices of different assurance providers, extending the literature on sustainability assurance. Board size, frequency of board meetings, CEO separation, proportion of women on the board, and the existence of a sustainability committee affect the choice of assurance provider. Our second set of results provides evidence that the link between assurance decisions and the board of directors' monitoring quality is context specific, which poses a challenge to legitimacy theory.

Acknowledgments

The authors appreciate the valuable feedback provided by the reviewers, discussants and participants of the International Corporate Governance Society Conference 2020, the mid-year meeting of the International Section of the American Accounting Association 2021, and the annual meeting of the European Accounting Association 2022.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Kholod Alsahali http://orcid.org/0000-0003-0454-8746
Ricardo Malagueño http://orcid.org/0000-0002-1481-6487
Ana Marques http://orcid.org/0000-0003-1595-0028

References

Aguilera, R.V., Rupp, D.E., Williams, C.A. and Ganapathi, J., 2007. Putting the S back in corporate social responsibility: a multilevel theory of social change in organizations. *Academy of Management Review*, 32 (3), 836–863. doi:10.5465/amr.2007.25275678

Alsahali, K., Marques, A. and Malagueño, R., 2021. The role of foreign institutional investors in sustainability assurance. *1st Workshop on Sustainability Reporting, Regulation & Practice*. University of Essex, Colchester, UK.

Alsahali, K.F. and Malagueño, R., 2022. An empirical study of sustainability reporting assurance: current trends and new insights. *Journal of Accounting & Organizational Change*, 18 (5), 617–642. doi:10.1108/JAOC-05-2020-0060

Al-Shaer, H. and Zaman, M., 2018. Credibility of sustainability reports: the contribution of audit committees. *Business Strategy and the Environment*, 27 (7), 973–986. doi:10.1002/bse.2046

Al-Shaer, H. and Zaman, M., 2019. CEO compensation and sustainability reporting assurance: evidence from the UK. *Journal of Business Ethics*, 158 (1), 233–252. doi:10.1007/s10551-017-3735-8

Aras, G. and Crowther, D., 2008. Governance and sustainability: an investigation into the relationship between corporate governance and corporate sustainability. *Management Decision*, 46 (3), 433–448. doi:10.1108/00251740810863870

Audousset-Coulier, S., 2015. Audit fees in a joint audit setting. *European Accounting Review*, 24 (2), 347–377. doi:10.1080/09638180.2014.892787

Baum, J. and Oliver, C., 1991. Institutional linkages and organizational mortality. *Administrative Science Quarterly*, 36, 187–218. doi:10.2307/2393353

Bell, R.G., Moore, C. and Filatotchev, I., 2012. Strategic and institutional effects on foreign IPO performance: examining the impact of country of origin, corporate governance, and host country effects. *Journal of Business Venturing*, 27, 197–216. doi:10.1016/j.jbusvent.2010.11.001

Bell, R.G., Filatotchev, I. and Aguilera, R.V., 2014. Corporate governance and investors' perceptions of foreign IPO value: an institutional perspective. *Academy of Management Journal*, 57 (1), 301–320. doi:10.5465/amj.2011.0146

Ben-Amar, W., Chang, M. and McIlkenny, P., 2017. Board gender diversity and corporate response to sustainability initiatives: evidence from the carbon disclosure project. *Journal of Business Ethics*, 142 (2), 369–383. doi:10.1007/s10551-015-2759-1

Bitektine, A., 2011. Towards a theory of social judgments of organizations: the case of legitimacy, reputation, and status. *Academy of Management Review*, 36 (1), 151–179. doi:10.5465/amr.2009.0382

Canning, M., O'Dwyer, B. and Georgakopoulos, G., 2019. Processes of auditability in sustainability assurance – the case of materiality construction. *Accounting and Business Research*, 49 (1), 1–27. doi:10.1080/00014788.2018.1442208

Carcello, J. V., Hermanson, D. R., Neal, T. L. and Riley Jr, R. A., 2002. Board characteristics and audit fees. *Contemporary Accounting Research*, 19 (3), 365–384. doi:10.1506/CHWK-GMQ0-MLKE-K03V

Carcello, J. V., Hermanson, D. R. and Ye, Z., 2011. Corporate governance research in accounting and auditing: insights, practice implications, and future research directions. *Auditing: A Journal of Practice & Theory*, 30 (3), 1–31. doi:10.2308/ajpt-10112

Casey, R. J. and Grenier, J. H., 2015. Understanding and contributing to the enigma of corporate social responsibility (CSR) assurance in the United States. *Auditing: A Journal of Practice & Theory*, 34 (1), 97–130. doi:10.2308/ajpt-50736

Channuntapipat, C., Samsonova-Taddei, A. and Turley, S., 2019. Exploring diversity in sustainability assurance practice: evidence from assurance providers in the UK. *Accounting, Auditing & Accountability Journal*, 32 (2), 556–580. doi:10.1108/AAAJ-05-2017-2940.

