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Financial and Sustainability Assurance Quality and Firm Valuation: Evidence from the European Market

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Abstract

Following the increased interest of stakeholders in financial and sustainability reporting, improving assurance quality to enhance the credibility and accuracy of disclosed information is deemed necessary for investment-related decision-making. However, due to differences in national and international assurance regimes and acceptable standards, investors may initially be sceptical. Stakeholders may therefore opt for complementary assured reports, incorporating the assurance quality of both reports in investment-related judgements. This study posits that different levels of assurance quality on separate financial and sustainability reports influence the stakeholders' perception on the assured reports of the organisation, explaining the variations in firm valuation. Using a panel data set of 319 companies from 22 European countries during the period 2013-2018, the results indicate that, in the short term, the firm valuation of an organisation with a superior assurance quality on financial reports is more likely to increase, even when these companies published an inferior assured sustainability report. Firm valuation is not significantly affected for companies that published a superior assured sustainability report besides an inferior assured financial report. The findings and implications are discussed in further detail.

(Keywords: Firm Value, Financial and Sustainability Assurance, Halo effect, Assurance Quality, Voluntary Assurance, Mandatory Assurance)

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1   Introduction

Publication and documentation of financial and sustainability information has gained significant importance over the years, primarily due to the increased desire of stakeholders to be able to evaluate firms' performance. For this reason, several governmental organisations help ensure a high degree of transparency, comparability and credibility of financial and sustainability information by supporting the disclosure of these statements (European Commission, 2014b; European Communities (EC), 2002). First, concerning the financial disclosure, the European Union mandated organisations to present a credible view of the financial position to stakeholders and, thus, improve the efficient and transparent functioning of the capital and equity market (Brüggemann et al., 2013). Although the mandatory nature of financial reporting decreased the level of information asymmetry between management and stakeholders (European Communities (EC), 2002), management may still be self-serving and prefer to decide the accuracy and credibility of disclosed information (Brüggemann et al., 2013). Lowenstein (1996) holds that management primarily focuses on managing the numbers stakeholders are interested in. Secondly, stakeholders have recently shown increased interest in the voluntary disclosure of CSP information due to the awareness of the necessity for protecting the environment for future generations. To increase the publication of sustainability reports, the European Commission has proposed regulations to govern sustainability performance disclosure (European Commission, 2014a). Furthermore, companies are increasingly being criticised for their corporate social responsibility policies, urging firms to disclose improved social and environmental details in standalone and integrated reports (Chung & Lee, 2019; Einwiller, Lis, Ruppel, & Sen, 2019). Since the increased importance of firms' engagement with society, several studies have examined the effect of disclosure of CSP on financial performance (Barnett, 2007; Godfrey, et al., 2009). These studies have shown that CSP disclosure impacts the cost of equity capital (Dhaliwal, Li, Tsang, & Yang, 2011; Mishra, 2017), and financial risk (Cheng, Green, & Ko, 2015; Lee & Faff, 2009). In this case, considering the absence of mandatory regulations concerning sustainability reporting (Lagasio & Cucari, 2019), management may voluntarily decide whether to disclose sustainability information and the compliance of disclosure with reporting standards to manage the

stakeholders' perception of firm performance (Manning, et al., 2019). However, these practices reduce sustainability reporting quality.

Following these arguments, Radhouane, et al. (2020) argue that stakeholders, in general, might initially be sceptical about the financial and sustainability content, resulting in a perceived information asymmetry between management and market participants. Therefore, for reports to be useful, users must perceive the information as credible and accurate (Healy & Palepu, 2001). Stakeholders consider organisational statements credible and accurate if the message is perceived as not self-serving. Assurance may improve the credibility and accuracy of disclosed information, enabling stakeholders to evaluate the reported practices more precisely (Pflugrath, Roebuck, & Simnett, 2011). Essentially, assurance is primarily focused on increasing confidence among stakeholders (IIA, 2015), primarily by enhancing the accuracy and credibility for stakeholders' decision-making (Pflugrath et al., 2011). Previous studies suggest that third-party assurance pressures organisations and managers to improve organisational transparency towards stakeholders and reduce the opportunities to legitimise inferior performance (Dando & Swift, 2003). Further, assurance from independent third parties may influence the compliance of the disclosed information with financial and sustainability reporting standards, although these standards are still interpreted differently (Boiral, 2013; Michelon, Pilonato, & Ricceri, 2015). For this reason, management can still manage the stakeholders' interpretation by deciding on the credibility and accuracy of assured information.

Therefore, prior studies have suggested a direction towards more assurance of superior quality on CSP and financial information by emphasising the importance of credibility for corporate reputation (Braam, et al., 2016; Pflugrath et al., 2011; Simnett, Zhou, & Hoang, 2016), resulting in an increased demand for higher assurance quality on sustainability and financial reports (Krasodomska, Simnett, & Street, 2021). In the context of prior studies, the improved quality of assurance of both sustainability and financial disclosed information decreases the information asymmetry, resulting in a more accurate and credible representation of the actual practices. Considering the increased use of accurate and credible information, investors might consider evaluating the financial assurance quality (FAQ) or sustainability assurance quality (SAQ) in order

to be able to assess the organisational performance better. Consistent with Karjalainen (2011) and Miralles Quirós et al. (2021), superior assurance on financial and sustainability information by third parties, primarily the big4 auditors, enhances the credibility and accuracy as indicators of information valuation. In addition, Pittman & Fortin (2004) found significant evidence that superior assurance quality reduces opportunistic behavior and subsequently increases firms' performance and reporting reputation. Following Kim, Cho, & Park (2019), firms may benefit from third-party assurance on disclosed information because investors will perceive the information as more accurate and credible, resulting in a more objective and unbiased firm value.

Nevertheless, stakeholders may still perceive difficulties in evaluating assurance quality due to differences in acceptable standards and the either mandatory or voluntary nature of financial and sustainability assurance (Dando & Swift, 2003; Perego, 2009; Venturelli & Pizzi, 2020; Wallage, 2000). Although the International Auditing and Assurance Standards Board (IAASB) (2017) and the European Commission (2014b) are facilitating the convergence of international and national assurance standards, stakeholders face difficulties in interpreting the quality of assured sustainability and financial information. Besides that, based on the differences in voluntary or mandatory assurance regimes, stakeholders might be more sceptical about the quality of assured sustainability information (Radhouane et al., 2020). Investors may, therefore, incorporate complementary reports, such as assured information about the financial or sustainability performance, to strengthen their opinion about the organisation for decision-making (Correa-Garcia, Garcia-Benau, & Garcia-Meca, 2020; Sandberg & Holmlund, 2015). More specifically, investors may acknowledge credible information in their decision-making by searching for complimentary assured reports published by the organisation. The sustainability and financial reports with superior assurance quality are mutually the best alternatives. However, prior literature indicates that the interpretation of the complementary assured reports might influence the opinion about the primary assured information report and the overall impression (Boatwright, Kalra, & Zhang, 2008; Mercer, 2004; Wang & Tuttle, 2014). In this case, these previous studies refer to the investors' cognitive biases in evaluating the assured information. Investors may get an impression of a report's assurance quality to influence the other reports' perception. Literature has identified this cognitive bias as the halo effect (Nicolau, et al., 2020; Reimsbach, et al., 2018;

Wang & Tuttle, 2014). The halo effect might affect the stakeholders' interpretation of organisations, which directly relates to the firm valuation. Therefore, this study posits that the interpretation of FAQ and SAQ affected by the halo effect will explain variations in firm valuation.

In the context of prior studies, literature on assurance of sustainability and financial information has focused on two important research lines. First, previous studies detailed the content and quality of assurance statements in financial and sustainability reports separately (Braam & Peeters, 2018; Dechow, Sloan, & Sweeney, 1995; Deegan, Cooper, & Shelly, 2006; Gürtürk & Hahn, 2016; Sattar, Javeed, & Latief, 2020). Secondly, studies focused on the stakeholder valuations of assured reports and their influence on credibility and reputation (Dando & Swift, 2003; Pflugrath et al., 2011). Although these studies acknowledge that FAQ and SAQ may influence firm valuations, the underlying effect related to the interpretation of FAQ and SAQ is still empirically underexplored (Cardinaels & van Veen-Dirks, 2010; Michelon, 2021). External assurance by third parties may improve the perceived credibility and accuracy of disclosed financial and sustainability information, resulting in increased firm valuations. In this context, the study aims to address this knowledge gap by examining how different levels of FAQ and SAQ affect firm value. First, this study addresses the effect of SAQ and FAQ on firm valuation. Secondly, this study focuses on whether the publication of a superior assured report next to an inferior assured primary report overcompensates the initial relationship as a consequence of the halo effect. More specifically, this study investigates whether the stakeholders' interpretation based on superior and inferior assurance quality of financial and sustainability information affects firm valuation by emphasising the investors' halo effect. To examine the relationship between combinations of assurance quality and firm valuation, the following research question is central to this study: *To what extent does the halo effect affect firm valuation when separate sustainability and financial reports are interpreted at different levels of assurance quality?*

This quantitative study includes a panel data set covering listed European companies during the period 2013-2018. Consistent with KPMG (2013), the number of engaging organisations in CSR reporting continues to grow since the report of the Global Reporting Initiative (GRI) (2013). Additionally, the sample consists of European companies to limit the country-level specific

influences and to analyse, in general, stakeholder-oriented organisations (Braam & Peeters, 2018).

The study contributes to the current literature related to financial and sustainability disclosure credibility in several ways. First, the analysis advances the understanding of the role of assurance on disclosed information for stakeholders' perception. Although the existing literature acknowledges that assurance enhances the accuracy and credibility of disclosed information, the effect on firm valuation is underexplored (Dando & Swift, 2003; Cho, et al., 2014). Second, the literature comprises only limited studies that explicitly address the importance of sustainability and financial information for investors and other stakeholders' decision-making (Esch, et al., 2019; Reimsbach et al., 2018). Finally, following the studies on financial and sustainability assurance, this study also incorporates the combination of both SAQ and FAQ on stakeholders' perceptions. Financial and sustainability assurance services will be examined in combination by using a 2x2 framework consisting of four combinations of sustainability and financial assurance quality categories. Elaborating on the effect of different levels of assurances quality enhances the understanding of stakeholders' perceptions and valuations.

