The Impact of Environmental Uncertainty on the Relationship between Standards Quality, Accounting Estimations Quality and Share Prices: An Empirical Study

Dr. Alaa eldin Tawfeek Ebrahim Deef
Assistant Professor of Accounting, Faculty of Commerce, Tanta University
E-mail: alaa.deef@yahoo.com

Abstract

This study investigates the impact of environmental uncertainty (EU) on the relation between standards quality and accounting estimations quality (AEQ) and explores the impact of the interaction between EU and AEQ on stock prices. The study uses the quality of accounting regulations and the quality of the application of financial reporting standards as proxies of the quality of standards. The study also uses both auditing quality and chief executive officer (CEO) reputation as proxies for financial reporting standards application quality, and discretionary accrual as a proxy for AEQ. Data were collected from 107 companies registered on the Saudi Arabia Stock Exchange over seven years (from 2015 to 2021) and provides four empirical findings. First, AEQ was not significantly affected by the adoption of international standards (International Financial and Reporting Standards and International Auditing and Assurance Standards) instead of Saudi accounting and auditing standards. Second, there was a significant and direct association between audit quality and AEQ. On the other hand, the reputation of the CEO did not have a significant effect on AEQ. Third, in response to increasing EU, the reputation of the CEO and audit quality had a significant effect on enhancing AEQ. Finally, the interaction between the intensity of EU and AEQ was reflected in a firm's share price.

Keywords: Accounting Estimations Quality, Standards Quality, Market Responses, Environmental Uncertainty.

1. Introduction

A central purpose of financial statements is to present stakeholders with information to enable them to evaluate the amount of money, timing, and uncertainty of the company's upcoming cash flows (International Accounting Standards Board [IASB], 2018). Accounting estimates are a vital component of preparing and auditing financial reporting. Accounting estimations quality (AEQ) is a function of the quality of the standards issued by accounting regulatory bodies, such as the International Financial and Reporting Standards (IFRS), and the quality of the application of these standards. Rational estimates are a vital component of financial reporting due to uncertainty in the measurement of certain items in that reporting (IAS 8; Pinello et al., 2020). Uncertainty influences management decisions, including those relating to financial reporting (Fatima et al., 2022). In this regard, environmental uncertainty (EU) reflects the variation in environmental events related to the operations of an enterprise (Fomina et al., 2022; Johnston et al., 2018; Surbakti and Sudaryati, 2021).

Over the last few decades, EU has grown globally. Therefore, the big question is how firms deal with this uncertainty (Mu et al., 2020). Increasingly, the literature is looking at the influence of EU on decisions made by investors, management, and other stakeholders. For example, EU has a significant effect on a firm's voluntary disclosure (Nagar et al., 2019), media coverage of the declaration of earnings (Bonsall et al., 2020) and audit fees (Chen et al., 2019). Environmental uncertainty is a key driver in making financial reporting decisions. For example, using conservatism when preparing financial statements is often deemed a prudent response to uncertainty in the business world (Financial Accounting Standards Board [FASB], 1981; Zubaidah and Nasrizal,

2019). However, there has been little attention in the research on the influence of EU on accounting information quality.

Although research on accounting estimates is not new, the focus on matters related to accounting estimates is a hot topic in accounting literature, especially for IFRS adoption and EU (Fomina et al., 2022). For more than 50 years, research has investigated professional judgement issues in accounting and auditing. As is recognized , the quality of the enforcement of standards (such as the IFRS) is dependent on the domestic environment (Fomina et al., 2022). Consequently, the study of issues related to AEQ remains a hot topic for now and in future years. There are at least three reasons for the growing interest in studying AEQ (Galal, 2022):

– Continuous and increasing changes in the business environment. As a result, uncertainty about business activities has increased. In this regard, EU is a characteristic of the business environment.

– Adopting the IFRS leads to an increase in professional judgements.

– The IASB concentrates on measuring assets and liabilities using more estimates to achieve the financial reporting objectives.