Channuntapipat, C., Samsonova-Taddei, A. and Turley, S., 2020. Variation in sustainability assurance practice: an analysis of accounting versus non-accounting providers. *The British Accounting Review*, 52 (2), 100843. doi:10.1016/j.bar.2019.100843

Chen, K. Y. and Zhou, J., 2007. Audit committee, board characteristics, and auditor switch decisions by Andersen's clients. *Contemporary Accounting Research*, 24 (4), 1085–1117. doi:10.1506/car.24.4.2

Clarkson, P., Li, Y., Richardson, G. and Tsang, A., 2019. Causes and consequences of voluntary assurance of CSR reports. *Accounting, Auditing & Accountability Journal*, 32 (8), 2451–2474. doi:10.1108/AAAJ-03-2018-3424

Cohen, J., Krishnamoorthy, G. and Wright, A. M., 2002. Corporate governance and the audit process. *Contemporary Accounting Research*, 19 (4), 573–594. doi:10.1506/983M-EPXG-4Y0R-J9YK

Cohen, J. R. and Simnett, R., 2015. CSR and assurance services: a research agenda. *Auditing: A Journal of Practice & Theory*, 34 (1), 59–74. doi:10.2308/ajpt-50876

Christensen, H. B., Hail, L. and Leuz, C., 2021. Mandatory CSR and sustainability reporting: economic analysis and literature review. *Review of Accounting Studies*, 26 (3), 1176–1248.

Dah, M. A. and Jizi, M. I., 2018. Board independence and the efficacy of social reporting. *Journal of International Accounting Research*, 17 (1), 25–45.

Darnall, N., Seol, I. and Sarkis, J., 2009. Perceived stakeholder influences and organizations' use of environmental audits. *Accounting, Organizations and Society*, 34 (2), 170–187. doi:10.1016/j.aos.2008.07.002

De Beelde, I. and Tuybens, S., 2015. Enhancing the credibility of reporting on corporate social responsibility in Europe. *Business Strategy and the Environment*, 24 (3), 190–216. doi:10.1002/bse.1814

Deegan, C., 2019. Legitimacy theory – despite its enduring popularity and contribution, time is right for a necessary makeover. *Accounting, Auditing & Accountability Journal*, 32 (8), 2307–2329.

Edgley, C.R., Jones, M.J. and Solomon, J.F., 2010. Stakeholder inclusivity in social and environmental report assurance. *Accounting, Auditing & Accountability Journal*, 23 (4), 532–557. doi:10.1108/09513571011041615

Farooq, M. B. and De Villiers, C., 2019. Sustainability assurance: who are the assurance providers and what do they do? In: S. Arvisson, ed. *Challenges in Managing Sustainable Business*. Cham: Palgrave Macmillan, 137–154.

Ferguson, A. and Pündrich, G., 2015. Does industry specialist assurance of non-financial information matter to investors? *Auditing: A Journal of Practice & Theory*, 34 (2), 121–146. doi:10.2308/ajpt-50930

Fernandez-Feijoo, B., Romero, S. and Ruiz, S., 2015. Multilevel approach to sustainability report assurance decisions. *Australian Accounting Review*, 25 (4), 346–358. doi:10.1111/auar.12104

Fredriksson, A., Kiran, A. and Niemi, L., 2020. Reputation capital of directorships and demand for audit quality. *European Accounting Review*, 29 (5), 901–926.

Fuhrmann, S., Ott, C., Looks, E. and Guenther, T.W., 2017. The contents of assurance statements for sustainability reports and information asymmetry. *Accounting and Business Research*, 47 (4), 369–400. doi:10.1080/00014788.2016.1263550

Galbreath, J., 2009. Corporate governance practices that address climate change: an exploratory study. *Business Strategy and the Environment*, 19 (5), 335–350. doi:10.1002/bse.648

García Lara, J.M., Osma, B.G. and Penalva, F., 2007. Board of directors' characteristics and conditional accounting conservatism: Spanish evidence. *European Accounting Review*, 16 (4), 727–755. doi:10.1080/09638180701706922