The remainder of this empirical study is classified into several sections. The second section will discuss the literature review and theoretical framework for the hypothesis development concerning the effect of financial and sustainability assurance quality. Further, in section 3, the study describes the adopted methodology for the empirical analysis. In the subsequent section, the study provides the empirical results, followed by section 5, which includes the robustness checks. Finally, in sections 6 and 7, the conclusion and discussion are formulated.

2   Theoretical Framework

2.1   Assurance

Financial and sustainability reports are important organisational tools to communicate CSP and financial performances to stakeholders. Publication of these reports is primarily focused on reducing asymmetric information (Radhouane et al., 2020), and improving the credibility of performed activities. Although the European Commission (2013) mandated financial reporting and assurance for large organisations, the stakeholder theory suggests that management may behave opportunistically towards stakeholders by deciding the accuracy and credibility of disclosed information (Colbert & Jahera, 2011). External assurance is an important instrument to verify the credibility of disclosed information. The Institute of Internal Auditors (IIA) (2015) defines assurances as 'the examination of organisational objectivity by providing an independent assessment of risk management, control processes, and governance'. It functions as an external corporate governance mechanism to improve the completeness and accuracy of disclosed information and provides investors and stakeholders credible information for related judgments (Adams & Evans, 2004). Furthermore, external assurance incentivises firms to behave more socially and financially responsible, thus aligning the activities with stakeholders' interests (Bagnoli & Watts, 2017; Dando & Swift, 2003). In accordance with these studies, obtaining external assurance by organisations improves the possibilities of monitoring activities, resulting in more well-considered decision-making. Besides, assurances of financial and sustainability information may provide disclosure transparency, resulting in decreased information asymmetries and uncertainties. In particular, improved credibility and accuracy of reports positively affects the trustworthiness of organisations towards stakeholders (GRI, 2013; Radhouane et al., 2020), the organisational reputation (Braam et al., 2016; Hodge, et al., 2009), and the effectiveness of management monitoring (Bagnoli & Watts, 2017; Dando & Swift, 2003), as a result of improved information quality and corporate commitment. Credibility and accuracy are, thus, crucial for stakeholders to determine the usefulness and informativeness of disclosed information.

These affected business aspects have several implications for business performance. First,

organisations benefit from more valuable, relevant, and credible information regarding the accessibility of finance to invest in beneficial projects or processes (Martínez-Ferrero & García-Sánchez, 2017). In addition, assurance of sustainability and financial information motivates organisations to improve compliance and corporate governance, resulting in increased stakeholders' perception due to the more advanced reporting quality and prevention of assurance duplication (Donkor, et al., 2021; Forte & Barac, 2015). Previous literature on organisational benefits of assurance shows that higher credibility of disclosed information positively affects the recommendation of bankers to their clients for purchasing particular shares (Quick & Inwinkl, 2020). The relation is more substantial when the stakeholders perceive the credibility as higher due to assured information by an accounting firm for a reasonable assurance level. Finally, previous literature argues that increased information credibility influences the costs organisations could afford to incur since stakeholders anticipate long-term rents as a result of good reputation (Wang & Tuttle, 2014; Weigelt & Camerer, 1988).

2.2   Financial Assurance Quality

Although the prior studies provide evidence that assurance on reports, in general, positively affects the accuracy and credibility of disclosed information, some literature emphasizes the differences between financial and sustainability assurance (Michelon, Patten, & Romi, 2019; Moroney & Trotman, 2016). In accordance with the regulations, financial assurance is mandated for organisations to enhance the credibility and accuracy of disclosed information (EC, 2002), thus, reducing the information asymmetry between market participants and organisations (Adams & Evans, 2004; Bagnoli & Watts, 2017; Colbert & Jahera, Jr., 2011). Management of organisations have initially fewer opportunities to manage the disclosed information because of the mandatory third-party assurance that monitors organisational activities, attests to management performance, and assesses compliance with audit standards (Colbert & Jahera, Jr., 2011). Although the assurance benefits the usefulness of financial information for investment-related judgments, management may still decide to manage the presented financial numbers. First, accounting firms, especially non-big4 audit firms, need to consider implementing better techniques and equipment to identify managed financial numbers (Akers, Giacomino, & Gissel,

2007). Further, auditors are consistent with the regulations to report management fraud by ensuring that the disclosed information is free from material misstatements (Makkawi & Schick, 2003). However, material misstatements may be caused by management fraud to positively affect the financial representation (Makkawi & Schick, 2003). Therefore, investors desire third-party assurance of superior quality to ensure a higher level of credibility and accuracy of disclosed financial information for decision-making. Superior FAQ is defined as publishing an assured report with high audit quality, suggesting low discretionary accruals (Dewi & Monalisa, 2016).

Previous literature shows that the quality of external assurance on disclosed financial information may improve the credibility and enhance the transparency towards stakeholders as the assured information is more informative about the financial activities and performance (Mazzotta, Mazzitelli, & Veltri, 2022). More precise, studies refer to the fact that superior qualified assurance on financial information declines the differences in perception between the stakeholders, management and auditors, so-called the "expectation gap" (Geiger, 1994). Moreover, superior assured financial information improves the accessibility of organisations for external equity financing (Lai, 2011), for example, due to the improved accuracy and informativeness (Dando & Swift, 2003; Michelon, 2021). Based on these arguments, the following hypothesis is formulated:

> **H1a:**   *FAQ is positively related to firm value.*

2.3   Sustainability Assurance Quality

As opposed to financial reporting, management is not mandated by law to disclose or assure sustainability information. Concretely, the IAASB (2017) and European Commission (2014b) focus on converging the international and national assurance and disclosure standards related to sustainability disclosure, although, the international organisation could only rely on the organisation's social responsibility for assuring and disclosing sustainability information. Consistent with financial assurance, the third-party assurance of sustainability information functions as an external corporate governance mechanism to reduce information asymmetry between stakeholders and organisations (Dando & Swift, 2003; Radhouane et al., 2020). However, in this context, management may still decide on the quality and quantity of information provided to investors and other stakeholders and whether to assure the credibility and accuracy

of disclosed information (Dando & Swift, 2003; Radhouane et al., 2020). Moreover, management may still be self-serving and prefer to decide the accuracy and credibility of disclosed and assured information. The voluntary third-party assurance on sustainability information may vary considerably in terms of choice for assurance scope and level (Braam & Peeters, 2018). Stakeholders might, therefore, initially be more sceptical about the accuracy and credibility of assured information (Radhouane et al., 2020). Investors may desire third-party assurance of superior quality to ensure the credibility and accuracy of disclosed sustainability information. *Superior assurance quality* on sustainability information is defined as the publication of an assured sustainability report with high audit quality, indicating that the report is entirely assured (assurance scope) and contains a reasonable assurance quality (assurance level) (Dando & Swift, 2003; García-Sánchez, Hussain, Martínez-Ferrero, & Ruiz-Barbadillo, 2019). Although management of organisations may benefit from non-assured information in case of inferior performance, organisations with superior assurance quality on disclosed information find themselves in better positions (Knechel, 2016; Low & Boo, 2012; Zorio, García-Benau, & Sierra, 2013). In addition, investors and other stakeholders, on average, also value accuracy and credibility in their decision-making. For this reason, organisations and stakeholders might, on average, be concerned with assured information of superior quality.

Further, the improved quality of assurance on sustainability reports, resulting in increased informativeness and transparency, directly improves the investors' interest in social and environmental performance (Fuhrmann, et al., 2017). Consequently, it enhances the degree of incorporation in investment-related judgments and positively affects the firm valuation. Moreover, because assurance on sustainability information is voluntary, superior assurance may reduce material inaccuracies or omissions due to the more extensive verification of disclosed sustainability information (Reverte, 2021). A high level of credibility and accuracy increases the corporate reputation and, consequently, the firm valuation (Pérez, 2015). Finally, the increased accuracy and credibility of sustainability information due to extensive assurance, indirectly pressures organisations to operate more sustainably (Maroun & Prinsloo, 2020; Pittman & Fortin, 2004), and reduces information asymmetry between stakeholders and organisations (Dal Maso, et al., 2017). Hence, stakeholders value assurance statements with a broader scope and

reasonable level of assurance. Related to these benefits, sustainability report users incorporate these mechanisms in their investment-related decisions (Mercer, 2004). The increased users' perception of credibility and accuracy related to the disclosed information positively impacts the firm valuation. Thus, organisations with higher perceived credibility over sustainability information due to superior assurance quality decrease the uncertainty of masked information and material misstatements in reports (Hoitash, Hoitash, & Bedard, 2009; Jensen & Meckling, 1976). Accordingly, the following positive relation with regards to firm valuation is hypothesized:

H1b: *SAQ is positively related to firm value.*

2.4   The Halo Effect

Besides the hypothesized direct effects of FAQ and SAQ on firm value, this study primarily focuses on the effect of simultaneously interpreting different levels of assurance quality of financial and sustainability information on firm value. Investors and other stakeholders increasingly desire a higher degree of transparency of organisations in disclosing financial and sustainability information (Manetti & Toccafondi, 2012; Peck & Sinding, 2009). Following the desire for advanced monitoring of investors, stakeholder theory suggests that companies need to improve the credibility and accuracy of disclosed information to stakeholders to better understand internal processes and performance (Hodge et al., 2009; Radhouane et al., 2020). In the decision-making process, management decides based on the cost-benefit analysis whether improved credibility and accuracy for meeting the increased requests and monitoring of stakeholders benefit the company (Braam & Peeters, 2018). Although the continuously balancing process of management teams, the stakeholders' pressure may affect the organisational responsiveness (Herremans, Nazari, & Mahmoudian, 2016; Johnson, Redlbacher, & Schaltegger, 2018). In particular, management considers whether a more reasonable and extended form of assurances meets the stakeholders' interests which may influence the organisational valuation and its management reputation (Braam et al., 2016; Hodge, et al., 2009). However, the costs related to assurance scope and level differ, which may influence organisations' short- and long-term costs. High costs related to assurance may influence management's perception of the level of credibility and accuracy to choose a less extensive form of assurance (Braam & Peeters, 2018).