Previous studies dealing with this area of research can be divided into three groups. The first group contains studies that explore the link between accounting regulations quality and AEQ. These studies have stated mixed outcomes. For instance, Downes et al. (2019), Dufour et al. (2020) and Key and Kim (2020) show that AEQ increased because of IFRS adoption. Conversely, other results indicate that the quality of accounting estimates did not increase after the adoption of the IFRS (Halabi et al., 2019). The second group of studies examined the effect of financial reporting standards application quality on AEQ. Those studies used both audit quality and characteristics of the chief executive officer (CEO) as indicators of the quality of the application of financial reporting standards. For instance, Honkamäki et al. (2022) found that the Big 4 auditing companies differed significantly from other audit firms in terms of auditing management estimates. Lau (2021) shows that the accounting estimates disclosed

in key audit matters (KAMs) (IAS 701) do not enhance earnings quality. KAMs have, however, been used as a "red flag" for accounting estimates. From the other side, there is a direct relation between CEO experience and conservative policies (Hu et al., 2020). In addition, the extent of CEOs' knowledge of and commitment to accounting practices has an important and positive impact on accrual accounting quality. Elsewhere, the age and tenure of the CEO was not found to have any impact on accrual accounting quality (Putri and Rusmanto, 2019), although Kouaib et al. (2018) demonstrated an adverse relationship between the CEO's level of accounting expertise and accrual accounting quality. The third group of studies focus on examining the relationship between EU and AEQ. These studies also yielded mixed results. For example, Johnston et al. (2018) showed a positive correlation between EU and goodwill impairment and that management capability moderates this relationship. Yung and Root (2019) concluded that EU and political uncertainty have a positive and significant impact on discretionary accrual. Kim and Yasuda (2021) concluded that EU has a negative and significant impact on discretionary accrual, but Ghani et al. (2017) found that EU does not have a significant effect on the extent of discretionary accrual.

There are three gaps in the accounting literature associated with the scope and objectives of this study. First, most of the previous studies did not consider EU when investigating the relation between the adoption of the IFRS and AEQ. Second, previous studies did not consider the EU level when examining the impact of audit quality on AEQ. Finally, most of the earlier studies did not consider the EU level when examining the effect of management capacity, especially the CEO's reputation, on AEQ. Based on the above, the main aim of this research is to examine the moderating role of the level of EU on the relation between standards quality and AEQ. This research also investigates the outcome of the interplay between EU and AEQ and if this has an effect on stock prices. The following sub-objectives emerged from the main study objective:

−   Does the quality of the accounting regulations affect the quality of the accounting estimates? In other words, is it possible to improve the quality of accounting estimates by adopting international standards (the IFRS and International Auditing and Assurance Standards [IAAS]) instead of Saudi standards?

−   Does the financial reporting standards application quality have an impact on AEQ?

−   Does the level of EU have an impact on the scope of accounting estimates?

−   Does the level of EU moderate the relation between accounting regulations quality and AEQ?

−   Does the level of EU moderate the relation between financial reporting standards application quality and AEQ?

−   Is the relationship between the level of EU and AEQ reflected in share prices?

Dedyansyah et al. (2021) reviewed research investigating the relationship between accounting information quality and IFRS adoption and reported that 38.8% of the articles emphasized the accrual model. In this respect, the current study uses the quality of accrual accounting as a proxy of the quality of accounting estimates because it represents a highly subjective portion of accrual accounting. Accrual accounting also helps stakeholders forecast cash flows. In addition, the study uses the adoption of the IFRS and IAAS as proxies for accounting regulations quality. Furthermore, both audit quality and CEO reputation are used as proxies of quality of IFRSs adoption. This study focused

on CEOs for four main reasons. First, CEOs have the authority to determine their firm's strategy and accounting policies with regard to preparing financial statements (Bouaziz et al., 2020). Second, CEOs have incentives for earnings manipulation because their performance is measured in terms of income (Putra, 2021). Third, the CEO is more likely to be involved in financial manipulation than the chief financial officer (CFO) (Putra, 2021). Fourth, as far as the researcher is aware, there is not sufficient research investigating the association between CEO reputation and AEQ.

Both the IFRS and IAAS came into effect in January 2017 for Saudi publicly traded non-financial firms. The study sample consists of 107 non-financial companies recorded on the Saudi Stock Exchange over a seven-year period (2015 to 2021). The study period has two features. First, it allows for two years before and five years after international standards were adopted in Saudi Arabia . Second, the study includes the COVID-19 period, which represents a state of EU. This study uses agency theory to develop its research framework and seven hypotheses to enable the study questions to be answered empirically.

The findings of this study show that a rising level of EU encourages those in management to enhance AEQ. Senior managers use accrual accounting selectively to adjust the value of items in financial statements in response to an increase in EU. This study provides four empirical findings. First, the adoption of international standards (IFRS and IAAS) instead of Saudi accounting and auditing standards does not affect AEQ. Second, there is a significant and positive relationship between audit quality and AEQ, but CEO reputation has no

relation to AEQ. Third, in response to a rise in the level of EU, CEO reputation and auditing quality have a significant impact on enhancing AEQ. Finally, the interaction between EU level and AEQ is reflected in a firm's share price.

