

**SUSTAINABILITY QUALITY ASSURANCE: ATTRIBUTES OF ASSURANCE PROVIDERS AS DETERMINANTS**

**Martínez-Ferrero, Jennifer \***

*IME (Multidisciplinary Institute for Enterprise)*

*Universidad de Salamanca*

**García-Sánchez, Isabel-María**

*IME (Multidisciplinary Institute for Enterprise)*

*Universidad de Salamanca*

**Ruiz-Barbadillo, Emiliano**

*Universidad de Cádiz*

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## **SUSTAINABILITY QUALITY ASSURANCE: ATTRIBUTES OF ASSURANCE PROVIDERS AS DETERMINANTS**

The aim of this paper is evaluate the quality assurance opinions of assurance providers and their attributes associated with the quality assurance opinion (type of assurer, industry specialization and tenure). For a sample of international listed companies from the period 2007–2014, our evidence shows greater assurance quality: when the assurers are from accounting firms, when the assurers are industry specialists and when the assurers have greater experience in the assurance market. In addition, the higher quality associated with industry specialization and long tenure is even greater when assurance providers are also accounting firms.

**Keywords:** assurance quality, accountant, industry specialization, tenure, sustainability reporting.

## I. INTRODUCTION

The considerable growing trend for sustainability reporting in the last few decades has not been accompanied by an increase in public confidence (Dando and Swift, 2003) or information credibility and accuracy due to the sense of a lack of consistency and completeness of sustainability reports (Adams and Evans, 2004). For some years, stakeholders have been demanding external assurance (Zorio et al., 2013) as a means of enhancing the degree of confidence in the outcomes of the evaluation of particular subject matter. Assurance engagements tend to be used to increase the credibility and reliability of social and environmental information (KPMG, 2005) and to provide greater confidence in the accuracy of reported information (Carey et al., 2000).

Nevertheless, assurance is not a legal requirement and no universal standard for such assurance exists (Lewellyn, 2000). Indeed, there is substantial heterogeneity in the subject matter of sustainability reports and the objectives, levels and criteria of assurance (Furhmann et al., 2016). This heterogeneity in assurance service leads to scepticism concerning an assurer's work because the nature and content of assurance statements can vary significantly (Hodge et al., 2009), thus influencing assurance quality. Associating assurance quality with misreporting at the level of assurance provided – false positives and false negatives collected in the assurance statement (Francis, 2004) – this exhibits qualitative differences according to the particular provider (O'Dwyer and Owen, 2005; Perego and Kolk, 2012); that is, assurance output may vary depending on the type of provider as the assurer's attributes are interrelated with the level of assurance (Mock et al., 2007). In the context of auditing, it has been demonstrated that certain attributes of the auditor (reputation effect, industry specialization and tenure) affect the quality of the provision (e.g. Casterella et al., 2004; Chen et al., 2008; DeAngelo, 1981; Elliot, 1997; Gul et al., 2009; Lim and Tan, 2010; Reichelt and Wang, 2009). Thus, the objective of this study is to analyse if these attributes affect the quality of the assurance.

With this aim in mind, the first issue examined in this study is the association between the type of assurance provider and assurance quality. Unlike auditing, assurance is a market not restricted to accountancy firms. Although they hold a great share of the market, other independent and external groups can provide assurance statements. The lack of compulsory rules and guidelines on sustainability reports and assurance has led to competition between auditors and consultants, as well as other engineering firms, as assurance practitioners (Hodge et al., 2009; Simnett et al., 2009), also potentially affecting assurance quality (Gunny et al., 2007; Peters and Romi, 2015; Pflugrath et al., 2011). In general, the audit literature agrees in pointing out that accounting firms are assurers of higher quality (Francis, 2004) as authors in assurance research have identified them as practitioners with greater experience, expertise and overall credibility (e.g. Pflugrath et al., 2011). Therefore, differences in the level of assurance precision provided – the quality of assurance opinions – by accounting and non-accounting providers must be addressed as the first factor and even more so as moderating factor of additional assurers' attributes proposed below.

Beyond the role of accounting firms, the impact of the industry specialization of the auditor and the length of the auditor–client relationship on audit quality has received considerable attention in the audit literature (Balsam et al., 2003; Casterella et al., 2004; Chen et al., 2008; Ferguson et al., 2003; Gul et al., 2009; Lim and Tan, 2010; Reichelt and Wang, 2009). However, in sustainability assurance research, this issue is either not addressed or is limited to only a few studies (Green and Taylor, 2013; Martínez-Ferrero and García-Sánchez, 2016). The motivation for this present study is to fill this gap; it builds on an extensive literature on audit issues that we aim to extend to sustainability reporting and assurance in order to test our propositions. Therefore, this paper aims to provide empirical evidence concerning the determinants of the quality of assurance opinions – as a proxy of quality in assurance statements. In particular, we examine the

level of assurance precision or quality as a result of some possible indicators: industry specialization and tenure.

In line with this, the second issue we examine in this study is the association between the industry specialization of assurers and assurance quality. Most prior research concerning auditing has unanimously reported the existence of positive synergies in audit firms (Reichelt and Wang, 2010). Industry specialization is able to spread industry-specific knowledge and expertise over more clients, producing economies of scale rarely achieved by non-specialists (Mayhew and Wilkins, 2003). This deeper knowledge and expertise leads to superior audit quality; it is the result of such specialists' greater skills, abilities and competences, as well as the adoption of a higher level of quality controls (Ferguson et al., 2003; Lim and Tan, 2008; Ruiz-Barbadillo et al., 2009; Reichelt and Wang, 2010). Based on this, specialists as assurers tend to offer a more differentiated and higher quality assurance services.

Our third research issue concerns the association between assurance provider tenure and assurance quality, as well as the length of the practitioner–client relationship. Lack of auditor tenure, compromises audit quality (Carey and Simnett, 2006); in contrast, as a result of the acquisition of client-specific knowledge and greater expertise, audit quality can increase with auditor tenure (Geiger and Raghunandan, 2002; Gul et al., 2009). Several auditing studies have reported an increase in audit quality as auditor tenure lengthens (Chen et al., 2008; Gul et al., 2009; Johnson et al., 2002; Myers et al., 2003), based on the premise that the accuracy of the auditor's reporting improves as the length of the relationship with the client increases, i.e. there is an experience effect. In the same way, it is expected that in a voluntary service, such as assurance, the assurer will offer a higher quality service as deeper knowledge of the company is gained over time.

Using 901 firm-year observations for 242 firms from 17 different countries and for the 8–year period from 2007 to 2014, we develop our analysis by employing several logistic regressions for panel data. Our first evidence concerns the higher quality of the assurance opinion when assurance is provided by an accounting firm, this result being related to the industry specialization and assurance provider tenure, consistent with prior literature on audit research. We find a favourable effect of industry specialization and the tenure of assurers on assurance quality and a greater effect if assurance is entrusted to an accounting firm, supporting the moderating role of accountants as practitioners.

Our study contributes to the literature in several ways. First, this study contributes to the sustainability assurance literature by being the first – to our knowledge – to examine empirically the impact of industry specialization, the length of the auditor–client relationship and the type of assurance provider on assurance quality. Thereby, we contribute to a growth in scholarship by extending and developing prior research on the topic of assurance services with regard to sustainability reporting (Kolk and Perego, 2010; Simnett et al., 2009). This area has just begun to be explored. Second, despite the strong demand for assurance of sustainability reports, there has been scant discussion, if any, in the literature concerning assurance quality. We contribute to the limited existing literature concerning the quality of assurance reports (Green and Taylor, 2013; Fuhmann et al., 2016; Perego and Kolk, 2010; Zorio et al., 2013). Previous studies have adopted content analysis for measuring assurance quality (Fonseca, 2010; Gürtürk and Hahn, 2016; Zorio et al., 2013), or use high-quality assurance statements as the counterpart for lower assurance risk, considering a reasonable/high opinion a form of assurance quality (Fuhmann et al., 2016). We contribute to the existing literature through the development of an innovative measure based on false positives and false negatives, drawing on audit quality research. In addition to analysing the quality of the opinion report (Perego and Kolk, 2010; Zorio et al., 2013), we examine the extent to which the level of opinion issued by the assurer is consistent with the level of corporate social responsibility (CSR) reported by the company. We also follow the recommendation

of Kolk and Perego (2010) in examining the quality of sustainability assurance statements, rather than merely their adoption. Similarly, we respond to the call of Cohen and Simnett (2014), who have argued the need for studies of assurance quality and have proposed qualified reports as a signal of quality. In the absence of international standards in this area, this line of research appears timely and necessary. Third, beyond contributing by focusing on assurance quality, our paper contributes to the literature by examining the input characteristics of assurance quality, such as the type of assurer, tenure and industry specialization. It brings together different streams of audit research, including industry specialization and audit tenure in an approach that has been scarce in the sustainability assurance literature to date. This study is important in advancing understanding of the role that assurance plays in producing credible sustainability reports, whether such assurance is provided by an accounting firm, by an industry specialist or by an assurer with longer tenure with the client.