Although management decides on assurance quality, investors determine whether the information is perceived credible and accurate (Pflugrath et al., 2011). These stakeholders' perceptions determine information processing and, consequently, firm valuation (Thompson, et al., 2022).

As stated above, this study assumes the stakeholders consider the assurance quality in decision-making. However, the interpretation and evaluation of assurance quality are difficult due to national and international differences in acceptable standards and assurance regimes regarding financial and sustainability assurance (Dando & Swift, 2003; Perego, 2009; Venturelli & Pizzi, 2020; Wallage, 2000). With regards to the different assurance regimes, the international rules mandate assurance on financial reports, which improves the comparability. Concerning the SAQ, the IAASB (2017) facilitates the convergence of international and national assurance standards, but investors perceive difficulties in evaluating since sustainability assurance is primarily voluntary. Increased difficulties in interpreting SAQ, for instance, may influence investors' willingness to incorporate secondary assured reports for investment-related judgments (Reimsbach et al., 2018). Uncertainties about accurate, credible, and verifiable information affect the stakeholders' decision-making process. In this case, investors primarily rely, for their investment-related decisions, on available complementary information, e.g. management's reputation (Boatwright, et al., 2008; Mercer, 2004), and secondary and historical reports (Hirst, et al., 1999; Hutton & Stocken, 2007; Williams, 1996). The availability of other information reports may make investors turn to this secondary information to evaluate the organisational performance (Boatwright, Kalra, & Zhang, 2008; Mercer, 2004; Wang & Tuttle, 2014). In case of evaluating credibility and accuracy of disclosed information, stakeholders may opt for complementary assured reports. The sustainability and financial reports with superior assurance quality are mutually the best alternatives. Followed by the hypothesized relation between SAQ and FAQ and firm value in H1a and H1b, this study states that the usage of the complementary assured reports overcompensates the negative impression formed based on the inferior assured report (Boatwright, Kalra, & Zhang, 2008; Mercer, 2004; Wang & Tuttle, 2014). Therefore, this study expects the presence of a complementary report with superior assurance to improve the perceived firm value. In this context, this study expects a cognitive bias among investors in case

of superior assurance quality of secondary information, expecting to positively affect the interpretation of the other externally assured information report. More precisely, this study expects a halo effect emanating from the superior SAQ or FAQ report on the interpretation of the inferior FAQ or SAQ, respectively. The halo effect is defined as "the cognitive bias whereby observers form an individual opinion about a particular characteristic based on the predisposition towards another attribute or product" (Nicolau et al., 2020).

This study expects the availability of a secondary report with superior assurance quality to improve the investors' perceived credibility and accuracy of the primary assured report, expecting to increase firm valuation. The halo effect may occur when one of the sustainability or financial report is published with an inferior assurance quality. This study expects the relation to run in both ways. First, as regulations mandate the assurance of financial information, this study argues that the assurance statements of superior quality will constantly improve the overall firm's reputation and credibility. This perception resulting from superior FAQ will result in a higher perceived credibility and sustainability performance, resulting in a higher firm valuation. Second, this study expects that superior SAQ will also improve the perceived organisational reputation and credibility, although the financial information is inferior assured. The fact that assurance on sustainability information is of voluntary nature will, in case of superior quality, positively affect the stakeholders' perceived opinion about the company. The improved organisational reputation will directly influence the firm valuation.

Based on the stated arguments above, this study expects the superior assurance quality on a secondary report to overcompensate the negative effect of inferior assurance quality on the primary report, resulting an increased firm valuation. The halo effect may influence investors' perception of SAQ and FAQ, resulting in a simultaneous interpretation. Accordingly, this study hypothesizes the following effect of the simultaneous interpretation of different levels of assurance quality on sustainability and financial reports:

> *H2a: The stakeholder's perception on a separate financial report with superior assurance quality overcompensates the negative effect of inferior SAQ on firm valuation.*
>
> *H2b: The stakeholder's perception on a separate sustainability report with superior assurance quality overcompensates the negative effect of inferior FAQ on firm valuation.*

3   Research Methods

3.1   Sample

The model was tested over 5 years (2013-2018) for listed European organisations that are mandatory to assure financial information and voluntarily decided to assure sustainability reports. The sample consists of 1412 listed firm-years observations, representing 602 organisations over 22 different European countries and 33 different industries. Table 1 shows the organizations' distribution over the countries and industries.

The data concerning sustainability assurance is based on the dataset of GRI. The GRI dataset provides investors and other stakeholders data about sustainability reports for facilitating relevant information for investment-related judgements. The database includes information on whether sustainability information is assured, the assurance level, provider, and scope. These indicators are composed of one variable representing SAQ. In addition, data on FAQ and firm-level were retrieved from the Thomson Reuters Eikon database. Finally, this study used data from BoardEx for variables related to board characteristics.

3.2   Variables

3.2.1   Dependent Variables

For the analyses, the variable of interest is firm valuation. Data on firm valuation will be obtained from the database of Thomson Reuters Eikon. Firm valuation is proxied by two stock-based indicators for firm performance (Kim et al., 2019). First, the firm valuation is measured by the natural logarithm of the market value, calculated by the share price multiplied by the number of ordinary shares in issues (Beiner, Schmid, & Wanzenried, 2011; Kohli, Devaraj, & Ow, 2012). The second measure of a firm's financial value is Tobin's Q, calculated as the firm's market value divided by the value of the firm's physical asset (Connolly & Hirschey, 2005; Platikanova, 2016; Wang, 2015). The results related to Tobin's Q are included in Section 5 (Robustness Checks).

TABLE 1:   DISTRIBUTION INDUSTRIES OVER COUNTRIES

Countries/SIC-Industries	Agriculture, Forestry & Fishing	Construction	Finance, Insurance & Real Estate	Manufacturing	Mining	Nonclassifiable Establishments	Retail Trade	Services	Transportation & Public Utilities	Wholesale Trade	Freq.	Percent
Austria (W)		8	2	3	3	3		9	20	3	51	3,61%
Belgium (W)		1	4	12		1	3	2		2	25	1,77%
Croatia (E)									2		2	0,14%
Czech Republic (E)					1						1	0,07%
Denmark (W)				1		4		2	3	3	13	0,92%
Estonia (E)									2		2	0,14%
Finland (E)	9	2	7	30		11	6	8	18		91	6,44%
France (W)		8	15	21	1	21	2	10	28	12	118	8,36%
Germany (W)		6	2	35		15		21	65	7	151	10,69%
Greece (E)	3	7		9		7		13	11	5	55	3,90%
Hungary (E)								4	7		11	0,78%
Ireland (W)		4		2		1		2			9	0,64%
Italy (W)		14		15		19		37	77	4	166	11,76%
Latvia (E)									4		4	0,28%
Luxembourg (W)				5							5	0,35%
Netherlands (W)	1	12	2	13		9	3	32	19	15	106	7,51%
Norway (W)	5			4		6		6	5	6	32	2,27%
Poland (E)		4		2				3	10	3	22	1,56%
Portugal (W)	5		5	1		4		5	15		35	2,48%
Slovenia (E)									2		2	0,14%
Spain (W)	1	17		7		19	5	70	57		176	12,46%
Sweden (W)	11	3	12	19	7	11	7	20	15	6	11	7,86%
Switzerland (W)		1		27	5	2		17	7	10	69	4,89%
United Kingdom of Great Britain and Northern Ireland (W)	2	14	14	19	27	10	10	23	28	8	155	10,98%
Total	**37**	**101**	**63**	**225**	**44**	**143**	**36**	**284**	**395**	**84**	**1412**	**100,00%**

3.2.2 Independent Variables

Following, this study will introduce the FAQ and SAQ as independent variables. The study assumes both variables to consist of different levels of quality; superior and inferior. A firm is assumed to have a superior level of FAQ if the audit quality is greater than the median and inferior in the opposite case (Dewi & Monalisa, 2016). FAQ is measured by discretionary accruals using the Modified-Jones model to operationalise the measure (Dechow et al., 1995).

Additionally, to capture the quality of sustainability assurance, the study used a composition of the following three measures: scope, provider, and level (Braam & Peeters, 2018). In accordance with Ballou, et al. (2018), this study assumes these three proxies correspond to superior SAQ information. The three items are combined into an index that measures SAQ (García-Sánchez, et al., 2019; O'Dwyer & Owen, 2005). The first indicator (scope) indicates whether an organisation has assured a specified section or the entire sustainability report. Further, the assurance provider indicates whether a big4 accounting firm performs the assurance or that the organisation has chosen another accounting firm or engineering firm. Thirdly, the level of assurance measures to what extent the organisation has assured the reported information to a limited/moderate or reasonable/high level. The three items (assurance scope, provider, and level) are indicated by three corresponding dummy variables, which, respectively, equal 1 if the report is entirely assured, assured by a big4 audit firm, and assured at a reasonable level. Subsequently, the sum of the dummy variables is taken to capture the SAQ (Suits, 1984). Following, SAQ is a dummy variable that is equal to one if the sum of the captured items exceeds the median, and 0 otherwise (Firth, 1997). Finally, for the regression analyses, this study will introduce a 2x2 matrix consisting of different combinations of the specified levels of FAQ and SAQ to conceptualise the division of sample firms into categories (See Graph 1).