According to the above findings, this study contributes to the AEQ literature in three ways. First, the study investigates empirically the impact of the level of EU on AEQ. Second, the study examines empirically the impact of the EU level on the relationship between financial reporting standards application quality and AEQ. Third, the study investigates empirically the impact of the relationship between the level of EU and AEQ on a firm's share price. Moreover, the results of this research have vital implications for accounting regulatory bodies and investors. Investors should be careful in their interpretation of an increase in discretionary accrual. An increase in discretionary accrual should not be construed as opportunistic behaviour by management, as this may be the result of increased accounting estimates in order to communicate information to market participants about the firm's risk because of a rise in EU. The results also reflect the need to publish a standard containing a comprehensive framework for judging accounting estimates in increasingly uncertain environmental conditions.

The remainder of the paper is organized as follows. The next part provides relevant prior research and develops the study hypotheses. Section three outlines the methodology and the design of the empirical study. The fourth section presents the statistical results of the study. The concluding section reports the study outcomes and proposes future areas of research.

2_ Theoretical framework

Accounting information serves at least two important functions in a capital market (Rashidi, 2021). First, it helps investors assess risk and make sound investment decisions. Second, it reduces information asymmetry and mitigates agency costs among stakeholders. Consequently, the principal objective of improving the quality of accounting information is to decrease uncertainty. A rise in the EU level, however, limits the ability of financial reporting to reduce the information asymmetry between stakeholders. Financial information is unclear when due to an increase in the level of EU (Rashidi, 2021).

Accounting estimates are frequently reported in financial statements because they measure certain amounts or value certain accounts based on the anticipated results of future events (ISA 540). Estimates are used for accrual accounting purposes to prepare truthful and fair financial statements (Nangih and Anichebe, 2021). Accounting estimates are, therefore, the formation of opinions and the convergence of values and are not based on exact and objective measurement bases (FASB, 2018). Therefore, the rationalization of accounting estimates requires the integration of knowledge and the cooperation of all stakeholders in the preparation of financial reports. In practice, however, the AEQ depends on the accuracy of the measure of uncertainty, which requires judgements and assumptions to be made about potential consequences. The accrual is based upon accounting estimates. Therefore, cash flow forecasts decrease if the accrual estimation procedure faces measurement problems, such as environmental

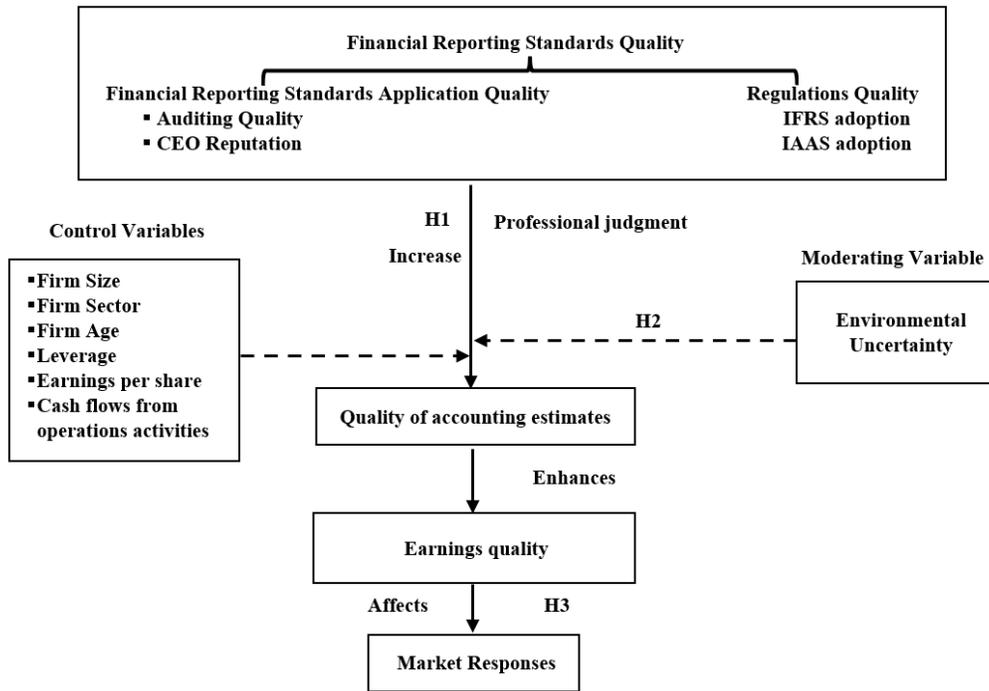uncertainty. This study uses agency theory to construct a research framework, as shown in Figure 1 below.