In contrast to financial audits, companies can hire other external firms beyond traditional accounting firms to provide assurance concerning their sustainability reports. This leads us to examine also the impact of the type of assurer and the moderating effect on the relationships proposed herein (specialization and tenure effects). Our study documents the positive influence of the use of the accounting profession on assurance quality, but also reports the moderating effect of the type of assurer by documenting greater assurance quality when an industry specialist is an accounting firm and when an assurer with extended tenure is also an accountant. Drawing on the type of assurer, we contribute to enhancing the knowledge provided by prior studies that defend the use of accounting firms as a tool for assuring the credibility of sustainability reporting, for example Francis (2004) for financial auditing and Perego (2009), Huggins et al. (2011), Pflugrath et al. (2011) and Zorio et al. (2013) for assurance demand. However, with respect to existing research on assurance, this study addresses some of their limitations. For example, Perego (2009) showed that having one of the Big 4 accounting firms (Deloitte, PwC, Ernst & Young, KPMG) positively affects assurance quality, but did not examine the level of assurance or whether qualified or non-qualified and only covered 2005. Pflugrath et al. (2011) examined Big 4 firms as a determinant of assurance, but their research employed an experimental design biased towards companies from the United Kingdom (UK), the United States (US) and Australia. Finally, Zorio et al. (2013) also considered Big 4 firms as providers of higher quality (captured by a context index), but only for a Spanish sample from 2005 to 2010.

Regarding the other indicators of assurance quality, our study also contributes to the literature on industry specialization in the assurance context, as Mock et al. (2007) recommended. Prior studies have generally reported that audit quality is greater when the audit is provided by an industry expert (Lim and Tan, 2008; Reynolds and Francis, 2003; among others). This study transfers the findings obtained by Craswell et al. (1995), Reynolds and Francis (2000), Balsam et al. (2003), Francis and Yu (2009) and Francis et al. (2011) on financial auditing quality to sustainability assurance. Literature on assurance is scarce, being limited to the studies of Green and Taylor (2013) and Martínez-Ferrero and García-Sánchez (2016). This research extends such studies in several respects. First, Green and Taylor (2013) only examined greenhouse gas emission reporting, while we examine overall CSR performance (social and environmental issues). Moreover, they considered reporting quality through perceptions gathered using a survey instrument, whereas we contribute by proposing several empirical regressions for an international sample and employing an innovative measure of quality based on assurance opinions. Finally, we extend their experimental evidence by also considering an additional factor for assurance quality, i.e. assurer tenure. With respect to Martínez-Ferrero and García-Sánchez (2016), whereas they examine the level of assurance based on brand name reputation and industry specialization effects, we go beyond this by also considering assurance quality. Our paper contributes to the

audit tenure literature and expands it to encompass assurance research by positing and demonstrating that extended tenure improves assurance quality and the level of precision of assurance reports. We contribute to the assurance research field by supporting the “auditor experience” hypothesis documented by audit studies (Carcello and Nagy, 2004b; Chen et al., 2008; Gul et al., 2009; Johnson et al., 2002; Myers et al., 2003; Standley and Todd DeZoort, 2007). Evidence on auditing is quite broad, but the inclusion of tenure as an input of assurance quality is restricted to the audit literature. Evidence concerning the tenure of assurance providers is non-existent, as is its relation to quality – to the best of our knowledge. Finally, this study adds exploratory evidence by using a panel data set (17 countries from 2007 to 2014), in contrast to previous studies of sustainability assurance that have adopted cross-sectional analysis. Our approach allows comparison between countries and years. Thus, we contribute to the literature by adopting an international approach encompassing 17 countries, rather than a single-country or two-region approach (Carey and Simnett, 2006; Gürtürk and Hahn, 2015; Hodge et al., 2009; Monroe and Hossain, 2013; Zorio et al., 2013). We thus respond to the call from Pflugrath et al. (2011) for studies employing international samples. Also, examining the period 2007 to 2014, rather than a single year (Hodge et al., 2009; Perego, 2009), allows us to update the time period hitherto analysed (Mock et al., 2007). Methodologically, we employ econometric models based on dependency techniques for the panel data. We specifically use logistic regressions for panel data, unlike previous studies that have adopted descriptive analysis, for example deductive content analysis or survey instruments (Gürtürk and Hahn, 2015; Hodge et al., 2009; Huggins et al., 2011; Pflugrath et al., 2011). Again, this represents a benefit of this research in responding to the call for empirical research on sustainability from authors such as Hasan et al. (2003) and Mock et al. (2007).

The remainder of the paper is structured as follows. The next section briefly summarizes the literature on assurance quality, industry specialization, assurer tenure and assurance providers, underpinning the models selected. We then describe the research model, data and sample. The last two sections present the results and concluding remarks.

## **II. THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT**

### **Sustainability Assurance Quality**

In the last decade, there has been remarkable growth in sustainability reporting, as noted by the General Reporting Initiative (GRI, 2013) and Kolk (2010), with the aim of showing firms’ commitment and concern for social and environmental aspects (Simnett et al., 2009). Nonetheless, the upturn in the number of these reports has not been accompanied by an increased level of public trust (Hodge et al., 2009). Many are concerned about the lack of credibility, transparency and consistency of sustainability reporting and argue the need for an assurance process that ensures such quality aspects (Adams and Evans, 2004; Simnett et al., 2009). Specifically, as voluntary disclosures are not useful if they are perceived to lack credibility (Coram, et al., 2009), external assurance processes become necessary to improve confidence in the accuracy of reported information (Carey et al., 2000), in particular the credibility and reliability of social and environmental information (Kolk and Perego, 2010; O’Dwyer and Owen, 2005). The International Federation of Accountants (IFAC, 2011) defined external assurance as the process by which a third-party assurer expresses a conclusion designed to enhance the degree of confidence in the outcomes of the evaluation of particular subject matter.

Firms’ incentives to assure their sustainability reporting on a voluntary basis are based on the rationale of increasing the transparency and credibility of the information disclosed (Kolk and Perego, 2010), a perceived credibility which is greatly influenced by the level of assurance issued by the provider (Hasan et al., 2003). In this regard, the GRI (2013,

p.11) defines the level of assurance as “the extent and depth of the work the assurance provider will undertake, and therefore, the degree of confidence report users should be able to have in the assured report”. Stating a level of assurance is essential to minimize the gap in expectations between users’ perceptions of reliability, comparability and materiality and the relevance of statements and their actual effectiveness (Manetti and Becatti, 2009).

However, while we acknowledge the value and relevance of an assurance report, because of the absence of generally accepted assurance standards,<sup>1</sup> the nature and content of assurance statements can vary significantly (Hodge et al., 2009). This lack of assurance standards not only increases the variability of opinions, but also uncertainty concerning the quality of such opinions. Ironically, assurance therefore lacks credibility as a tool for increasing the credibility of its target (Fonseca, 2010). Prego and Kolk (2010) contend that one of the fundamental concerns regarding assurance credibility relates to the major inconsistencies regarding the scope of assurance, the criteria employed and the levels of assurance provided (Manetti and Becatti, 2009). These are crucial aspects that influence assurance quality to the extent that the absence of assurance deficiencies is interpreted as evidence of higher quality (Gunny et al., 2007).

The term “assurance quality” needs to be explained before proceeding further. However, it is a complex concept and literature in this area is scarce. We take as our basis for the definition of assurance quality that proposed by Francis (2011, p. 127) for audit, namely that “audit quality is achieved by the issuance of the appropriate audit report on the client’s compliance with generally accepted accounting principles”, associating quality with a dichotomy between either “audit failure” or “no audit failure”, in other words, poor audit quality or good audit quality. In the field of assurance, Bagnoli and Watts (2014) assume that assurance increases the probability that any difference between the actual level of sustainability in which the firm engages and the amount of disclosure in its reporting will be uncovered. Following these authors and adopting Francis’s (2004) statement concerning audit research, misreporting in assurance statements (low assurance quality) can arise as a result of the following: (i) false positives (type 1 statistical error), i.e. issuing a negative assurance opinion for firms when a positive report would be appropriate based on their actual sustainability performance; (ii) false negatives (type 2 statistical error), i.e. issuing a positive assurance report when a more negative opinion report would be appropriate based on their actual sustainability performance. In this context, prior research has examined some aspects that may be of relevance for increasing the value and quality of an assurance service (Zorio et al., 2013). Among these, in what follows we highlight those that examine how some assurers’ attributes are interrelated with the level of assurance provided (Mock et al., 2007) since, as Pflugrath et al. (2011) document, the credibility of sustainability reporting is also dependent on the assurer. Hence, an important issue to be investigated is whether different assurance providers’ attributes affect the level of assurance precision in reporting.

### **The Role Of The Type Of Assurance Provider In Assurance Quality**

The level of assurance precision is likely to be dependent on the quality of the assurance provider as, unlike auditing, assurance is a market not restricted to accounting firms.

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<sup>1</sup> There is no international legal standard for assurance engagement, although the International Standard on Assurance Engagements (ISAE) 3000 and the AccountAbility (AA) 1000 Assurance Standard (AS) are those most used by assurers. ISAE3000, developed by the International Auditing and Assurance Standards Board (IAASB), focus on the procedural characteristics of assurance. The AA1000 standards, provided by the non-profit organization AccountAbility, are more focused on stakeholder inclusiveness. In contrast to ISAE3000, which can be adopted only by accounting professionals, AA1000AS includes the possibility of being adopted by any assurance provider, regardless of their nature.