GRAPH 1:   2X2 MATRIX INCLUDING DIFFERENT COMBINATIONS OF LEVELS OF FAQ AND SAQ

		External assurance quality of financial information	
		Superior	**Inferior**
External assurance quality of sustainability information	**Superior**	Sustainability and financial report with superior assurance quality.	Financial report with inferior assurance quality, and sustainability report with superior assurance quality.
	Inferior	Sustainability report with inferior assurance quality, and financial report with superior assurance quality.	Sustainability and financial report with inferior assurance quality.

3.2.3   Control Variables

In addition to the dependent and independent variables, this study includes several control variables since it has repeated firm-level measurements in the regression analyses. For this `reason, the analysis includes control variables on firm and industry levels, besides the dummies to control for time effects.

First, following the extant literature (Braam et al., 2016; Gürtürk & Hahn, 2016; Manning et al., 2019; Oware & Mallikarjunappa, 2019; Sattar et al., 2020), the analysis includes several firm-specific control variables. The firm-specific control variables consist of the following. Firm size is included as differently sized organisations may behave economically and socially differently. The natural logarithm of total assets measures the variable. Besides, a ratio of current total debt to capital at year-end is included (Leverage), as organisation with differences in leverage ratios have different priorities in financial and sustainability practices.

Further, the number of sales in a year to the previous period multiplied by 100 per cent (SalesGrowth) and return on assets (ROA) are included to control for differences in profitability which influences economic and sustainability decision-making. Boards size is measured by the number of directors on board as organisations with large board size are better able to check and control financial and sustainability decision-making by the management.

Secondly, the industry-specific control variable is represented by an industry dummy based on the two-digit standard industrial classification (SIC) codes. Finally, this study also included a vector of year dummies to control time variations over the constant variables among the firms. Table 2 summarizes the definitions of the dependent, independent and control variables.

3.3 Regression Model

To test the hypotheses, this study formulates the following panel data regression model where the variation in firm value is explained by the quality of financial and sustainability assurance, while the model also includes control variables related to industry variations.

$$FV_{it} = \quad \beta_0 + \beta_1 FAQ_{it} + \beta_2 SAQ_{it} + \beta_3 Firm\ Size_{it} + \beta_4 Sales\ Growth_{it} +$$
$$\beta_5 Leverage_{it} + \beta_6 ROA_{it} + \beta_7 Board\ Size_{it} + \beta_8 Industry_{Control,it} +$$
$$\beta_9 Year_{Control,it} + \varepsilon_{it} \qquad\qquad (1)$$

and where interrelatedness of FAQ and SAQ affects firm value as follows:

$$FV_{it} = \quad \beta_0 + \beta_1 FAQS/SAQS_{it}, \beta_1 FAQSSAQI_{it}, \beta_1 FAQI/SAQS_{it}, \beta_1 FAQI/SAQI_{it} +$$
$$\beta_2 Firm\ Size_{it} + \beta_3 Sales\ Growth_{it} + \beta_4 Leverage_{it} + \beta_5 ROA_{it} +$$
$$\beta_6 Board\ Size_{it} + \beta_7 Industry_{Control,it} + \beta_8 Year_{Control,it} + \varepsilon_{it} \qquad (2)$$

TABLE 2:   LIST OF VARIABLES, DESCRIPTIONS, AND SOURCES

Main Variables	Description	Source
Firm Value	Firm value represents the valuation corresponding to an organisation. The variable is measured by the natural logarithm of market value and Tobin's Q.	Thomson Reuters
FAQ	Financial Assurance Quality (FAQ) focuses on the quality of assured financial information. FAQ is measured by the natural logarithm of discretionary accruals using the Modified-Jones model to operationalize the measure. This model defines discretionary accruals as the differences between total accruals and normal accruals. The FAQ is related to H2a subdivided in FAQS and FAQI representing superior FAQ and inferior FAQ, respectively.	Thomson Reuters
SAQ	Sustainability Assurance Quality (SAQ) focuses on the quality of assured sustainability information. The variable will be measured by a composition of the following three items: scope, provider, and level. The SAQ is related to H2b subdivided in SAQS and SAQI representing superior SAQ and inferior SAQ, respectively.	GRI Reports List

Interaction terms FAQS/SAQS, FAQS/SAQI, FAQI/SAQS, FAQI/SAQI	The interaction terms (FAQS/SAQS, FAQS/SAQI, FAQI/SAQS, and FAQI/SAQI) correspond to the different combinations of assurance levels on sustainability and financial information from the 2x2 matrix (See Graph 1). FAQS/SAQS represents the interaction between superior assurance quality on financial information, and inferior assurance quality on sustainability information. FAQS/SAQI represents the interaction term between FAQS and SAQI. Further, FAQI/SAQS and FAQI/SAQI correspond to the interaction term of FAQI and SAQS, and FAQI and SAQI, respectively.	
Assurance Scope	The scope of the assurance provided by a third party measures the scope of the assurance. The dummy variable equals 1 if the scope of the assurance covers the entire sustainability report, and 0 otherwise.	GRI Reports List
Assurance Provider	In order to indicate whether non-financial information is assured by a big4 firm, a dummy variable is used that equals 1 if the assurance is provided by a big4 firm, and 0 otherwise.	GRI Reports List
Assurance Level	The level of assurance indicates whether assurance on sustainability reports is reasonable or limited. The dummy variable is equal to 1 for reasonable assurance and equals 0 otherwise.	GRI Reports List
FirmSize	Firm size is calculated by the natural logarithm of the firm's year-end total assets.	Thomson Reuters
SalesGrowth	Sales Growth is measured by the number sales in a year to the previous period, multiplied by 100 per cent.	Thomson Reuters
Leverage	Leverage is calculated as the ratio of current total debt to total capital at year-end.	Thomson Reuters
ROA	Return on asset (ROA) is measured by the firm's net income divided by its year-end total assets.	Thomson Reuters
BoardSize	Board size measures the number of directors on board.	BoardEx
Industry	Industry represents a dummy variable based on the two-digit standard industrial classification (SIC) codes.	Thomson Reuters
Year	A vector of year dummies.	

4   Results

4.1   Descriptive statistics

The descriptive statistics for the variables employed in the regression analyses are presented in Table 3. The data is winsorized at a 95% level to normalize the variables and deal with potential outliers (Liao, Li, & Brooks, 2016). Before conducting these analyses, the dataset was tested for statistical problems that could bias the results. First, the assumptions underlying the models were tested for multicollinearity using Pearson's correlation coefficient and variance inflation factors (VIF). Table 4 shows the multicollinearity between the dependent, independent, and control variables based on Pearson's correlation coefficient. The table shows that Firm Size and Leverage are highly correlated, following the statistical significance at a 5% level. The correlation might be explained by the fact that more prominent companies have better access to finance and, thus, lower the cost of capital. Besides, the Pearson's correlation coefficients show that the variable ROA and Leverage have a high negative correlation which can be explained by the inverse relationship between both variables. In the regression analysis, the study uses the variables Firm Size and ROA to control for the high correlation.

The results in Table 5, presenting the VIF, indicate weak multicollinearity (Hair, Ringle, & Sarstedt, 2011). Moreover, data has been tested for autocorrelation and heteroscedasticity using the Wooldridge and Breusch-Pagan test (See Appendix (Table 10 and 11)). The results indicate the presence of heteroscedasticity and absence of autocorrelation in the benchmark model (See Model 1 in Table 7). The robust standard errors were used for estimating coefficients to control the heteroscedasticity. Further, the regression results will be subject to robustness checks (See Section 5). Finally, based on the Hausman test (See Appendix Table 12), the random effects model will be used for the regression analyses. This indicates that the time-invariant industry indicators will not be omitted in the model.

TABLE 3:　　　SUMMARY STATISTICS DEPENDENT, INDEPENDENT, AND CONTROL VARIABLES

Variable	Obs	Mean	Std. Dev.	Min	Max
MarketValue	1181	15.345	1.87	9.172	19.233
Tobin's Q	1412	.848	1.519	0	28.426
FAQ	1213	12.009	2.438	2.996	17.776
SAQ	1412	.394	.489	0	1
FirmSize	1249	15.927	2.271	9.361	21.444
SalesGrowth	1412	.109	2.23	-1	82.177
Leverage	1406	.377	.354	0	8.732
ROA	1412	.028	.102	-2.245	1.688
BoardSize	1023	12.309	5.149	1	32
Industry	1412	15.293	7.696	1	33

Note. FAQ: Financial Assurance Quality; SAQ: Sustainability Assurance Quality; ROA: Return on Assets. See variable descriptions in Table 2.

TABLE 4:　　　PEARSON CORRELATIONS

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) MarketValue	1.000									
(2) Tobin's Q	0.121***	1.000								
(3) SAQ	0.018**	0.014**	1.000							
(4) FAQ	0.532***	-0.265***	-0.014	1.000						
(5) LnFirmSize	0.561***	-0.227***	0.031	0.098	1.000					
(6) Leverage	0.128***	-0.076***	-0.018	0.105	0.253*	1.000				
(7) SalesGrowth	-0.018	0.499***	0.032	-0.036	-0.033	0.035	1.000			
(8) ROA	0.135***	0.217***	0.056**	-0.024	0.002	-0.068**	0.026	1.000		
(9) Dividend	0.074***	-0.014	0.000	0.090	0.022	0.050	-0.024	0.041	1.000	
(10) BoardSize	0.305***	-0.196***	0.006	0.066	0.075	0.084	-0.037	-0.053	-0.009	1.000

Note. FAQ: Financial Assurance Quality; SAQ: Sustainability Assurance Quality; ROA: Return on Assets. See variable descriptions in Table 2. *** Statistical significance at 1% level; ** Statistical significance at 5% level; * Statistical significance at 10% level;

TABLE 5:   VARIANCE INFLATION FACTORS (VIF)

Variable	VIF	1/VIF
LnFirmSize	4.45	0.224646
LnFAQ	3.73	0.267748
BoardSize	1.49	0.6689282
Leverage	1.40	7.12685
ROA	1.22	0.820363
Dividend	1.05	0.950457
SalesGrowth	1.05	0.950529
SAQ	1.02	0.983914
Year	1.01	0.994612
Mean VIF	**1.83**	

4.2 Test of hypotheses

Following hypotheses 1a and 1b, the study expects direct effects of FAQ and SAQ on the firm valuation. Table 6 shows the results related to this analysis. Models 1 present the effect of FAQ on the proxy of firm valuation: Market Value. The model shows that FAQ has a significantly positive effect on firm valuation after controlling for variables related to the firm performance and organisational structure. The results, as shown in Table 6, provide support for H1a, indicating that the credibility and relevance of financial information positively affect the investors' perception of the valuation of organisations. Besides, Model 2 shows the results related to the effect of FAQ on Market Value. As indicated in hypothesis 1b, the study predicts that improved SAQ positively relates to the proxy for firm valuation. Model 2 indicates a positive relationship between SAQ and Market Value. The results related to sustainability assurance support H1b, indicating that an increased quality of assurance on sustainability reports improves the credibility and accuracy for investment-related judgments, thus, increasing the firm valuation.