García-Sánchez, I.M., Suárez-Fernández, O. and Martínez-Ferrero, J., 2019. Female directors and impression management in sustainability reporting. *International Business Review*, 28 (2), 359–374. doi:10.1016/j.ibusrev.2018.10.007

Giannarakis, G., 2014. Corporate governance and financial characteristic effects on the extent of corporate social responsibility disclosure. *Social Responsibility Journal*, 10 (4), 569–590. doi:10.1108/SRJ-02-2013-0008

Gjølberg, M., 2009. The origin of corporate social responsibility: global forces or national legacies? *Socio-Economic Review*, 7 (4), 605–637. doi:10.1093/ser/mwp017

GRI, 2006. Sustainability reporting guidelines Version 3.0. Amsterdam: Global Reporting Initiative. Available from: www.globalreporting.org

GRI, 2013. The external assurance of sustainability reporting. research and development series. Global Reporting Initiative. Available from: https://www.globalreporting.org/resourcelibrary

Helfaya, A. and Moussa, T., 2017. Do board's corporate social responsibility strategy and orientation influence environmental sustainability disclosure? UK evidence. *Business Strategy and the Environment*, 26 (8), 1061–1077. doi:10.1002/bse.1960

Herda, D. N., Taylor, M. E. and Winterbotham, G., 2014. The effect of country-level investor protection on the voluntary assurance of sustainability reports. *Journal of International Financial Management & Accounting*, 25 (2), 209–236. doi:10.1111/jifm.12018

Hodge, K., Subramaniam, N. and Stewart, J., 2009. Assurance of sustainability reports: impact on report users' confidence and perceptions of information credibility. *Australian Accounting Review*, 19 (3), 178–194. doi:10.1111/j.1835-2561.2009.00056.x

Hummel, K., Schlick, C. and Fifka, M., 2019. The role of sustainability performance and accounting assurors in sustainability assurance engagements. *Journal of Business Ethics*, 154 (3), 733–757. doi:10.1007/s10551-016-3410-5

Humphrey, C., Loft, A. and Woods, M., 2009. The global audit profession and the international financial architecture: understanding regulatory relationships at a time of financial crisis. *Accounting, Organizations and Society*, 34 (6-7), 810–825. doi:10.1016/j.aos.2009.06.003

Ienciu, I. A., Popa, I. E. and Ienciu, N. M., 2012. Environmental reporting and good practice of corporate governance: petroleum industry case study. *Procedia Economics and Finance*, 3, 961–967. doi:10.1016/S2212-5671(12)00258-4

Isidro, H., Nanda, D. and Wysocki, P. D., 2020. On the relation between financial reporting quality and country attributes: research challenges and opportunities. *The Accounting Review*, 95 (3), 279–314. doi:10.2308/accr-52607

Jizi, M. I., Salama, A., Dixon, R. and Stratling, R., 2014. Corporate governance and corporate social responsibility disclosure: evidence from the US banking sector. *Journal of Business Ethics*, 125 (4), 601–615. doi:10.1007/s10551-013-1929-2

Jizi, M., 2017. The influence of board composition on sustainable development disclosure. *Business Strategy and the Environment*, 26 (5), 640–655. doi:10.1002/bse.1943

Jo, H. and Harjoto, M. A., 2011. Corporate governance and firm value: the impact of corporate social responsibility. *Journal of Business Ethics*, 103 (3), 351–383. doi:10.1007/s10551-011-0869-y

Jones, M. J. and Solomon, J. F., 2010. Social and environmental report assurance: some interview evidence. *Accounting Forum*, 34 (1), 20–31. doi:10.1016/j.accfor.2009.11.002

Ke, B., Lennox, C. and Xin, Q., 2015. The effect of China's weak institutional environment on the quality of Big 4 audits. *The Accounting Review*, 90 (4), 1591–1619. doi:10.2308/accr-50943

Khurana, I. and Raman, K., 2004. Litigation risk and the financial reporting credibility of Big 4 versus non-Big 4 audits: evidence from Anglo-American countries. *The Accounting Review*, 79 (2), 473–495. doi:10.2308/accr.2004.79.2.473

Kolk, A. and Perego, P., 2009. Determinants of the adoption of sustainability assurance statements: an international investigation. *Business Strategy and the Environment*, 19 (3), 182–198. doi:10.1002/bse.643

Krause, R., Filatotchev, I. and Bruton, G.D., 2016. When in Rome, look like Caesar? Investigating the link between demand-side cultural power distance and CEO power. *Academy of Management Journal*, 59 (4), 1361–1384. doi:10.5465/amj.2014.0532