Although accounting firms hold a great part of the market share, other independent and external groups can provide assurance statements. In general, external assurance services are provided by three different types of providers: (i) accounting/auditing firms; (ii) engineering firms, which offer technical certification; (iii) sustainability consultants, who have great expertise concerning sustainability and stakeholder-related issues. This has resulted in a debate regarding which might be the most appropriate assurance practitioners as there is no prior process of empowerment whereby the market is reserved for those who demonstrate sufficient knowledge. The lack of compulsory rules and guidelines on sustainability reporting and assurance has led to competition between auditors and consultants and other engineering firms as assurance practitioners (Hodge et al., 2009; Simnett et al., 2009); this could affect assurance quality, supporting the view that the type of assurer is one of the main attributes determining the level of assurance reported (Mock et al., 2007).

In this regard, Elliot (1997) states “the audit tradition is a professional asset of incalculable value. It derives from the market place need for high-quality, decision-making information”. It is therefore not surprising that most of the prior literature agrees that professional accountants are assurers of higher quality (Francis, 2004). Thus, the perceived credibility of assured information is greater if provided by an accounting firm (Hodge et al., 2009) in terms of trustworthiness, expertise and overall credibility (Pflugrath et al., 2011). Such firms’ greater experience in providing financial auditing services (Perego, 2009) affords skills and training relevant for issuing higher quality assurance statements (Hodge et al., 2009). They provide more detailed and consistent statements, transferring auditing techniques to the assurance process (Power, 2003) and they are more effective monitors because of their reputational capital (Simnett et al., 2009). Moreover, they are subject to independent, professional conduct requirements (Peters and Romi, 2015). Specifically, it is this assurer independence of accounting firms that increases the probability of detecting material errors and omissions (Hodge et al., 2009; Huggins et al., 2011; O’Dwyer and Owen, 2005), therefore improving the quality of the information process. Their use also increases the likelihood of detecting if sustainability reports lack sufficient specificity to be useful for information users (such as shareholders, customers, employees or regulatory bodies).

Overall, while sustainability experts who possess a higher level of subject matter expertise tend to be non-auditing professionals (Huggins et al., 2011), we expect, as does most of the prior literature (Craswell et al., 1995; DeFond et al., 2000; Ferguson et al., 2003), that the reputational premium of the brand name of professional accountants has led to them being considered assurance providers of higher quality (Pflugrath et al., 2011; Zorio et al., 2013) than engineering and consulting firms; that is, assurance quality opinion is higher when this voluntary service is entrusted to an accounting firm. Based on the above, we propose our first hypothesis as follows: *HYPOTHESIS 1: Assurance quality is higher for accounting firms as assurance providers than for non-accounting firms.*

### **The Role Of Industry Specialization In Assurance Quality**

Assurance services exhibit qualitative differences according to the particular provider (O’Dwyer and Owen, 2005; Perego and Kolk, 2012), which leads to assurance output varying based on the type of provider. A greater propensity for issuing an assurance opinion as a proxy of quality may be influenced by the industry specialization of the assurance provider (Balsam et al., 2003). An industry specialist is an auditor with deep knowledge and understanding, as well as long experience of the clients’ specific industry, which provides expertise in such clients’ industries (Balsam et al., 2003).

However, the extant audit literature agrees that industry-specialist auditors are likely to provide services that vary in terms of audit quality. Among others, Carcello and Nagy

(2004a) defend industry knowledge and the expertise of practitioners as an aspect able to affect audit quality, based on a differentiation strategy that aims to provide competitive advantage with respect to non-specialist provision in terms of costs and services (Francis et al., 1999; Mayhew and Wilkins, 2003). Because assurance demand must be met by competent people (Francis et al., 2011), the relevance of industry knowledge and the experience of practitioners acts a differentiating element (DeFond et al., 2000). Similarly, for the assurance market, Knechel et al. (2006) report in their Dutch survey that experience with the client (firms) and industry expertise are among the most significant attributes increasing assurance quality.

The notion that industry specialists are more likely to provide high-quality assurance opinions in their reporting has been widely established in financial auditing (Ferguson et al., 2003; Lim and Tan, 2008; Reichelt and Wang, 2010). However, references in the assurance context are limited to Green and Taylor (2013) and Martínez-Ferrero and García-Sánchez (2016). The former, employing a survey instrument, show the lower importance of industry-specific knowledge of the assurer in terms of the perception of greenhouse gas emission assurance quality. The latter, although it does not analyse assurance quality, supports the impact of industry specialism on the level of assurance reporting, namely that industry specialists as practitioners are more likely to report positive opinions concerning sustainability reports, although these do not have to be adequate. Therefore, there are some initial indications of the need for analysis of specialization as a potential determinant of the level of assurance opinions as there are substantial variations in the process of verifying sustainability reports and the information contained therein. Consider, for example, the sustainability report of an oil company versus a company in the telecommunications sector; the information contained in their disclosures will differ markedly. While the former may focus on environmental information given its impact on the firm, the latter may show a greater orientation towards social or human rights issues. It is required, therefore, that assurers have specialized knowledge in the sector due to the different characteristics of the information held.

Justifying the need for this study and in the absence of previous studies on assurance, we aim to examine previous evidence in the field of financial auditing to propose our hypotheses. As Solomon et al. (1999) argue, in the case of auditing practice, greater experience in a particular industry enables more accuracy in audit judgments, in particular improving the accuracy of error detection, which may be extrapolated to the need for specialists as assurance providers able to provide stricter opinions. Their greater skills, abilities and competences within a specific industry lead to higher levels of quality control, introducing sophistication and quality in applying policies, as well as a higher propensity to detect errors and thus issue accurate reports with high-quality outcomes (DeAngelo, 1981; Francis, 2004). Their greater understanding of their clients, their knowledge-sharing practices and the use of standardized audit programmes (Casterella et al., 2004; Ferguson et al., 2003) increases this propensity for error detection, as well as providing more effective procedures to measure clients' risks concerning sustainable performance and the imposition of stricter quality standards (Reichelt and Wang, 2009). In sum, the expertise of industry specialists increases the propensity to report an opinion concerning the accuracy of sustainability reports and to detect any irregularities, misrepresentations, or absence of credibility. They provide greater monitoring competence (Watkins et al., 2004) in detecting higher risk in sustainability performance or any misrepresentations in voluntary reporting, thus increasing assurance quality.

In addition, the degree of industry expertise may also be complemented by the brand name effect (Craswell et al., 2003). Examining whether the impact of industry specialization on audit quality is conditional on the type of assurance provider, Gunny et al. (2007) find that industry specialization is one of those attributes that allow mitigation

of audit deficiencies for non-accounting auditors. Similarly, Elder et al. (2015) suggest that accounting firms have the ability to specialize to a greater extent than smaller alternative firms, moderating the impact that such specialization can exert on audit quality. As industry specialists, accounting suppliers enjoy greater brand name reputation derived from their independence and professional expertise (Wallage, 2000).

Based on the above, our premise is that industry specialists as assurers benefit from greater specific knowledge and expertise in their specific areas, which induces a greater propensity to issue an assurance statement of higher quality, i.e. an opinion concerning the level of sustainability performance and reporting. Furthermore, this effect is moderated by the type of provider. That is, the increase in the quality of the assurance opinion as a result of the industry specialization of the assurer is greater when this assurer belongs to the accounting profession. Thus, our set of second hypotheses is as follows: *HYPOTHESIS 2a: Assurance quality is higher for industry specialists as assurance providers than for non-industry specialists; HYPOTHESIS 2b: The impact of industry specialization of assurance providers on assurance quality is moderated by the type of provider, i.e. accounting/non-accounting firm.*

### **The Role Of Assurer Tenure On Assurance Quality**

Assurance quality opinion may be affected by other auditor attributes, such as the length of the firm–assurer relationship (Gul et al., 2009). The auditor’s competence and ability to issue an audit of higher quality depends on the auditor–client relationship (Brooks et al., 2013). This has been extensively examined in the auditing literature as assurer tenure – the number of years an auditor is retained by the firm (Myers et al., 2003) – may affect the level of assurance issued. As several researchers have suggested, the impact of the length of the auditor–client relationship on audit/assurance quality depends on client-specific knowledge and experience (Mautz and Sharaf, 1961) and the deepening knowledge as the firm–assurer relationship strengthens over time.

In this tenure scenario and under the “auditor experience” hypothesis, prior audit studies have examined tenure as an audit attribute that allows practitioners to reinforce their ability to detect any irregularities and misrepresentations in the corresponding report, or the absence of credibility in terms of this disclosure (Carcello and Nagy, 2004b; Johnson et al., 2002; Myers et al., 2003; Standley and Todd DeZoort, 2007). For instance, Carcello and Nagy (2004b) support this argument, based on evidence that audit quality is lower in the early years of the auditor–client relationship. They therefore predict that long tenure allows assurance providers to learn more in terms of client-specific knowledge, which positively affects audit quality (Johnson et al., 2002; Myers et al., 2003). Thus, long tenure should be associated with more effective audits (Chen et al., 2008; Gul et al., 2009) as a result of the better understanding of the client’s systems, business and industry environment (Hills, 2002) and moreover by enabling auditors to identify areas of high risk (Bell et al., 2015). Chen et al. (2008), for instance, find a positive relationship between reporting quality and long tenure. Expanding this to the issuance of assurance quality opinions and for auditing research, Geiger and Raghunandan (2002) indicate that the likelihood of receiving a high-quality assurance opinion is lower if the auditor is in the three initial years of the relationship with the client, essentially to ensure the new client relationship. Overall, short assurance provider–client relationships may lead to deterioration in assurance quality because of the lack of ability to accumulate knowledge about the client.