With regards to hypotheses 2a and 2b, the results are presented in Table 7. Hypothesis 2a suggest that the superior FAQ positively affects the investors' interpretation of an inferior SAQ, resulting in an increased firm valuation. Besides, hypothesis 2b predicts a positive effect of superior SAQ on the interpretation of FAQ, expecting to increase the firm valuation. Model 1 shows the results related to the benchmark model, indicating that a simultaneous interpretation of superior FAQ and SAQ positively affects the firm valuation of investors and other stakeholders. Model 2 shows a statistically significant relationship between the interpretation of superior FAQ and inferior SAQ on firm value. The results are approximately similar to the coefficient and significance level in the benchmark model, indicating that the impression on FAQ positively affects the investors' opinion on SAQ and firm valuation. Model 3 shows, contradictory to Model 2, a statically insignificant relation between FAQI/SAQS and firm valuation. Although the coefficient shows a positive effect, the relation is not significant. Finally, Model 4 indicates that the interpretation of inferior SAQ and FAQ is negatively related to firm valuation, but insignificantly.

TABLE 6:   REGRESSION ANALYSES RESULTS (HYPOTHESES 1A/1B)

Variables	(1) Model 1 **MarketValue**	(2) Model 2 **MarketValue**
FAQ	0.0224** (0.0101)	
SAQ		0.0128* (0.0251)
FirmSize	0.682*** (0.0323)	0.639*** (0.0226)
SalesGrowth	-0.0142*** (0.00364)	-0.0143*** (0.00378)
ROA	1.672*** (0.167)	1.169*** (0.109)
Dividend	-0.00605*** (0.00197)	-0.00520*** (0.00186)
Board Size	-0.0112 (0.0107)	-0.00401 (0.00666)
Constant	4.570*** (0.922)	5.338*** (0.846)
Observations	1,412	1,412
R-squared	0.488	0.418
Number of Groups	319	319
Control Industry	Yes	Yes
Control Year	Yes	Yes

Note. FAQ: Financial Assurance Quality; SAQ: Sustainability Assurance Quality; ROA: Return on Assets. See variable descriptions in Table 2.

*** Statistical significance at 1% level;

** Statistical significance at 5% level;

* Statistical significance at 10% level.

TABLE 7:   REGRESSION ANALYSES RESULTS (HYPOTHESIS 2)

Variables	(1) Model 1 MarketValue	(2) Model 2 MarketValue	(3) Model 3 MarketValue	(4) Model 4 MarketValue
	Benchmark Model			
FAQS/SAQS	0.0400** (0.0273)			
FAQS/SAQI		0.0480* (0.0270)		
FAQI/SAQS			0.0301 (0.0718)	
FAQI/SAQI				-0.0443 (0.0590)
FirmSize	0.641*** (0.0226)	0.641*** (0.0226)	0.639*** (0.0226)	0.638*** (0.0226)
SalesGrowth	-0.0142*** (0.00378)	-0.0141*** (0.00377)	-0.0143*** (0.00378)	-0.0143*** (0.00378)
ROA	1.145*** (0.110)	1.139*** (0.110)	1.172*** (0.109)	1.171*** (0.109)
Dividend	-0.00533*** (0.00185)	-0.00531*** (0.00185)	-0.00525*** (0.00185)	-0.00523*** (0.00185)
Board Size	-0.00383 (0.00665)	-0.00355 (0.00665)	-0.00398 (0.00666)	-0.00387 (0.00666)
Constant	5.306*** (0.846)	5.358*** (0.846)	5.353*** (0.847)	5.363*** (0.847)
Observations	1,010	1,010	1,010	1,010
R-squared	0.397	0.396	0.395	0.396
Number of Groups	301	301	301	301
Control Industry	Yes	Yes	Yes	Yes
Control Year	Yes	Yes	Yes	Yes

Note. FAQS: Superior Financial Assurance Quality; FAQI: Inferior Financial Assurance Quality; SAQS: Superior Sustainability Assurance Quality; SAQI: Inferior Sustainability Assurance Quality; ROA: Return on Assets. See variable descriptions in Table 2.

*** Statistical significance at 1% level;

** Statistical significance at 5% level;

* Statistical significance at 10% level.

5   Robustness Checks

In the theoretical framework (Section 2), the study discussed that sustainability reporting and assurance are voluntary. For this reason, the number of published sustainability reports and assurance on the disclosed information fluctuates. Graph 2 shows the number of published sustainability reports and assured reports over time. From 2013 onwards, the graphs show an increase in published and assured sustainability reports due to the proposed regulations of the European Commission (2014b). Graph 3 shows the distribution of the assured reports over the Western and Eastern European countries. The visual representation shows that most assured sustainability reports are published in Western European countries. However, in the last years, the number of assured reports has increased in Eastern Europe. In order to, for example, examine the effect of the interpretation of superior and inferior assured reports on the firm valuation for different samples, robustness checks were conducted. Besides the differentiation in sample size, this study also conducted several other robustness checks related to specification changes and an alternative dependent variable. The results of these robust checks are presented in Tables 8 and 9 and the Appendix. The checks have been conducted with the same control variables and sample size as the benchmark models (See Tables 6 and 7).

GRAPH 2:   DISTRIBUTION SUSTAINABILITY REPORTING AND ASSURANCE
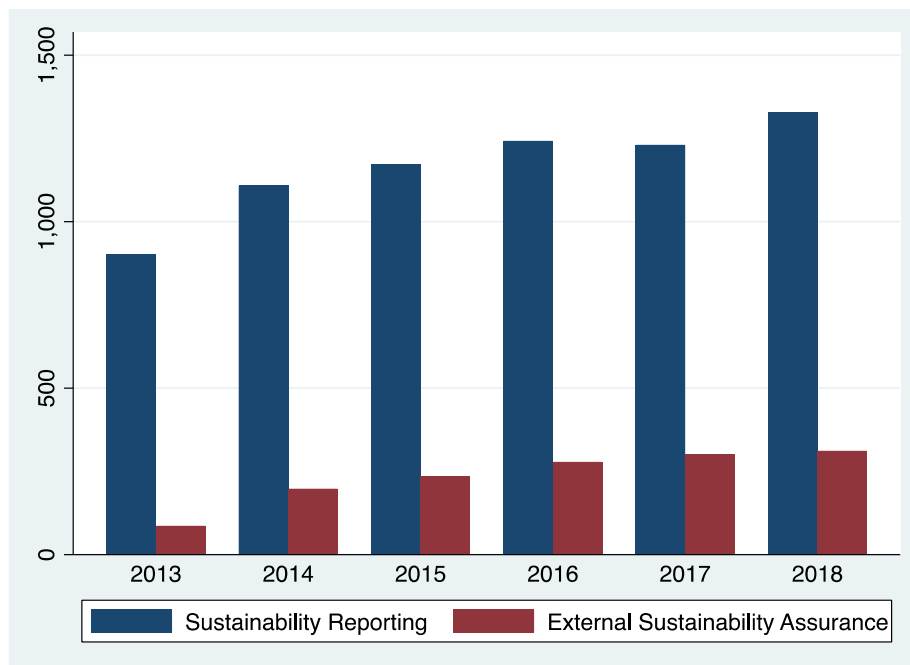
GRAPH 3:   DISTRIBUTION SUSTAINABILITY ASSURANCE OVER WESTERN AND EASTERN EUROPEAN COUNTRIES
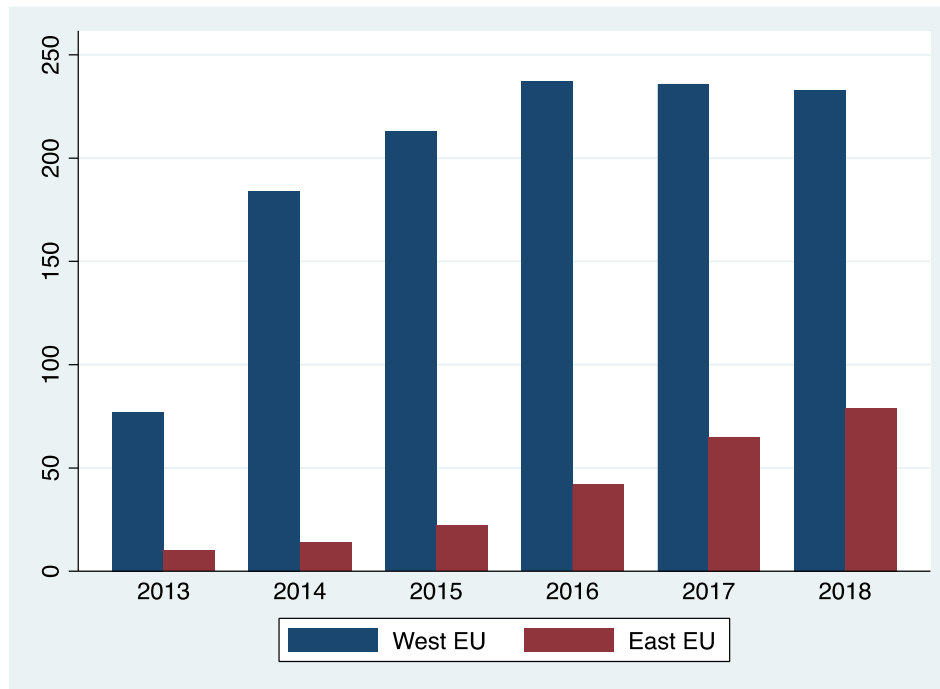
The first check is related to Hypotheses 1a and 1b. The results shown in Table 8 relate to an alternative dependent proxy for firm valuation: Tobin's Q. The results indicate the same significant relation between FAQ and firm valuation as the benchmark model. Although the positive coefficients, the results provide no significant support for the effect of SAQ on firm valuation. Therefore, the results indicate that the results in Model 2 of Table 6 are not robust.