Laksmana, I., 2008. Corporate board governance and voluntary disclosure of executive compensation practices. *Contemporary Accounting Research*, 25 (4), 1147–1182. doi:10.1506/car.25.4.8

Liao, L., Lin, T. P. and Zhang, Y., 2018. Corporate board and corporate social responsibility assurance: evidence from China. *Journal of Business Ethics*, 150 (1), 211–225. doi:10.1007/s10551-016-3176-9

Lyon, T. P. and Maxwell, J. W., 2011. Greenwash: corporate environmental disclosure under threat of audit. *Journal of Economics & Management Strategy*, 20 (1), 3–41. doi:10.1111/j.1530-9134.2010.00282.x

Maroun, W., 2020. A conceptual model for understanding corporate social responsibility assurance practice. *Journal of Business Ethics*, 161 (1), 187–209. doi:10.1007/s10551-018-3909-z

Martínez-Ferrero, J. and García-Sánchez, I. M., 2017a. Coercive, normative and mimetic isomorphism as determinants of the voluntary assurance of sustainability reports. *International Business Review*, 26 (1), 102–118. doi:10.1016/j.ibusrev.2016.05.009

Martínez-Ferrero, J. and García-Sánchez, I. M., 2017b. Sustainability assurance and assurance providers: corporate governance determinants in stakeholder-oriented countries. *Journal of Management & Organization*, 23 (5), 647–670. doi:10.1017/jmo.2016.65

Masulis, R. W., Wang, C. and Xie, F., 2012. Globalizing the boardroom—the effects of foreign directors on corporate governance and firm performance. *Journal of Accounting and Economics*, 53 (3), 527–554. doi:10.1016/j.jacceco.2011.12.003

Michelon, G. and Parbonetti, A., 2012. The effect of corporate governance on sustainability disclosure. *Journal of Management & Governance*, 16 (3), 477–509. doi:10.1007/s10997-010-9160-3

Michelon, G., Patten, D.M. and Romi, A.M., 2019. Creating legitimacy for sustainability assurance practices: evidence from sustainability restatements. *European Accounting Review*, 28 (2), 395–422. doi:10.1080/09638180.2018.1469424

Oehmichen, J., Schrapp, S. and Wolff, M., 2017. Who needs experts most? Board industry expertise and strategic change—a contingency perspective. *Strategic Management Journal*, 38 (3), 645–656. doi:10.1002/smj.2513

Perego, P., 2009. Causes and consequences of choosing different assurance providers: an international study of sustainability reporting. *International Journal of Management*, 26 (3), 412–425. Available from: hdl.handle.net/1765/19537

Perego, P. and Kolk, A., 2012. Multinationals' accountability on sustainability: the evolution of third-party assurance of sustainability reports. *Journal of Business Ethics*, 110 (2), 173–190. doi:10.1007/s10551-012-1420-5

Peters, G. F. and Romi, A. M., 2015. The association between sustainability governance characteristics and the assurance of corporate sustainability reports. *Auditing: A Journal of Practice & Theory*, 34 (1), 163–198. doi:10.2308/ajpt-50849

Pflugrath, G., Roebuck, P. and Simnett, R., 2011. Impact of assurance and assurer's professional affiliation on financial analysts' assessment of credibility of corporate social responsibility information. *Auditing: A Journal of Practice & Theory*, 30 (3), 239–254. doi:10.2308/ajpt-10047

Pisani, N., Kourula, A., Kolk, A. and Meijer, R., 2017. How global is international CSR research? Insights and recommendations from a systematic review. *Journal of World Business*, 52 (5), 591–614. doi:10.1016/j.jwb.2017.05.003

Rao, K. K., Tilt, C. A. and Lester, L. H., 2012. Corporate governance and environmental reporting: an Australian study. *Corporate Governance: The International Journal of Business in Society*, 12 (2), 143–163. doi:10.1108/14720701211214052

Reimsbach, D., Hahn, R. and Gürtürk, A., 2018. Integrated reporting and assurance of sustainability information: an experimental study on professional investors' information processing. *European Accounting Review*, 27 (3), 559–581. doi:10.1080/09638180.2016.1273787

Simnett, R., Vanstraelen, A. and Chua, W. F., 2009. Assurance on sustainability reports: an international comparison. *The Accounting Review*, 84 (3), 937–967. doi:10.2308/accr.2009.84.3.937

Stolowy, H. and Paugam, L., 2018. The expansion of non-financial reporting: an exploratory study. *Accounting and Business Research*, 48 (5), 525–548. doi:10.1080/00014788.2018.1470141