In addition, examining whether the impact of assurer tenure on audit quality is conditional on the type of assurance provider, Gunny et al. (2007) find that auditor tenure allows the mitigation of audit deficiencies for non-accounting auditors. Brooks et al. (2013) propose that the type of firm, i.e. accounting/non-accounting, moderates the impact of auditor tenure on audit quality. One of the possible explanations for this moderating effect is

provided by DeAngelo's (1981) argument that larger audit firms tend to provide higher audit quality as a result of their greater risk based on having more to lose if they fail in their reporting. They must protect their brand name reputation and avoid the litigation risk that arises from damage to that reputation (Lennox, 1999). In addition, Lim and Tan (2010) suggest that a longer contractual relationship with the client leads to an increase in the auditor's reputational capital within the client's industry, thus increasing the need to improve quality audits in the face of concern regarding the potential loss of reputation and other clients by failing to meet the client's demand. That is, the reputational effect on assurance quality that arises from longer assurer tenure must be reinforced by those effects that arise from involvement in the accounting profession.

Based on the above arguments and supporting the experience hypothesis in the voluntary assurance context, we expect that an assurer will be more likely to issue a higher quality assurance statement if the length of the relationship with the client firm is longer. Client knowledge and experience are not available to a replacement practitioner; thus, increasing assurer tenure may reinforce knowledge and understating of a specific client, which is necessary to conduct high-quality assurance and improve clients' willingness to provide quality sustainability reports. Moreover, this effect is moderated by the type of provider. That is, the increase in the quality of an assurance quality as a result of a longer assurer–client relation is greater when this assurer belongs to the accounting profession. Therefore, our set of third hypotheses is as follows: HYPOTHESIS 3a: *The quality of assurance opinions in sustainability reporting is higher for assurance providers with longer tenure*; HYPOTHESIS 3b: *The impact of the tenure of assurance providers on the quality of assurance is moderated by the type of provider, i.e. accounting/non-accounting firm.*

### III. RESEARCH METHODS, DATA AND SAMPLE

#### Sample

The data were sourced from an initial selection of the world's largest 2,000 listed firms provided by Forbes, a selection that has been widely employed in prior research (e.g. Martínez-Ferrero et al., 2016; Pollach, 2014). We based the composition of our sample on the information available in two databases: (i) Thomson One Analytics for the accounting and financial information provided in consolidated financial statements (e.g. total assets, leverage); (ii) the Ethical Investment Research Service (EIRIS) database, for social and environmental performance and disclosure data. The sampling procedure was as follows: for the initial largest 2,000 firms, we included economic, financial and accounting data obtained from Thomson One Analytics. Then, we combined the information on these firms with data available in the EIRIS database and with information concerning the assurance process, obtained by examining the yearly sustainability reports from each company's own website and hand-collecting data on them. Because we aimed to analyse the link between certain attributes of assurance providers and the level of precision of the assurance opinion, we required companies that disclose sustainability reports, as well as externally assuring them (similar to Furhmann et al., 2016). Thus, we excluded companies that do not assure their sustainability reports.

In this second and final stage, the sample comprised 242 companies for the period 2007–2014, resulting in 901 observations. The sample was unbalanced because not all companies were in represented all periods. The firms engaged in activities in different sectors (finance, basic materials, industry, utilities, services, construction, retail, transportation and telecommunications) and were from 17 different countries (Germany, Belgium, Canada, Spain, France, Hong Kong, India, Italy, Japan, the Netherlands, Denmark, Finland, Norway, Sweden, Switzerland, the UK and the US).

## Measurement Of Variables

### ***Measure Of Assurance Opinion Quality***

Audit and assurance quality are not directly observable and thus prior studies have used several proxies. The audit literature has adopted a number of measures, such as audit fees (Ferguson et al., 2003), earnings quality (Francis et al., 2005), abnormal accruals (Balsam et al., 2003) and the propensity for issuing a going-concern opinion for financially distressed or bankrupt firms (Lim and Tan, 2008; among others). Meanwhile, the scant literature that has previously examined assurance quality (Gürtürk and Hahn, 2016; Perego and Kolk, 2010; Zorio et al., 2013) has determined the quality of assurance statements by means of content analysis based on the evaluative framework provided by O'Dwyer and Owen (2005). In contrast, the proposed assurance quality measure in this study aims to solve the limitations of the level of subjectivity in this method of analysis.

Given the lack of consensus on the superiority and reliability of any particular model for estimating audit quality – and even more so, for estimating assurance quality – we base our assurance quality proxy on Francis's (2004, p. 346) argument that “audit quality is inversely related to audit failures: the higher the failure rate, the lower the quality of auditing”. According to this author, misreporting in audit statements can arise in the form of false positives (type 1 statistical error), i.e. issuing a going-concern report for firms when a clean report is appropriate, or false negatives (type 2 statistical error), i.e. issuing a positive audit report when a going-concern report is appropriate. Adopting this approach in our research context, we associate assurance quality with misreporting in the level of assurance provided, i.e. with false positives and false negatives.

From the above, in this study, the assurer's propensity to issue a quality assurance opinion (*AQ\_Opinion* indicator variable) is directly taken from the assurance report and represents the ability of the assurance provider to issue an assurance report in accordance with the level of sustainable performance. It takes the value of 1 if the assurer issues a limited/moderate assurance opinion for less sustainable firms or a reasonable/high opinion for more sustainable firms and 0 otherwise. We thus expand the assurance literature by proposing a singular methodology, based on the audit quality literature, to evaluate the quality of the assurance opinion by considering false positives and negatives (Casterella et al., 2004; Ferguson and Stokes, 2002; Lim and Tan, 2008; Minutti-Meza, 2013; Reichelt and Wang, 2010; Reynolds and Francis, 2001). Taking the quality of the assurance opinion in assurance statements as a proxy of assurance quality has been described a two-stage process that depends on two factors: the firm's CSR performance and the auditor's ability to detect this in the assurance statement. The first stage is the identification of companies with lower and higher CSR performance. The second stage entails determining whether the assurance report a company receives is in line with its CSR performance: a limited/moderate opinion for firms with lower CSR performance and a reasonable/high opinion for firms with superior CSR performance.

Using the EIRIS database, we determined the level of sustainable performance related to social and environmental issues. Appendix 1 describes in detail the measurement of CSR performance through an index composed of 21 items taking values between 0 to 84 based on a range between 0 to 4: inadequate, weak, moderate, good and exceptional (see Table A1). It can be seen that for this initial sample, the median of CSR is 56 points with a deviation of + 16 points (see Table A2), while the minimum value is 4 and the maximum 76. Obtaining this performance, we then define a company as having “lower CSR performance” if it exhibits a level of sustainable performance equal to or below the value of the CSR median of the corresponding industry. That is, less sustainable firms present CSR values lower than their industry median, while more sustainable firms present CSR values higher than their industry median. Table 1 (Panel A) shows that this screening results in a sample including 467 observations for less sustainable firms and

434 observations for more sustainable firms. Moreover, Panel B shows that of the 901 observations of sustainability reports in our sample, 505 (around 56%) have assurance statements in accordance with their CSR performance, representing high-quality assurance opinions, while 396 observations (around 44%) represent false positive and negative opinions.

[Insert Table 1 about here]

In the second stage, the above breakdown allows us to examine the level of assurance reported by each assurance practitioner and to evidence both type 1 errors (false positives) and type 2 errors (false negatives). Regarding the level of sustainability assurance and being aware of the lack of a clear standard, in general, practitioners may offer two levels of assurance to indicate the extent of their work and therefore the degree of confidence in the sustainability report assured: a “reasonable or high” level and a “limited or moderate” level (according to ISAE 3000 and AA1000AS, respectively, as assurance standards). The “reasonable/high” level communicates a high level of verification – albeit not absolute because of some possible limitations in the internal control systems – and the conclusions are worded in a positive way. AA1000AS states that high assurance will provide users with a high level of confidence in a disclosure concerning the subject matter to which it refers. At a “limited/moderate” level, the assurance risk is acceptable, but greater than the risk expressed by a reasonable level. The assurer’s opinion is therefore expressed in a negative way. This means that the sustainability information lacks sufficient specificity to be useful and results in a negative conclusion, meaning that the sustainability report does not cover total performance in a reliable and unbiased manner (Manetti and Becatti, 2009).

Table 1 reports the level of assurance for each sample, i.e. less and more sustainable firms, to identify false positives/negatives and thence qualified assurance reports. For the sample including less sustainable firms (467 observations), 40 false negatives are identified, while for the sample including more sustainable firms (356 observations), 356 false positive are identified. That is, there is a distribution of 505 quality opinions concerning sustainability (427 in less sustainable firms and 78 in more sustainable firms) and of 396 non-quality opinions (40 in less sustainable firms and 356 in more sustainable firms).