Further, the other sets of robustness checks are related to Hypotheses 2a and 2b. The first set of test results differentiates between samples. Following the differences in voluntary reporting and assurance of disclosed sustainability information, this study conducted two additional analyses in which the Eastern and Western European countries are separately excluded. The results concerning the sample change in Table 9 show further support for the positive relationship between the simultaneous interpretation of FAQS/SAQI and firm valuation. Further, the coefficient of FAQI/SAQS is positive and statistically significant. As opposed to the results in Model 7, the findings of the robustness checks indicate a positive relationship between the FAQI/SAQS and firm valuation. The results related to the Eastern European countries are insignificant for the relation between SAQS/FAQI. Investors in Eastern European countries are considered less familiar

with sustainability reports as fewer organisations publish these reports (Horváth et al., 2017). Therefore, considering Graph 3 and these aspects, the results indicate that investors from Eastern European countries make less use of sustainability reports, especially due to the fewer publications of the published sustainability reports, and focus more on the financial performance for investment-related judgments. The consideration also explains the positive and statistically significant relation between FAQS/SAQI and firm valuation. Overall, the effect of publishing a superior FAQ and inferior SAQ report on firm valuation seems robust to the Western and Eastern European sample.

To further approach the causality in the models, this study also incorporates lagged effects for the dependent and, besides, the independent variables. Table 9 shows the results related to regression model 2 (see section 3.3) with lag effects. The results indicate the same significant and positive effect on firm valuation compared to the results in Table 7, providing additional and robust support for H2a. Moreover, the results show even a more substantial positive coefficient for the simultaneous interpretation of superior FAQ and inferior SAQ. Thus, the results in both the lag effect model and structural equation model provide support for H2a. Related to H2b, both the non-lagged and lagged model provide no support to this hypothesis. Moreover, the effect does not hold in the specification change with 2-year lagged dependent variables for the combination of superior SAQ and inferior FAQ.

TABLE 8:　　　Robustness Checks Hypotheses 1a/1b

Dependent variable: Firm Valuation (measured by Market Value)		
Benchmark Models	Level Effect FAQ	Level Effect SAQ
Observations: 1,412	0.0224**	0.0128**
	(0.0101)	(0.0251)
Alternative Dependent Variable		
1.　Tobin's Q	0.00944**	0.0103
	(0.0184)	(0.0781)

Note. The same independent and control variables as in the Benchmark model (see Table 6) are included in the robustness checks. The complete regression output is included in the Appendix (Table 13).

TABLE 9:   ROBUSTNESS CHECKS HYPOTHESES 2A/2B

Dependent variable: Firm Valuation (measured by Market Value)				
Benchmark Model	Level Effect FAQS/SAQS	Level Effect FAQS/SAQI	Level Effect FAQI/SAQS	Level Effect FAQI/SAQI
Observations: 1,012	0.0400**	0.0480**	0.0301	-0.0443
	(0.0273)	(0.0270)	(0.0718)	(0.0590)
Sample Changes				
1. West EU	0.108**	0.198***	0.0874*	-0.00927
	(0.0535)	(0.160)	(0.160)	(0.112)
2. East EU	0.370***	0.296**	0.171	-0.270
	(0.143)	(0.141)	(0.293)	(0.645)
Specification Changes				
3. Add 1-year lag dependent variables	0.0330**	0.0592**	0.110	-0.0422
	(0.0287)	(0.0283)	(0.0705)	(0.0626)
4. Add 2-year lag dependent variables	0.071*	0.0217	-0.0368	-0.0887
	(0.0277)	(0.0274)	(0.0684)	(0.0632)
Alternative Dependent Variable				
5. Tobin's Q	0.0212**	0.0272*	-0.0266	-0.0110
	(0.0821)	(0.223)	(0.0811)	(0.175)
6. Tobin's Q (Add lagged dependent variable)	0.0309**	0.258*	-0.0468	-0.0947
	(0.0905)	(0.238)	(0.0896)	(0.194)

Note. The same independent and control variables as in the Benchmark model (see Table 7) are included in the robustness checks. Industry and year fixed effects are also included. Only the statistics of the variable of relevance are included in this model. *** Statistical significance at 1% level; ** Statistical significance at 5% level; * Statistical significance at 10% level.

The complete regression outputs are included in the Appendix (Tables 14 till 19).

Finally, this study also included analyses with an alternative dependent proxy for firm valuation: Tobin's Q. The robustness check test results related to an alternative proxy for firm valuation indicate, in accordance with the hypotheses, a significantly positive effect of the combination of superior FAQ and inferior SAQ on the firm valuation in the lagged and non-lagged models. For the effect of FAQI/SAQS on firm valuation, the models correspond to the benchmark model, indicating an insignificant relation.

6   Discussion

6.1   Interpretations

Based on the results presented in Table 6, this study provides support for the existing literature related to the positive relationship between the assurance quality of financial and sustainability information and firm valuation (Dando & Swift, 2003; Geiger, 1994; Lai, 2011; Mazzotta et al., 2022; Mercer, 2004; Michelon, 2021; Reverte, 2021). Concretely, the results show that the interpretation of SAQ and FAQ positively influences the credibility, accuracy, and transparency of disclosed information in sustainability and financial reports, resulting in a higher firm valuation. Further, it indicates that investors and other stakeholders incorporate the assurance quality of sustainability and financial information in their decision-making process. Besides, the findings indicate that, in the absence of mandatory regulation concerning the reporting and auditing of sustainability information, it would be beneficial for organisations to assure these reports.

In addition, the results in model 2 of Table 7 provide support for the expected halo effect related to the interpretation of superior FAQ and inferior SAQ on firm valuation. The results indicate that investors and other stakeholders form an overall impression of organisations based on the superior assured financial report while understating the inferior assured sustainability report. The perception based on the financial report overcompensates the stakeholders' opinion over the inferior assured sustainability report. Based on the initial results, this study states that inferior quality assurance on a report would otherwise negatively influence the firm valuation. Further, the results in model 2 provide support for the halo effect in decision-making, which suggests that stakeholders who incorporate the most recent and available information in decision-making primarily rely their opinion on the financial report with superior assurance quality. Moreover, the results indicate that the organisations are concerned with superior assurance quality on financial reports. Although publication of reports with superior assurance quality is beneficial for the firm valuation, it also may generate an unbalanced perspective on the actual valuation of organisations. In particular, the management of well-performing firms in the financial area may generate greater confidence among stakeholders in the performance of the organisations, thus

making unreasonable trying to improve the corporate reputation and performance (Boiral, 2013; Cho et al., 2012; Hummel & Schlick, 2016). In this case, the management of organisations deflects attention from the poor SAQ report by highlighting the superior FAQ report, which raises concerns about the reporting fairness (Boiral, 2013; Cho et al., 2012; Hummel & Schlick, 2016).

On the other hand, the results in Model 3 of Table 7 indicate that the relationship does not hold the opposing way. The findings suggest that, although SAQ positively influences firm valuation, investors and other stakeholders primarily rely for the valuation of organisations on the quality of assurance of financial performance. Model 3 shows an insignificant positive effect, indicating that superior SAQ positively influences the company's reputation and credibility of disclosure but that it has no substantial effect on firm valuation.

In addition to the initial results, this study also conducted several additional robustness checks (See Table 9). First, the robustness check test results in models 1 and 2 are related to the change of the sample. The results suggest robust initial results for the relation between FAQS/SAQI and firm valuation in Western and Eastern European countries. However, in contrast to Model 3 of Table 7, the results related to the Western European countries show, opposed to the Eastern European countries, a significant relationship between the interpretation of superior SAQ and inferior FAQ and the firm valuation. The difference in significance of the results relies primarily on the number of published sustainability reports in both areas, as shown in Graph 3. Stakeholders of Eastern European organisations have less access to (assured) sustainability information, which indirectly suggests that these investors use less of this information in decision-making (Horváth et al., 2017).

Moreover, the test results in Model 3 of Table 9 represent the lag analyses, suggesting that the halo effect related to the simultaneous interpretation of superior FAQ and inferior SAQ is positively related in the longer term. It indicates that investors and other stakeholders incorporate the financial assurance quality of prior years in their decisions related to firm valuation. Besides, these results show that organisations and managements need to consider the FAQ in the long term to improve the firm value. Concretely, the positive association between the

halo effect in the lagged regression model and firm valuation indicates that improved assurance quality, and thus increased costs related to more reasonable and extended assurance, may benefit organisations not only in the short term. Therefore, it may improve the long-term vision in management decision-making.

Consistent with the results in the non-lagged model, the findings in model 3 of Table 9 do not support the halo effect in the case of superior SAQ and inferior FAQ. The results suggest that investors, over time, reduce the usage of assurance quality on sustainability performance to form a well-considered judgement about the organisation.