Figure 1. Standards quality and AEQ: the moderating role of EU level and market responses

According to agency theory, a firm operates in an uncertain environment, which is likely to cause information asymmetry between those at the management level and other stakeholders (Walker, 2013). Financial reporting should play an informational role in alleviating asymmetry of information and accounting estimates are of growing importance to the preparation and auditing of financial reports (IASB, 2018). In certain situations, making accounting estimates is simple, but in other cases it is more complicated (Public Company Accounting Oversight Board [PCAOB], 2014). In these regards, agency theory supports two

views on the relation between AEQ and the behaviour of management when making financial reporting decisions (Beaver, 2002; Walker, 2013). The first point of view is that those at the management level hold private information about the firm. Accordingly, managers could provide more relevant accounting information, thus maximizing the informational role of financial reporting. The second view focuses on the use of accrual accounting being either opportunistic or beneficial. The opportunistic assumption is that managers use discretion to manage reported gains to maximize their personal benefits. In contrast, the assumption of beneficial behaviour is that managers use their discretion to communicate information to other stakeholders and maximize the value of the business.

2.1 Accounting regulations quality and accounting estimates quality

Financial statements are prepared and audited according to an established set of standards (e.g., IFRS and IAAS). For instance, the central purpose of the IFRS Foundation is to establish high-quality, easy-to-understand, easily implementable, and globally accepted standards. In recent years, professional bodies have taken an interest in how to refine or improve accounting estimates. For example, the PCAOB suggested modifying accounting estimation standards to increase auditing quality. In general, this proposal invited auditors to improve their assessment of clients' accounting estimates (PCAOB, 2017). On the other hand, adopting the IFRS influences managers' accounting estimates in several ways. For example, the IFRS require those in management to complete asset impairment tests and conduct revaluations periodically (as appropriate). Despite

this, the IFRS do not explicitly provide management with a comprehensive framework for making accounting estimates under rising levels of environmental uncertainty (Ozili, 2021). Currently, most accounting regulatory bodies do not provide an explanation or definition of the term "accounting estimate". This increases the general uncertainty and controversial interpretations of the practical use of accounting estimates. For example, the term accounting estimation was introduced by the IFRS following the issuance of IAS 8. An accounting estimate indicates the monetary amount of financial statement items in accordance with financial reporting standards and an estimate of uncertainty (ISA 540). Accounting estimates are an adjustment of the carrying amount of assets elements or liabilities elements (IAS 8). Accounting estimates are usually made according to historical information and management judgement. Hence, accounting estimates are arbitrary and contingent upon managerial tendency (Galal, 2022) and are, therefore, made according to both subjective and objective determinants. Consequently, making accounting estimates is a complicated process and requires all the necessary information to be obtained (Nangih and Anichebe, 2021).

The IFRS represent the most significant change ever observed in the accounting world. More than 87% of countries have adopted the IFRS (Dedyansyah et al., 2021). Development of the IFRS was based on a principle-based approach, which allowed for the use of managers' professional judgement when preparing financial statements (Fomina et al., 2022; Kouaib et al., 2018). Consequently, the adoption of the IFRS is considered a critical cause of the broadening of accounting estimates in preparing and auditing financial

statements. In these regards, the adoption of the IFRS would be likely to provide those in management with the means to exercise discretion in a manipulative manner in various areas, such as the impairment of intangible assets (Capkun et al., 2016). The use of accounting estimates is a controversial issue in accounting. As referred to earlier, making accounting estimates can be a simple (i.e., accrued expenses) or complex (i.e., assets impairment) process. Managers' ability to employ rational and impartial professional judgements in making accounting estimates depends on several components, which consist of knowledge, skills, and behavioural aspects. In addition, AEQ depends on the nature of the items, the informational environment, accounting expertise, and level of certainty (Galal, 2022). Quality is an elementary factor in any discussion by accounting regulators of setting global accounting standards (Deb et al., 2022; Osasere and Ilaboya, 2018). For example, one of the reasons for adopting the IFRS is to improve disclosure quality. However, the key challenge is how to operationalize and evaluate this quality (Osasere and Ilaboya, 2018). Financial reporting quality depends on the extent of the freedom afforded by accounting standards and allowable accounting treatments.