### **Assurance Provider Attributes**

The first independent variable is related to the type of assurance provider as a moderator of the effect of industry specialization and tenure on the level of precision of assurance with regard to sustainability reporting. In contrast to a financial audit, sustainability assurance can be provided by three different types of practitioners: (i) accounting/auditing firms, (ii) engineering firms and (iii) sustainability consultants. The lack of compulsory rules and guidelines on assurance services has led to competition between accountants and non-accounting professionals (Simnett et al., 2009). Thus, to represent the type of assurer, “*Accountant*” is a dummy variable that takes the value of one when a company employs an assurance statement provided by professional accountants, whereas it takes the value zero if the assurance is provided by an environmental engineering or third-party consultancy firm (Kolk and Perego, 2010; Mock et al., 2007).

Regarding industry specialization as an explanatory variable, defined as “*Specialization*”, we consider as possible specialist providers classic auditing firms (DeFond et al., 2000), as well as engineering and consultancy firms. Audit research on industry specialization has developed in parallel with the Big N (formerly 8, then 6 and now 4) auditing firms. However, in the assurance context, it is necessary to also consider non-Big N and non-accounting firms as possible industry experts. Although industry specialization is not directly observable, the prior literature on financial auditing has used several proxies to

measure this (see, for instance, Craswell et al., 1995; Ferguson et al., 2003; Francis, 2004; Francis and Yu, 2009). Most of these proxies are based on market share, under the premise that industry expertise arises from a large volume of clients (Balsam et al., 2003; Craswell et al., 1995; DeFond et al., 2000; Francis and Yu, 2009), client sales (Balsam et al., 2003), or audit fees (Ferguson et al., 2003). Given the data availability for this study, we proxy industry specialization using a numerical variable measuring the assurance provider market share for an industry based on the volume of clients (Balsam et al., 2003; Chung and Kallapur, 2003; Craswell et al., 1995; Green and Taylor, 2013). As Balsam et al. (2003) reported, “to the extent that such experience is industry-specific, having a large number of clients in a specific industry rather than having a few large clients may achieve industry specialization”. The industry specialization variable is computed for each year and country as the ratio of the sum of the number of clients of an auditing firm in an industry to the sum of clients for all companies in the industry.

Regarding assurer tenure as an explanatory variable, “*Tenure*” is measured by a numerical variable that represents the length of the auditor–client relationship in years (Reynolds and Francis, 2001).

### **Control Variables**

As controls in our regression analysis, we use a number of firm and country attributes that the extant literature has shown to be associated with audit performance and assurance opinion. These control variables include firm size, leverage and insolvency risk (total assets, debt ratio and financial distress), as well as sustainability disclosure quality (adoption of the GRI standard in reporting CSR practices). Regarding these firm variables, “*Client\_Size*” represents the firm size calculated as the natural logarithm of total assets. Company size has been shown to be associated with assurance and even more so with a high-quality assurance opinion. In assurance research, Simnett et al. (2009) empirically support a positive relation between firm size and the propensity to assure a sustainability report, while Peters and Romi (2015) report a negative association. Similar to Monroe and Hassain (2013), we include as control variables client leverage and insolvency risk: “*Client\_Leverage*” is measured by the ratio of total debt to total equity and represents the firm leverage; “*Client\_Insolvency*” is measured using Altman’s (1983) Z-score, which is a measure of the probability of bankruptcy, with a lower value indicating greater financial distress. Given the lack of assurance studies, we base our expectations on some audit research. For example, Bell et al. (2015) report a negative relationship between client leverage and audit quality. Brooks et al. (2013) and Lim and Tan (2010) show that the greater the Z-score value (lower risk of insolvency), the greater the audit quality. Thus, it is expected that firms with a higher risk of insolvency (lower Z-score value) and that are more highly leveraged are more likely to receive a less favourable opinion concerning their sustainability reports.

In addition to the previous firm variables, it is also necessary to control for potential differences between firms in terms of making voluntary disclosures. To represent social reporting disclosure, we create a proxy called “*Disclosure\_GRI*” using triangulation in discourse analysis; we consider both the quantity and the quality of sustainability disclosure. Quality is determined on the basis of international standards for sustainability information, specifically the GRI G3.1 guidelines (similar to Martínez-Ferrero et al., 2015), as the unofficial accepted standard used by firms for preparing their sustainability reports (Hess, 2008). By comparing the information contained in sustainability reports with the recommendations of the GRI standards, we can determine the extent to which this information is comprehensive, comparable and harmonized. Under the conception of GRI as a possible global framework for the extensive and accepted voluntary reporting of sustainability (Furhmann et al, 2016; Manetti and Becatti, 2009), our proxy takes the value of one for firms that disclose sustainability information in compliance with the GRI

guidelines and zero otherwise, i.e. firms that disclose sustainability information but not complying with the GRI guidelines.

In this regard, transparency is one of the key elements in any sustainability reporting (Fernández-Feijoo et al., 2014). Assuming that external assurance is a mechanism of credibility and transparency, Bagnoli and Watts (2016) suggest that firms that voluntarily engage in sustainability disclosure policies also purchase external assurance. Moreover, similar to Kolk and Perego (2010) and Martínez-Ferrero and García-Sánchez (2016), we use institutional-level factors as controls by including the national commitment to sustainability. “NCR” represents the national corporate responsibility index of the country of origin of the assured firm, computed by Accountability (2005). This index is composed of three factors: an internal dimension, reflecting the strength of corporate governance, among other aspects; an external dimension that identifies the civil society context; environmental management, which synthesizes the stringency of regulations attached to other similar items. The inclusion of this variable responds to the notion that sustainability assurance shows great variability between countries, reflecting the fact that, in line with previous studies (Kolk and Perego, 2010; Simnett et al., 2009) it may be strongly influenced by institutional factors. In this respect, Smith et al. (2009) have shown that firms located in countries that are more stakeholder-oriented report higher quality sustainability information as they have social responsibilities beyond shareholder maximization (Kolk and Perego, 2010).

Finally, we also control for industry, year and country using dummy variables. “*Industry<sub>j</sub>*” is a dummy variable, where *j* represents the different sectors of activity in which the companies in the sample operate; “*Year<sub>n</sub>*” is a dummy variable, where *n* represents the years of the sample; “*Country<sub>k</sub>*” is a dummy variable, where *k* represents the different countries in the sample.

### Model Specification And Analytic Techniques

This study aims to highlight how the type of assurance provider, industry specialization and tenure affect assurance quality. Moreover, it also examines the moderating effect of the type of assurance provider on the specialization–assurance quality and tenure–assurance quality relationships.

To examine the impact of the type of assurer, industry specialization and tenure, we use three logistic regressions (models 1, 2 and 3 respectively). Each indicator variable (“*Accountant*”, “*Specialization*” and “*Tenure*”) is regressed in the corresponding model to test hypotheses 1, 2a and 3a respectively:

$$\text{Prob (AQ\_Opinion)} = \beta_1 \text{Accountant/Specialization/Tenure}_{it} + \beta_2 \text{Client\_Size}_{it} + \beta_3 \text{Client\_Leverage}_{it} + \beta_4 \text{Client\_Insolvency}_{it} + \beta_5 \text{Disclosure\_GRI}_{it} + \beta_6 \text{NCR}_{it} + \sum_{j=7}^{15} \beta_j \text{Industry}_i + \sum_{n=16}^{23} \beta_n \text{Year}_t + \sum_{k=24}^{40} \beta_k \text{Country}_i + \mu_{it} + \eta_i$$

(Model 1a, 2a and 3a)

Models 2a and 3a are complemented by the following models 2b and 3b to examine the moderating role of accounting firms in the relation between industry specialization and assurance quality and between assurer tenure and assurance quality respectively. Thus, to examine hypothesis 2b, we include in the logistic regression models the indicator variables “*Specialization*” and “*Accountant*” and the interaction between both attributes, “*Specialization\_Accountant*”. Similarly, to examine hypothesis 3b, we include in the logistic regression models the indicator variables “*Tenure*” and “*Accountant*” and the interaction between the two attributes, “*Tenure\_Accountant*”.

$$\text{Prob (AQ\_Opinion)} = \gamma_1 \text{Specialization/Tenure}_{it} + \gamma_2 \text{Accountant}_{it} + \gamma_3 \text{Specialization/Tenure\_Accountant}_{it} + \gamma_4 \text{Client\_Size}_{it} + \gamma_5 \text{Client\_Leverage}_{it} + \gamma_6 \text{Client\_Insolvency}_{it} + \gamma_7 \text{Disclosure\_GRI}_{it} + \gamma_8 \text{NCRI}_{it} + \sum_{j=9}^{17} \gamma_j \text{Industry}_i + \sum_{n=18}^{25} \gamma_n \text{Year}_t + \sum_{k=26}^{42} \gamma_k \text{Country}_i + \mu_{it} + \eta_i$$

(Models 2b and 3b)

where  $i$  ranges from company 1 to company 696;  $t$  takes the values of the years from 2007 to 2014;  $\beta$  and  $\gamma$  represent the estimating parameters;  $\eta_i$  represents the unobservable heterogeneity;  $\mu_{it}$  represents the classic error term. Appendix 2 provides information summarizing the definitions of the variables.