Furthermore, the results in both the lagged and non-lagged models and panels show that although inferior assurance quality on both financial and sustainability reports is associated with firm valuation from a stakeholder perspective, the effect is insignificant. These results indicate that the inferior assurance quality on both sustainability and financial reports statistically insignificantly affects the stakeholders' choices concerning investment and decision-related judgments. However, in the context of assurance quality, stakeholders are more focused on superior assurance quality of reports than inferior assurance quality. Consistent with prior literature (Cheng et al., 2015), this can be explained by the suggestion that the value of assurance depends on stakeholders' perception of the assured information. Concretely, the perceived importance of complementary assured information in a separate sustainability or financial report or the level of assurance may be interpreted differently through the difference in strategic relevance of assured information (Coram, Monroe, & Woodliff, 2009).

Conclusively, the robustness results suggest that the findings based on the initial equation, in general, is robust for the combination of superior FAQ and inferior SAQ. Further, the robustness results regarding the relationship between the combination of inferior FAQ and superior SAQ show, in accordance with the initial model, that there is no statistically significant relationship between both variables, indicating that the relationship does not hold overall.

6.2   Limitations

The findings presented in section 4 must be considered in light of limitations. First, assurance on sustainability information is voluntary in Europe, which may indicate a potential selection bias. Furthermore, this study assumes that stakeholders determine whether the assurance quality is incorporated in decision-making. However, organisations may also draw attention to stakeholders about the quality of assurance on sustainability and financial information. For this reason, future research might control the organisational intentions by incorporating media coverage or attention, which may indicate whether the reports are drawn more on the attention of stakeholders. In addition, the Breusch-Pagan/Cook-Weisberg test indicates problems related to the heteroscedasticity of the benchmark model. Although robust standard errors were used in the analyses, the results could be less efficient because of heteroscedasticity.

Finally, this study is based on a European sample from 2013-2018 due to the data available in the GRI Reports Database. Although the GRI's Sustainability Disclosure Database positively affects the comparability of sustainability data, the sample over these years is limited. Therefore, the concern is the generalizability of the results over a longer period.

Based on the limitation, future research could further address the effect of media attention on the suggested effect of investors' cognitive bias on firm valuation.

7   Conclusion

In the last decades, the credibility and accuracy of reported financial and sustainability information have increased, primarily for social and environmental disclosed information, due to the absence of extensive mandatory third-party assurance. Although increasingly more firms assure their reports, the credibility and accuracy are difficult to evaluate as a consequence of national and international differences in acceptable standards and different assurance regimes towards financial and sustainability assurance (Dando & Swift, 2003; Perego, 2009; Venturelli & Pizzi, 2020; Wallage, 2000). For this reason, investors and other stakeholders increasingly incorporate the assurance quality in published reports. (Hoang & Phang, 2021; Martínez-Ferrero, et al., 2018; Zorio et al., 2013). Prior studies show that FAQ and SAQ increase firm valuation but did not elaborate on the interpretation of both the quality of financial and sustainability assurance on firm valuation simultaneously. For this reason, this study explored the influence of the interpretation of the quality of financial and sustainability information on the firm valuation for a sample of European listed companies that, during the years 2013-2018, decided to assure the published sustainability and financial reports. In this study, several robustness checks are conducted besides the initial models. The initial results show that superior assurance quality on both sustainability and financial published information strengthens the investors' perception of organisations, resulting in an increased firm valuation in the short term. In addition, the results show that superior assurance quality on the published financial report, complementary to an inferior assured sustainability report, increases firm valuation, indicating that the investors' perception of the superior assured report positively impacts the perceived credibility and accuracy of the sustainability report. The latter result provides support for the halo effect among stakeholders, which directly suggests that managements of organisations with superior assurance on financial reports can consider whether extensive assurance on the other report would be more beneficial than it would cost the organisation. The results in the lagged models do provide support for the relationship in the longer term related to superior FAQ and inferior SAQ. The results with 1-year lagged show that the relation is stronger in the case of superior FAQ and inferior SAQ and does not hold the other way around. Besides, the models with 2-year lags for the independent variables do not support the hypotheses. Although the results of the lag analyses partially show

the halo effect among stakeholders, they indicate that superior assurance on the financial report improves the stakeholders' perceived credibility and accuracy of the organisation and sustainability report. Additionally, the findings suggest that the credibility and accuracy of organisational reports benefit firm valuation, which may indirectly encourage management to reduce practices that legitimize inferior performance.

From an organisational perception, the desire for superior assurance increases the difficulties for management to manage the financial performance through, for example, earnings management.

The findings of this study have several implications for corporate practices, management and investors' decision-making and accountability, and future research related to financial and sustainability assurance. First, the findings show that extensive and costly assurance, which indicates a superior assurance quality, increases the firm valuation. This perspective indicates that management and organisations have incentives for superior assurance. However, the findings also suggest that assurance of superior quality on financial reports is sufficient to increase firm valuation, which might incentivize management to manage the disclosed information. Therefore, the findings imply that organisations could decide to mask poor performance in the absence of mandatory regulations. The findings should signal policymakers to formulate regulations to mandate organisations to report all the information fairly and transparent. Second, the capital providers and management should consider the benefits of high-quality assurance on both sustainability and financial reports for, on the one hand, the incentives to perform well and, besides, the increased valuation of the firm. Finally, the findings support the hypothesized relationship related to superior FAQ and inferior SAQ. However, it also calls for an in-depth analysis to further research the profitability of assurance in the longer term by using the cost-benefit analysis more consistent in the models.

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Appendix

TABLE 10:   BREUSCH-PAGAN/COOK-WEISBERG TEST FOR HETEROSKEDASTICITY

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
  Ho: Constant variance
  Variables: fitted values of MarketValue
  chi2(1)   =   44.34
  Prob > chi2 = 0.0000

TABLE 11:   WOOLDRIDGE TEST FOR AUTOCORRELATION

Wooldridge Test for Autocorrelation						
Benchmark Model	Coef.	Robust St. Err.	t	P>t	[95%Conf.	Interval]
D. MarketValue						
HIGHHIGH						
D1.	0.001	0.032	0.040	0.971	-0.061	0.064
FirmSize						
D1.	0.269	0.109	2.480	0.014	0.055	0.483
SalesGrowth						
D1.	-0.002	0.002	-1.060	0.291	-0.007	0.002
ROA						
D1.	0.853	0.103	8.300	0.000	0.650	1.055
Dividend						
D1.	-0.004	0.002	-2.720	0.007	-0.007	-0.001
BoardSize						
D1.	-0.014	0.014	-1.060	0.290	-0.041	0.012

Note. Wooldridge test for autocorrelation in panel data. H0: no first-order autocorrelation
$F(1, 163) = 1.297$. Prob > F =   0.2564

TABLE 12:   HAUSMAN TEST

Hausman (1978) specification test	
	Coef.
Chi-square test value	5.094
P-value	.253

TABLE 13:   REGRESSION ANALYSES RESULTS (HYPOTHESES 1A/1B)

Variables	(1) Model 2 **Tobin's Q**	(2) Model 4 **Tobin's Q**
FAQ	0.00944* (0.0184)	
SAQ		0.0103 (0.0781)
FirmSize	-0.0984** (0.0408)	-0.0597* (0.0327)
SalesGrowth	0.140** (0.0575)	0.292*** (0.0131)
ROA	1.252*** (0.241)	0.701** (0.341)
Dividend	-0.0321** (0.0138)	-0.00123 (0.00572)
Board Size	-0.0236* (0.0121)	-0.0356*** (0.0121)
Constant	2.672** (1.080)	1.782* (0.970)
Observations	1,412	1,412
R-squared	0.331	0.445
Number of Groups	319	319
Control Industry	Yes	Yes
Control Year	Yes	Yes

Note. FAQ: Financial Assurance Quality; SAQ: Sustainability Assurance Quality; ROA: Return on Assets. See variable descriptions in Table 2.

*** Statistical significance at 1% level;

** Statistical significance at 5% level;

* Statistical significance at 10% level.

TABLE 14:　　REGRESSION ANALYSES RESULTS WITH LAG EFFECTS

Variables	(1) Model 1 MarketValue	(2) Model 2 MarketValue	(3) Model 3 MarketValue	(4) Model 4 MarketValue
FAQS/SAQS_{t-1}	0.0330**			
	(0.0287)			
FAQS/SAQL_{t-1}		0.0592**		
		(0.0283)		
FAQI/SAQS_{t-1}			0.110	
			(0.0705)	
FAQI/SAQI_{t-1}				-0.0422
				(0.0626)
FirmSize_{t-1}	0.00950	0.00969	0.00991	0.00982
	(0.00925)	(0.00920)	(0.00921)	(0.00925)
SalesGrowth_{t-1}	-0.0135***	-0.0133***	-0.0137***	-0.0137***
	(0.00424)	(0.00422)	(0.00421)	(0.00423)
ROA_{t-1}	0.293**	0.284**	0.315**	0.311**
	(0.125)	(0.124)	(0.124)	(0.124)
Dividend_{t-1}	0.00353	0.00341	0.00380*	0.00372
	(0.00228)	(0.00226)	(0.00226)	(0.00227)
Board Size_{t-1}	0.0506***	0.0501***	0.0493***	0.0500***
	(0.00817)	(0.00814)	(0.00815)	(0.00817)
Constant	15.18***	15.22***	15.19***	15.19***
	(1.355)	(1.363)	(1.366)	(1.360)
Observations	984	984	984	984
R-squared	0.298	0.292	0.289	0.285
Number of Groups	301	301	301	301
Control Industry	Yes	Yes	Yes	Yes
Control Year	Yes	Yes	Yes	Yes

Note. FAQS: Superior Financial Assurance Quality; FAQI: Inferior Financial Assurance Quality; SAQS: Superior Sustainability Assurance Quality; SAQI: Inferior Sustainability Assurance Quality; ROA: Return on Assets. See variable descriptions in Table 2.

*** Statistical significance at 1% level;

** Statistical significance at 5% level;

* Statistical significance at 10% level.