Suchman, M., 1995. Managing legitimacy: strategic and institutional approaches. *The Academy of Management Review*, 20, 571–610. doi:10.5465/amr.1995.9508080331

Suddaby, R., Bitektine, A. and Haack, P., 2017. Legitimacy. *Academy of Management Annals*, 11 (1), 451–478. doi:10.5465/annals.2015.0101

Tilt, C., 2018. Making social and environmental accounting research relevant in developing countries: a matter of context? *Social and Environmental Accountability Journal*, 38 (2), 145–150. doi:10.1080/0969160X.2018.1489296

Vafeas, N., 1999. Board meeting frequency and firm performance. *Journal of Financial Economics*, 53 (1), 113–142. doi:10.1016/S0304-405X(99)00018-5

Walker, K. and Wan, F., 2012. The harm of symbolic actions and green-washing: corporate actions and communications on environmental performance and their financial implications. *Journal of Business Ethics*, 109 (2), 227–242. doi:10.1007/s10551-011-1122-4

Wang, R., Zhou, S. and Wang, T., 2020. Corporate governance, integrated reporting and the use of credibility-enhancing mechanisms on integrated reports. *European Accounting Review*, 29 (4), 631–663. doi:10.1080/09638180.2019.1668281

Webb, E., 2004. An examination of socially responsible firms' board structure. *Journal of Management and Governance*, 8 (3), 255–277. doi:10.1007/s10997-004-1107-0

Williams, C. and Aguilera, R. V., 2008. Corporate social responsibility in a comparative perspective. In: A. Crane, D. Matten, A. McWilliams, J. Moon and D.S. Siegel, eds. *Oxford Handbook of Corporate Social Responsibility.* Oxford: Oxford University Press, 452–472.

Yamahuch, T., 2017. Third-party opinion on the JTEKT CSR Report 2017. JTEKT Corporation. Available from: https://www.jtekt.co.jp/c/csr/pdf/2017/05_E_CSR2017.pdf

Appendix. Variables' description

Variable	Source of data	Definition
Assurance	Asset4	Indicator variable that equals 1 if the sustainability report is assured, and 0 otherwise.
Big-4	Asset4	Indicator variable that equals 1 if the assurance is provided by Big-4 firm, and 0 otherwise.
Engineering	Asset4	Indicator variable that equals 1 if the assurance is provided by engineering firm, and 0 otherwise.
Consulting	Asset4	Indicator variable that equals 1 if the assurance is provided by consulting firm, and 0 otherwise.
Accounting	Asset4	Indicator variable that equals 1 if the assurance is provided by accounting firm excluding Big-4 firms, and 0 otherwise.
Expert	Asset4	Indicator variable that equals 1 if the assurance is provided by expert opinion, and 0 otherwise.
BoD_Size	Asset4	The total number of board members at the end of the fiscal year.
BoD_Meet	Asset4	The total number of board meetings during a year.
CEO_Sep	Asset4	Indicator variable that equals 1 if the CEO is not the chairperson of the board, and 0 otherwise.
BoD_Women	Asset4	The proportion of women on the board of directors.
BoD_Indep	Asset4	The ratio of independent board members by total board members.
Sust_Comt	Asset4	Indicator variable that equals 1 if the company's board committee include a sustainability committee, and 0 otherwise.
Country_Factor	(Isidro et al. 2020)	The score measuring the economic, legal, and social environment of a country.
AudC_Exp	Asset4	Indicator variable equal 1 if the company have an audit committee with at least three members and at least one financial expert.
AudC_Indep	Asset4	The proportion of independent board members on the audit committee.
Instit_Inv	DataStream	The ratio of total outstanding shares held by all institutional investors.
Block_Inv	DataStream	The ratio of total outstanding shares held by large investors (not necessarily institutional) with at least 5% shareholding.
ROA	DataStream	Profitability, via return on assets (ROA).
Size	DataStream	The natural logarithm of total sales is proxy for firm size.
Leverage	DataStream	The ratio of total debt divided by total assets is used to measure companies' financial risk.
Mining	DataStream	Indicator variable equals 1 if the company is in the mining industry, and 0 otherwise.
Manufacturing	DataStream	Indicator variable equals 1 if the company in the manufacturing industry, and 0 otherwise.
Utilities	DataStream	Indicator variable equals 1 if the company operates in the utility industry, and 0 otherwise.
Financial	DataStream	Indicator variable equals 1 if the company in the financial industry, and 0 otherwise.
GOV_Score	Asset4	The score measuring companies use of best governance practices.