The econometric models used are based on dependence techniques for panel data, i.e. repeated observations of the cross-section of companies over time. As noted, our sample is composed of 242 international firms in 8 periods (from 2007 to 2014). The use of a panel data set allows us to overcome the limitations of cross-sectional (several companies in a period) and time-series analysis (one company for several periods), especially those related to their low explanatory capacity, which is closely linked to the period of analysis considered. Panel data models provide greater consistency and explanatory power by considering several periods (Petersen, 2009). In addition, this technique allows us to control for unobservable heterogeneity, which refers to the particular behaviour and characteristics of each company included in the sample. These characteristics differ among companies but are invariant over time, making it difficult to measure them because they are unobservable to researchers. However, if we do not consider them, the results could be biased. Thus, unobservable heterogeneity is controlled for by modelling it as an individual effect,  $\eta_i$ , which is then eliminated by taking the first differences of the variables. Moreover, panel data allow us to study the dynamics of cross-sectional firms, as well as to eliminate the bias of aggregation that arises when time-series analyses are used to characterize the behaviour of individuals. Panel data methodology has additional advantages that enhance the possible econometric specifications, as well as the parameter estimations, for example more informative data, greater variability, less collinearity among variables, more degrees of freedom and greater efficiency than cross-sectional or time-series methods (Pindado and Requejo, 2012).

Therefore, we apply different regression models to the panel data, with the decision regarding which analytic technique to use depending on the nature of the dependent variable and the type of function that is proposed to relate  $X$  and  $Y$ . In this case, because the dependent variable in this study, “*AQ\_Opinion*”, is a dummy variable coded as either zero or one, it is necessary to use a panel data methodology that is appropriate for dummy variables. Thus, the analytic technique is based on a logistic (logit) regression model, a binary probability model widely adopted in research in the fields of sustainability assurance (Fernández-Feijoo et al., 2015; Simnett et al., 2009) and business (Cowan et al., 2013). Specifically, binomial or binary logistic regression addresses situations in which the observed outcome for a can be of only two possible types, as in the case for the dependent variable in this study in which the phenomenon to be explained can only be measured as zero or one (Cowan et al., 2013).

#### IV. EMPIRICAL RESULTS AND DISCUSSION

##### Descriptive Statistics

Table 2 reports the descriptive statistics and correlation matrices for the variables used in the analysis. Moreover, this table reports the breakdown of the sample by the level of assurance quality (quality vs. non-quality assurance opinion), as well as the results of

difference means test for each variable under the null hypothesis of equal means. Panel A shows the descriptive statistics for the variables included in the proposed models for analyses. This shows that around 56% of the sample firms receive an assurance opinion in accordance with their sustainability performance (quality assurance opinions); 62.8% of assurance services are provided by accounting firms and 49.3% by industry specialists. The average length of the assurer–client relationship is around 6 years. Regarding control variables, the mean value of “*NCRP*” is around 65 (range 0–100); that is, in general firms operate in countries that are more stakeholder-oriented, with a greater compromise in relation to social and environmental concerns. In terms of differences between the sub-samples according to quality opinions, industry specialization and tenure are higher in the sample of quality assurance opinions, while the market share of accounting firms is greater when we examine non-quality assurance opinions. Moreover, these descriptive statistics show that the two comparable sub-samples differ significantly with regard to the type of assurer and client leverage. Panel B shows the bivariate correlations between the variables used in the model for each sample. In no case are high values obtained for the coefficients between the dependent and independent variables or between the independent variables.

[Insert Table 2 about here]

### Multivariate Analyses

In what follows, we present the results of the logistic regression models used to test the relationships between the type of assurer, industry specialization, tenure and assurance quality, regressed using the Stata software. For each explanatory variable, we report the odds ratio<sup>2</sup> coefficient and the standard error associated with each coefficient. In addition, for each logistic regression model we also include the additional panel-level variance component. This is parameterized as the log of the variance (labelled *Insig2*). The standard deviation is also included in the output of each model (labelled *sigma\_u*), together with *rho*, which is the proportion of the total variance contributed by the panel-level variance component. When *rho* is zero, the panel-level variance component is unimportant and the panel estimator is no different from the pooled estimator. A likelihood ratio test of this is included. This test formally compares the pooled estimator (logit) with the panel estimator. Moreover, the pseudo-R<sup>2</sup> is included as goodness-of-fit measure. The logit pseudo- R<sup>2</sup> indicates how well the data fit the presumed underlying theoretical distribution. Pseudo-R<sup>2</sup> is computed as a  $\chi^2$  model divided by the number of observations minus the number of variables plus one plus the  $\chi^2$  model. Finally, we detail the percentages of concordant pairs. In this case, the percentage of success obtained is 62.5% with a percentage of sensitivity (ratio between the correct values of 1 and the total values of 1 observed) around 75%.

Table 3 presents the results of models 1, 2a and 3a, examining the impact of the type of assurer, specialization and tenure on the quality of the assurance opinion. In model 1, we examine the relationship between the type of assurer and assurance quality, measured as the propensity of assurers issuing quality assurance opinions. The

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<sup>2</sup> Odds ratios in logistic regression can be interpreted as the effect of one unit of change in X in the predicted odds ratio with the other variables in the model held constant. In logistic regression, the odds ratio represents the constant effect of a predictor X on the likelihood that one outcome will occur. In regression models, we often try to express the effect of X on the likelihood of a categorical Y having a specific value through probability, but the effect is not constant. This avoids expressing in one number how X affects Y in terms of probability. The effect of X on the probability of Y takes different values depending on the value of X. For this, we undertake several logistic regressions and report the odds ratio coefficients. If the result of an odds ratio is greater than 1, the association is positive and therefore increases the likelihood that the event will occur (in our case, the assurer's opinion is correct). Conversely, if lower than 1, the association is negative and therefore the probability that the event occurs is lower. To improve interpretation, odds ratios can be translated into probabilities by applying the following formula:  $Probability = Odds\ ratio / (Odds\ ratio + 1)$ .

coefficient for “*Accountant*” shows a significant and positive association with the quality of the assurance opinion (coef. 2.2769; p-value < 0.90). In terms of probability (using the above-mentioned formula), the use of accounting firms as assurers increases the propensity to issue an assurance opinion of higher quality by 69.48%, that is, an opinion in line with the level of the sustainability performance of each firm. Supporting hypothesis 1, our findings show that assurance quality is higher when the opinion is provided by an accounting firm as assurer. In model 2a, we examine the relationship between industry specialization and assurance quality. The coefficient for “*Specialization*” shows a significant and positive association with the quality of assurance opinions (coef. 6.6599; p-value < 0.95). In terms of probability, having industry specialists as assurers increases the propensity to issue a quality assurance opinion by 86.94%. In support of hypothesis 2a, assurance quality is higher when the opinion is provided by an industry specialist. In model 3a, we examine the relationship between assurer tenure and assurance quality. The coefficient for “*Tenure*” shows a significant and positive association with the reporting of quality assurance opinions (coef. 1.0904; p-value < 0.90). In terms of probability, longer assurer–client relationships increase the probability of an assurer issuing a quality assurance opinion by 52.16%. Supporting hypothesis 3a, we find that an assurer’s propensity to issue a quality assurance opinion on sustainability reporting is higher for assurance providers with a longer tenure.

[Insert Table 3 about here]

In addition, models 2b and 3b examine the moderating impact of the type of assurer on the relation between specialization and tenure respectively. Table 5 shows the results obtained from these regressions. The positive association between employing an industry specialist assurer and assurance quality holds also in model 2b, which examines the moderating effect of the type of assurer. In this model, “*Specialization*” again shows a significant and positive association with quality assurance opinions (coef. 119.268; p-value < 0.99), while “*Accountant*” also positively influences the propensity to report an assurance opinion of higher quality (coef. 8.3487; p-value < 0.95). In terms of probability, employing accounting firms increases the propensity to issue qualified assurance opinions by 89.30%. To test the moderating effect of the type of assurer, the interaction between “*Specialization*” and “*Accountant*” is examined. The coefficient of the interaction term “*Specialization\_Accountant*” shows a positive and significant influence on the quality of assurance opinions (coef. 1.0161; p-value < 0.95). Operating with coefficients, the effect on assurance quality when opinions are provided by industry specialists from an accounting firm is greater (coef. “*Specialization*” + coef. “*Specialization\_Accountant*” = 119.268 + 1.0161 = 120.2841) than if such opinions are provided by industry specialists but from engineering or consultancy firms. In terms of probability, the propensity to issue qualified assurance opinions increases by 99.18% when assurers are industry specialists and accountants. The above supports hypothesis 2b: The type of assurer moderates the impact of industry specialization on assurance quality.