TABLE 15:　　　REGRESSION ANALYSES RESULTS (WEST-EUROPE)

Variables	(1) Model 1 **MarketValue**	(2) Model 2 **MarketValue**	(3) Model 3 **MarketValue**	(4) Model 4 **MarketValue**
	Benchmark Model			
FAQS/SAQS	0.108** (0.0535)			
FAQS/SAQI		0.198** (0.160)		
FAQI/SAQS			0.0874* (0.0535)	
FAQI/SAQI				-0.00927 (0.112)
FirmSize	0.752*** (0.0169)	0.756*** (0.0169)	0.752*** (0.0170)	0.755*** (0.0169)
SalesGrowth	-0.0109 (0.00918)	-0.0106 (0.00919)	-0.0109 (0.00919)	-0.0106 (0.00920)
ROA	2.312*** (0.228)	2.258*** (0.226)	2.297*** (0.227)	2.252*** (0.226)
Dividend	0.0251** (0.0128)	0.0256** (0.0128)	0.0253** (0.0128)	0.0253** (0.0128)
Board Size	-0.0163*** (0.00627)	-0.0160** (0.00628)	-0.0164*** (0.00628)	-0.0161** (0.00629)
Constant	3.481*** (0.457)	3.380*** (0.456)	3.383*** (0.455)	3.393*** (0.456)
Observations	911	911	911	911
R-squared	0.582	0.523	0.459	0.459
Number of Groups	271	271	271	271
Control Industry	Yes	Yes	Yes	Yes
Control Year	Yes	Yes	Yes	Yes

Note. FAQS: Superior Financial Assurance Quality; FAQI: Inferior Financial Assurance Quality; SAQS: Superior Sustainability Assurance Quality; SAQI: Inferior Sustainability Assurance Quality; ROA: Return on Assets. See variable descriptions in Table 2.

*** Statistical significance at 1% level;

** Statistical significance at 5% level;

* Statistical significance at 10% level.

TABLE 16:   REGRESSION ANALYSES RESULTS (EAST-EUROPE)

Variables	(1) Model 1 MarketValue	(2) Model 2 MarketValue	(3) Model 3 MarketValue	(4) Model 4 MarketValue
	Benchmark Model			
FAQS/SAQS	0.370***			
	(0.143)			
FAQS/SAQI		0.296**		
		(0.141)		
FAQI/SAQS			0.171	
			(0.293)	
FAQI/SAQI				-0.270
				(0.645)
FirmSize	0.633***	0.654***	0.675***	0.682***
	(0.0655)	(0.0649)	(0.0664)	(0.0654)
SalesGrowth	-0.143	-0.110	-0.216	-0.207
	(0.341)	(0.348)	(0.356)	(0.356)
ROA	2.866***	2.797***	2.352***	2.318**
	(0.887)	(0.903)	(0.901)	(0.905)
Dividend	-0.00877**	-0.00880**	-0.00962**	-0.00975**
	(0.00370)	(0.00376)	(0.00384)	(0.00386)
Board Size	-0.0937***	-0.0903***	-0.0948***	-0.0950***
	(0.0246)	(0.0250)	(0.0257)	(0.0259)
Constant	5.595***	4.951***	4.942***	4.842***
	(0.973)	(0.986)	(0.942)	(0.967)
Observations	101	101	101	101
R-squared	0.421	0.421	0.417	0.416
Number of Groups	30	30	30	30
Control Industry	Yes	Yes	Yes	Yes
Control Year	Yes	Yes	Yes	Yes

Note. FAQS: Superior Financial Assurance Quality; FAQI: Inferior Financial Assurance Quality; SAQS: Superior Sustainability Assurance Quality; SAQI: Inferior Sustainability Assurance Quality; ROA: Return on Assets. See variable descriptions in Table 2.

*** Statistical significance at 1% level;

** Statistical significance at 5% level;

* Statistical significance at 10% level.

TABLE 17:   REGRESSION ANALYSES RESULTS WITH 2-YEAR LAG EFFECTS (INTERACTION)

Variables	(1) Model 1 MarketValue	(2) Model 2 MarketValue	(3) Model 3 MarketValue	(4) Model 4 MarketValue
$FAQS/SAQS_{t-2}$	0.0713 (0.0277)			
$FAQS/SAQI_{t-2}$		0.0217 (0.0274)		
$FAQI/SAQS_{t-2}$			-0.0367 (0.0684)	
$FAQI/SAQI_{t-2}$				-0.0887 (0.0632)
$FirmSize_{t-2}$	-0.00364 (0.00796)	-0.00402 (0.00795)	-0.00422 (0.00797)	-0.00488 (0.00796)
$SalesGrowth_{t-2}$	0.0462*** (0.0149)	0.0463*** (0.0149)	0.0460*** (0.0149)	0.0468*** (0.0149)
ROA_{t-2}	0.205* (0.123)	0.201* (0.122)	0.215* (0.123)	0.203* (0.122)
$Dividend_{t-2}$	-0.00352 (0.00221)	-0.00355 (0.00221)	-0.00352 (0.00221)	-0.00354 (0.00220)
$Board\ Size_{t-2}$	0.0456*** (0.00808)	0.0456*** (0.00809)	0.0456*** (0.00808)	0.0453*** (0.00806)
Constant	15.49*** (1.440)	15.50*** (1.445)	15.49*** (1.442)	15.52*** (1.447)
Observations	965	965	965	965
R-squared	0.295	0.296	0.295	0.299
Number of Groups	301	301	301	301
Control Industry	Yes	Yes	Yes	Yes
Control Year	Yes	Yes	Yes	Yes

Note. FAQS: Superior Financial Assurance Quality; FAQI: Inferior Financial Assurance Quality; SAQS: Superior Sustainability Assurance Quality; SAQI: Inferior Sustainability Assurance Quality; ROA: Return on Assets. See variable descriptions in Table 2.

*** Statistical significance at 1% level;

** Statistical significance at 5% level;

* Statistical significance at 10% level.

TABLE 18: REGRESSION ANALYSES RESULTS (ALTERNATIVE DEPENDENT VARIABLE) – NON-LAGGED

Variables	(1) Model 1 Tobin's Q	(2) Model 2 Tobin's Q	(3) Model 3 Tobin's Q	(4) Model 4 Tobin's Q
FAQS/SAQS	0.0212** (0.0821)			
FAQS/SAQI		0.0272* (0.223)		
FAQI/SAQS			-0.0266 (0.0811)	
FAQI/SAQI				-0.0110 (0.175)
LnFirmSize	-0.0588* (0.0328)	-0.0596* (0.0327)	-0.0588* (0.0328)	-0.0596* (0.0327)
SalesGrowth	0.292*** (0.0131)	0.292*** (0.0131)	0.292*** (0.0131)	0.292*** (0.0131)
ROA	0.688** (0.344)	0.704** (0.340)	0.685** (0.344)	0.704** (0.340)
Dividend	-0.00130 (0.00572)	-0.00126 (0.00572)	-0.00131 (0.00572)	-0.00126 (0.00572)
Board Size	-0.0588* (0.0328)	-0.0596* (0.0327)	-0.0588* (0.0328)	-0.0596* (0.0327)
Constant	1.770* (0.972)	1.788* (0.969)	1.794* (0.970)	1.790* (0.969)
Observations	1,022	1,022	1,022	1,022
R-squared	0.385	0.384	0.383	0.383
Number of Groups	319	319	319	319
Control Industry	Yes	Yes	Yes	Yes
Control Year	Yes	Yes	Yes	Yes

Note. FAQS: Superior Financial Assurance Quality; FAQI: Inferior Financial Assurance Quality; SAQS: Superior Sustainability Assurance Quality; SAQI: Inferior Sustainability Assurance Quality; ROA: Return on Assets. See variable descriptions in Table 2.

*** Statistical significance at 1% level;

** Statistical significance at 5% level;

* Statistical significance at 10% level.

TABLE 19:   REGRESSION ANALYSES RESULTS (ALTERNATIVE DEPENDENT VARIABLE) – 1-YEAR LAG EFFECTS

Variables	(1) Model 1 **Tobin's Q**	(2) Model 2 **Tobin's Q**	(3) Model 3 **Tobin's Q**	(4) Model 4 **Tobin's Q**
$FAQS/SAQS_{t-1}$	0.0309** (0.0905)			
$FAQS/SAQI_{t-1}$		0.258* (0.238)		
$FAQI/SAQS_{t-1}$			-0.0468 (0.0896)	
$FAQI/SAQI_{t-1}$				-0.0947 (0.194)
$FirmSize_{t-1}$	-0.122*** (0.0239)	-0.122*** (0.0238)	-0.122*** (0.0239)	-0.123*** (0.0238)
$SalesGrowth_{t-1}$	-0.0736*** (0.0156)	-0.0741*** (0.0155)	-0.0737*** (0.0156)	-0.0742*** (0.0155)
ROA_{t-1}	4.368*** (0.387)	4.387*** (0.384)	4.360*** (0.386)	4.377*** (0.384)
$Dividend_{t-1}$	-0.00906 (0.00681)	-0.00882 (0.00680)	-0.00909 (0.00681)	-0.00890 (0.00681)
$Board\ Size_{t-1}$	-0.0386*** (0.0110)	-0.0391*** (0.0110)	-0.0387*** (0.0110)	-0.0386*** (0.0110)
Constant	2.650*** (0.902)	2.645*** (0.901)	2.677*** (0.900)	2.679*** (0.901)
Observations	997	997	997	997
R-squared	0.222	0.222	0.222	0.221
Number of Observations	313	313	313	313
Control Industry	Yes	Yes	Yes	Yes
Control Year	Yes	Yes	Yes	Yes

Note. FAQS: Superior Financial Assurance Quality; FAQI: Inferior Financial Assurance Quality; SAQS: Superior Sustainability Assurance Quality; SAQI: Inferior Sustainability Assurance Quality; ROA: Return on Assets. See variable descriptions in Table 2.

*** Statistical significance at 1% level;

** Statistical significance at 5% level;

* Statistical significance at 10% level.