Regarding assurer tenure, the previous positive effect obtained in model 3a remains in model 3b, in which we examine the moderating effect of having an accounting firm on the association between tenure and assurance quality (coef. 1.2869; p-value = 0.999). Again, “*Accountant*” reflects a positive and significant association with quality (coef. 6.7487; p-value = 0.95); in terms of probability, assurance quality is 87.09% greater when opinions are provided by accounting firms as opposed to engineering and consultancy firms. Moreover, to test the moderating effect of the type of assurer, the interaction between “*Tenure*” and “*Accountant*” is examined. The coefficient of interaction term “*Tenure\_Accountant*” shows a positive and significant influence on the quality of assurance opinions (coef. 1.7897; p-value < 0.95). Operating with coefficients, the effect on assurance quality when opinions are provided by assurers with longer tenure from an accounting firm is greater than if opinions are provided by assurers with an extended

tenure but from engineering or consultancy firms (coef. “*Tenure*” + coef. “*Tenure\_Accountant*” = 1.2869 + 1.7897 = 3.0766). In terms of probability, the propensity to issue qualified assurance opinions increases by 75.47% when assurers are accountants and the length of their relationship with clients is longer. The above provides support for hypothesis 3b: The type of assurer moderates the impact of tenure on assurance quality.

[Insert Table 4 about here]

Overall, we demonstrate a greater propensity to issue a quality assurance opinion concerning sustainability reporting for accounting firms, for industry specialists as assurance providers over non-industry specialists and for assurers with a longer client relationship. First, we report evidence that supports the general assumption that accounting firms are assurers of greater quality. In line with Francis (2004), O'Dwyer and Owen (2005), Hodge et al. (2009) and Huggins et al. (2011), we agree with the perception that assurance quality is higher when opinions are provided by accountants. They benefit from greater expertise in the audit service, which allows them to transfer auditing techniques to assurance; moreover, they have relevant skills and training. Second, in line with Balsam et al. (2003) and Francis (2004), but in contrast to Green and Taylor (2013), we find industry specialization to be a reliable indicator of assurance quality. We thus find support for greater industry-specific knowledge and expertise, together with the greater skills, abilities and competences associated with a specific industry, resulting in specialists being assurers of greater quality. These aspects increase the propensity for greater accuracy in their assurance judgments and also of detecting any misrepresentation in sustainability reports. Therefore, industry specialization increases assurance quality. Third, with regard to the issue of assurer tenure, we support the “auditor experience” hypothesis examined in audit research by Johnson et al. (2002), Carcello and Nagy (2004b), Chen et al. (2008) and Gul et al. (2009), among others. As these authors posit, longer tenure acts as a reliable indicator of assurance quality by providing assurers with a greater understanding of client-specific knowledge, including clients’ systems and business, and allowing them to develop more effective audits. Finally, our findings demonstrate the moderating effect of the type of assurer; concretely, assurance quality is greater when is provided by accounting firms. The moderating role of accountants acting as assurers in relation to industry specialization supports the previous evidence of Gunny et al. (2007) for audit research and the moderation concerning tenure is in line with the previous studies of Lim and Tan (2008) and Brooks et al. (2013).

## V. CONCLUSIONS

This paper analyses the effect on assurance quality of certain attributes of assurance providers: (i) the type of assurance provider; (ii) industry specialization; (iii) length of the assurer–client relationship. In addition, it also examines the moderating role of the type of provider on the relations between industry specialization and assurance quality and assurer tenure and assurance quality. Assurance quality is associated with misreporting in the level of assurance provided (Francis, 2004); that is, it is proxied as the propensity to report a quality assurance opinion that does not include false positives or negatives (Type 1 and 2 statistical errors) in the assurance statement.

For our international sample of analysis for the period 2007–2014, the empirical evidence supports the notion that greater assurance quality arises from a number of assurer attributes. First, assurance quality increases when opinions are provided by an accounting firm. Accountants provide more quality opinions regarding sustainability reporting thanks to their professional expertise, skills and training developed through the audit service they provide, but also because they adopt more effective monitors to avoid losing their reputational capital. Second, industry specialization improves assurance

quality as a result of deeper industry knowledge and experience, allowing firm to reinforce their skills, abilities and competences. Specialists adopt higher levels of quality control, issuing more accurate assurance judgments and thus increasing assurance quality. Third, evidence concerning assurer tenure supports the “auditor experience” hypothesis, whereby longer tenure is a reliable indicator of assurance quality. An extended assurer–client relationship leads to greater client-specific knowledge, reinforcing the practitioner’s ability to detect any irregularities and misrepresentations in reports, thus providing more effective assurance services. Fourth, there is evidence regarding the moderating role of the type of assurance provider; that is, there is greater assurance quality when the assurer is an industry specialist, when assurer tenure is longer and even more so when assurance is entrusted to an accounting firm. In other words, accounting firms show a greater ability to offer more effective assurance, increasing the propensity to issue a quality assurance opinion and reinforcing the positive associations between specialization and quality and tenure and quality.

Our findings have several implications for firms, practitioners, investors and regulatory bodies given existing doubts about the quality of assurers with low industry specialization and short tenure, as well as the presence in the market of engineering/consultancy firms. For companies, it is fundamental to know the divergence in assurance quality based on their choice of provider (accounting vs. consultancy/engineering firms; industry specialists vs. non-specialists; longer vs. shorter assurer tenure). The positive effect of industry specialization suggests that firms can benefit from entrusting their assurance to an industry specialist, thus reducing the risk of receiving an assurance opinion with deficiencies. Second, the positive effect of tenure on assurance quality suggests that a limited length of auditor–client relationship could impair assurance quality, even more so when the auditor is an accounting firm. Third, firms interested in enhancing assurance quality to increase the credibility and transparency of their sustainability reporting should consider hiring accounting firms as assurers; this reinforces the positive relation between industry specialization and tenure in terms of assurance quality. For assurers, the results concerning industry specialization and long tenure reinforce the need to attain in-depth industry- and client-specific knowledge and experience, allowing them to develop their skills, abilities and competences in the assurance process. This will enable them to issue assurance opinions on sustainability reporting of greater quality. Moreover, following Green and Taylor (2013), external users believe that some attributes of assurance providers are especially important for assurance quality. Thus, the implications of this study are relevant to the financial community; investors, for example, react to financial/economic disclosures, but also to social and environmental reporting. To the extent that assurance statements influence decision-making processes, the quality of such statements allows investors/analysts to assess a specific firm accurately, thus affecting their decision making. Investors should be incentivized to invest in firms providing sustainability information and for which assurance is of greater quality. Finally, regarding policy markets and regulatory bodies, understanding the assurance provider attributes that favour and drive assurance quality can help them determine areas of deficiencies with regard to assurance issues. In general, assurance practice is unregulated and non-standardized because of the absence of regulatory laws and the lack of an auditing standard that must be followed by the assurance profession. The existing standards adopted depend on the assurance provider (ISAE 3000 for accounting firms and AA1000AS for engineering or consultancy firms). It is necessary for assurers to adhere to high-quality professional standards to reinforce their capability to issue assurance quality opinions. As Pflugrath et al. (2011) suggest, the results of this study have implications for regulators in terms of developing practices and implementing assurance standards in an emerging area. They must try to establish an assurance pattern that improves quality, as Kolk and Perego (2010) suggest. Regulatory bodies, accounting policymakers and practitioners must develop clear assurance standards to ensure the reliability, comparability and homogeneity of assurance reports. Overall, our

findings should further the interests of governments, policymakers and public institutions in providing institutional support for assurance provision.

However, our results require careful interpretation as our study suffers from a number of limitations. Although we have conducted robustness tests on alternative samples, our results may suffer measurement error associated with our proxies. In this regard, a first potential problem is the absence of reliable measures of assurance quality based on the opinion issued by practitioners. As Gul et al. (2009) stated, there is no consensus on the superiority of any particular model in terms of reliability for estimating audit quality and even more so for estimating assurance quality. Similarly, there is still debate in the literature concerning how industry specialists should be measured. We have tried to resolve this lack of consensus by proposing an additional measure that examines industry leadership. Nonetheless, adopting alternative measures to capture assurance quality, industry specialization and tenure could assist in overcoming the limitations associated with this study and could provide an opportunity for future research. Moreover, although our models included several control variables established and validated by previous studies, omitted variables may affect the results. Furthermore, while we identified four factors contributing to assurance quality (industry specialization, tenure, type of assurer and industry leadership), there are undoubtedly others that future research should examine. Finally, despite the fact that the use of an international sample is one of the main contributions of this study, the relations proposed are not examined with regard to the functions of institutional factors and their implications, such as corporate governance, the shareholder or stakeholder orientation of countries, ownership concentration or cultural values. Due to the limited information available in the different databases used, the sample is restricted to specific countries. Methodologically, we cannot neglect the self-reporting bias in the sample selection as our sample is restricted only to those companies which have chosen to report their sustainability practices with an assurance statement. Future research should address the above-mentioned limitations, providing evidence that is more generalizable.

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## **Appendix 1: Corporate Social Responsibility (CSR) performance**

This appendix presents CSR performance measured using a multidimensional construct addressing all the activities carried out by the firms in question, especially with regard to social and environmental aspects (Carroll, 1979). In this case, information on CSR performance was compiled from the EIRIS database, widely used in academic research (see Fabrizi et al., 2014, Martínez-Ferrero et al., 2016; among others). Through the information that companies disclose online and through questionnaires and surveys sent to companies, EIRIS addresses different areas, including environmental and social issues (human rights and relationships with employees and stakeholders), as shown in Table A1, assigning criteria grades to specific attributes in text addressing each of these three areas. This procedure might involve a subjective assessment of relevant corporate

practices, but the topics addressed and the questions posed are designed in such a way as to enable a reasonable assessment of the activities evaluated. Moreover, EIRIS combines a broad range of environmental and socio-labour data points to assess how companies respond to the various sustainability challenges they face and to identify corporate leadership in tackling environmental and social challenges through policies, systems, reporting and documented improvements in performance. To obtain the CSR performance of companies, we make use of an aggregate CSR measure that takes into consideration a range of important issues (environmental and social aspects) across companies according to the 21 issues shown in Table A1. Similar to Martínez-Ferrero et al. (2016) and Fabrizi et al. (2014), we transform the EIRIS criterial rating for each measure into a numerical rating. According to the scoring criteria of EIRIS (inadequate, weak, moderate, good and exceptional), we assign five values: 0, 1, 2, 3 and 4. Overall, companies are considered sustainable with regard to a specific aspect when the score is above the threshold of 2 and are otherwise not considered sustainable. Because “CSR” is determined based on the non-weighted sum of these 21 items, it is in the range 0 to 84.

In Table A2, we represent the descriptive statistics of sustainable performance, as well as the sub-categories of performance: social and environmental.

Table A2. Sustainable performance: Descriptive statistics

<b>Panel A. Sustainable Performance for the Full Sample</b>									
	Media n	Mean	Std. Dev.						
CSR	56	53.253	17.018						
Social	47	44.731	13.799						
Environmental	10	8.522	4.115						
<b>Panel B. Sustainable Performance by Industry</b>									
	CSR			Social			Environmental		
	Media	Mean	St.	Media	Mean	St.	Media	Mea	St.
Finance	50	48.906	15.259	43	41.91	12.44	8	6.98	3.550
Basic	64	62.682	15.217	52	52.69	12.47	11	9.98	3.314
Industry	56	54.909	16.193	46	45.57	13.23	10	9.33	3.853
Utilities	60	54.895	15.543	49	44.84	13.73	11	10.0	3.128
Services	56	51.535	18.739	46	44.18	14.60	9	8.34	4.434
Construction	56	48.813	17.703	47	41.12	14.42	8.5	7.68	3.947
Retail	58	50.853	19.311	48.5	43.23	15.08	9.5	7.61	4.899
Transportation	53	54.459	9.236	41	45.29	8.698	10	9.16	2.489
Telecommunic	49.5	46.019	19.854	42.5	40.56	15.89	7	5.45	4.659.

**Sample:** 901 observations for 242 listed companies in 2007–2014

**Table 1.** Quality of assurance reports in line with sustainable performance

<b>Panel A. Distribution of sample according to sustainable performance and level of assurance</b>			
		<b>Sample including less sustainable firms N = 467</b>	<b>Sample including more sustainable firms N = 434</b>
<b>Level of Assurance</b>	Limited/Moderate	427 reports	356 reports
	Reasonable/High	40 reports	78 reports
<b>Panel B: Distribution of quality assurance opinions</b>			
		Freq.	%
Non-quality assurance opinion		396	43.95
Quality assurance opinion		505	56.05
Total		901	100
<p>Note: Samples of less sustainable firms and more sustainable firms are obtained based on the CSR median of their corresponding industry. Less sustainable firms present CSR values lower than their industry median. More sustainable firms present CSR values higher than their industry median.</p>			

**Table 2.** Descriptive statistics and correlation matrixes

<b>Panel A. Mean and standard deviation of variables used in regressions</b>									
	<b>Full Sample</b>		<b>Non-Quality Assurance Opinion</b>		<b>Quality Assurance Opinion</b>		<b>Difference Test</b>		
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Diff [mean (0) – mean (1)]	Std. Error	
AQ_Opinion	0.560	0.496							
Accountant	0.628	0.484	0.679	0.467	0.588	0.493	0.091	0.032	
Specialization	0.493	0.302	0.481	0.298	0.502	0.305	-0.021***	0.020	
Tenure	6.725	4.134	6.257	3.832	7.077	4.326	-0.802	0.276	
Client_Size	16.177	2.154	16.406	2.293	15.998	2.023	0.407	0.144	
Client_Leverage	2.358	7.356	2.819	6.119	2.018	8.139	0.801***	0.535	
Client_Insolvency	0.783	0.912	0.713	0.701	0.834	1.038	-0.121	0.066	
Disclosure_GRI	0.495	0.500	0.635	0.499	0.463	0.499	0.072	0.034	
NCRI	64.790	5.243	65.806	5.085	63.994	5.232	1.811	0.347	
<b>Panel B. Bivariate correlations between variables used in regressions</b>									
	1	2	3	4	5	6	7	8	9
1. AQ_Opinion	1								
2. Accountant	-0.094***	1							
3. Specialization	0.034	0.034	1						
4. Tenure	0.096***	0.021	0.201**	1					
5. Client_Size	-0.094***	-0.063*	-0.171***	0.097***	1				
6. Client_Leverage	-0.054	0.155***	-0.037	0.095***	0.175**	1			
7. Client_Insolvency	0.066*	-0.092**	-0.144***	-0.124***	-0.0219***	-0.137***	1		
8. Disclosure_GRI	-0.072**	0.041	-0.002	0.178***	0.229***	0.032	-0.057	1	
9. NCRI	-0.172***	0.118***	-0.002	0.214***	-0.138***	0.034	0.056	0.123	1

**Sample:** 901 observations for 242 listed companies in 2007–2014.  
 \*, \*\* and \*\*\* represent statistical significance at 90%, 95% and 99%, respectively.

**Table 3.** Impact of some attributes of assurance providers on assurance quality

<i>Dependent variable: AQ_Opinion</i>	<b>Model 1</b>		<b>Model 2a</b>		<b>Model 3a</b>	
	OR	Std. Err.	OR	Std. Err.	OR	Std. Err.
Accountant Specialization	2.2769*	1.0856	6.6599**	6.0577		
Tenure					1.0904*	0.0579
Client_Size	0.3402***	0.0639	0.307	0.1047	0.8265	0.1025
Client_Leverage	0.9920	0.0223	0.9749	0.0283	0.9828	0.0259
Client_Insolvency	0.7559*	0.1264	1.0442	0.1481	1.0486	0.1464
Disclosure_GRI	1.2379	0.3733	0.8506	0.2512	0.8737	0.2558
NCRI	0.8242***	0.0387	1.0189	0.0339	1.0229	0.0332
Industry	Controlled		Controlled		Controlled	
Year	Controlled		Controlled		Controlled	
Country	Controlled		Controlled		Controlled	
Insig2u	1.7527	0.2662	2.2345	0.2656	2.1731	0.2643
sigma_u	2.4022	0.3197	3.0564	0.4058	2.9637	0.3916
rho	0.6369	0.0616	0.7396	0.0512	0.7275	0.0524
Likelihood-ratio test of rho = 0: chibar2(01) = 143.62 Prob >= chibar2 = 0.000 and pseudo R <sup>2</sup> : 0.21 (Model 1)						
Likelihood-ratio test of rho = 0: chibar2(01) = 202.85 Prob >= chibar2 = 0.000 and pseudo R <sup>2</sup> : 0.19 (Model 2a)						
Likelihood-ratio test of rho = 0: chibar2(01) = 192.08 Prob >= chibar2 = 0.000 and pseudo R <sup>2</sup> : 0.19 (Model 3a)						

**Sample:** 901 observations for 242 companies in 2007–2014.

\*, \*\* and \*\*\* represent statistical significance at 90%, 95% and 99%, respectively.

**Table 4.** Moderating role of the type of provider on the impact of industry specialization and tenure on the quality of assurance opinions

<i>Dependent variable: AQ_Opinion</i>	<b>Model 2b</b>		<b>Model 3b</b>		
	OR	Std. Err.	OR	Std. Err.	
Specialization	119.268***	197.277	Tenure	1.2869***	0.1129
Accountant	8.3487**	8.1349	Accountant	6.7487**	5.9345
Specialization_Accountant	1.0161**	0.0161	Tenure_Accountant	1.7897**	0.0802
Client_Size	0.7790*	0.1033	Client_Size	0.7933*	0.09883
Client_Leverage	0.9803	0.0279	Client_Leverage	0.9843	0.0253
Client_Insolvency	1.0473	0.1508	Client_Insolvency	1.0573	0.1484
Disclosure_GRI	0.8879	0.2658	Disclosure_GRI	0.8641	0.2519
NCRI	1.0121	0.0348	NCRI	1.007	0.0331
Industry	Controlled		Industry	Controlled	
Year	Controlled		Year	Controlled	
Country	Controlled		Country	Controlled	
Insig2u	2.2852	0.2694		2.1299	0.2637
sigma_u	3.1349	0.4223		2.9001	0.3825
Rho	0.7492	0.0506		0.7189	0.0533
Likelihood-ratio test of rho = 0: chibar2(01) = 204.07 Prob >= chibar2 = 0.000 and pseudo R <sup>2</sup> : 0.16 (Model 2b)					
Likelihood-ratio test of rho = 0: chibar2(01) = 188.78 Prob >= chibar2 = 0.000 and pseudo R <sup>2</sup> : 0.19 (Model 3b)					

**Sample:** 901 observations for 242 companies in 2007–2014.

\*, \*\* and \*\*\* represent statistical significance at 90%, 95% and 99%, respectively.