Some research demonstrated that IFRS adoption led to an improvement in financial reporting quality (Downes et al., 2019; Dufour et al., 2020; Key and Kim, 2020). On the other hand, other research indicates that the adoption of IFRS has not affected the quality of financial reporting (Halabi et al., 2019). On the other hand, auditors are responsible for providing assurance on the client's estimations. For example, IAS 1 requires professional judgement to determine the best way to present accounting information in financial statements, and ISA 701 requires auditors to report KAMs by disclosing a client's potential estimate biases.

In summary, accounting estimates are a critical factor in making financial reporting decisions and in auditing financial statements. Despite this, previous studies have yielded mixed results regarding the effect of IFRS adoption on AEQ. Furthermore, within the scope of the researcher's knowledge, there is a dearth of studies dealing with the impact of IAAS adoption on AEQ.

Based on the above, the first research question of the study can be stated as follows:

Q.1. Does the quality of accounting regulations affect the quality of accounting estimates? In other words, is it possible to improve the quality of accounting estimates by adopting international standards (IFRS or IAAS) instead of Saudi standards?

To respond empirically to the above question, the following hypothesis is made:

H1: The quality of accounting regulations significantly affects AEQ.

H1a: Adopting the IFRS has significantly enhanced AEQ.

H1b: Adopting the IAAS has significantly enhanced AEQ.

2.2 Implementation of standards quality and accounting estimates quality

Those at the management level of a firm are responsible for the establishment of accounting estimates. Accounting regulatory bodies are generally vague on the topic of making accounting estimates and do not provide a methodology for doing so. For example, the IFRS do not include an objective basis for the preparation of accounting estimates in general; they only provide resources for accounting estimates (IAS 1) and for recognizing changes in accounting estimates (IAS 8). As a result, compliance with financial reporting standards requirements is insufficient to guarantee high AEQ (Staneva, 2018).

The adoption of the IFRS requires both subjective and professional judgement when making financial reporting decisions (e.g., fair value assessments).

Financial reporting is the final joint product of auditors and their clients. Moreover, audit quality is an element of financial statement quality. Hence, the quality of financial statements is a collaborative outcome between client and auditor (Deb et al., 2022). Therefore, auditors should be a useful mechanism for evaluating and ensuring the quality of client estimates as part of the wider technique of auditing financial statements (ISA 540). Auditing accounting estimates is complicated due to the elements of uncertainty, business risks and managerial discretion (Deb et al., 2022; Oyewo et al., 2020). In this regard, Lau (2021) found that disclosing KAMs in terms of management estimates does not improve the value relevance of reported earnings, whereas the content of KAMs is used as a "red flag". Therefore, it is possible that high audit quality restricts opportunistic behaviour when making accounting estimates and related disclosures in audit reports (ISA 701; ISA 706). In this context, the Big 4 audit companies are more likely than other audit companies to disclose the extent of client estimates and their audit procedures in KAMs (Honkamäki et al., 2022).

In summary, previous research suggests that audit quality influences the quality of financial reporting. As far as the researcher is aware, there is a shortage of research related to the influence of audit quality on AEQ. From the above, the second research question can be formulated as follows:

Q.2. Does auditing quality enhance the quality of accounting estimates?

To respond empirically to the above question, the following hypothesis is made:

H2: The quality of an audit has a significant and positive relationship with AEQ.

CFOs are primarily responsible for preparing financial reports. At the same time, earnings are often used as a tool for assessing CEO performance. The CEO's characteristics establish the CEO's behaviour with respect to the accounting method selected, accounting policies and accounting estimations for the preparation of financial reports (Kutluk, 2017). Agency theory suggests that the information asymmetry problem motivates managers to make financial reporting decisions that optimize their benefits, to the impairment of the benefits of other stakeholders (Jensen, 1986). In this regard, some studies have used organizational theory, behavioural theory, and upper-level theory to investigate and explain the impact of CEO characteristics on AEQ. For example, Putra (2021) shows that female CEOs, CEOs with longer tenure and those with higher levels of education, as well as foreign CEOs, make firms more profitable without being involved in earnings management. In addition, there is a positive relationship between a CEO's level of experience and the degree to which prudent accounting policies are adopted (Hu et al., 2020). Furthermore, narcissism and the CEO's level of education have a positive influence on discretionary accrual value, although the CEO's gender has a negative influence on discretionary accrual value. Conversely, neither the age of the CEO nor the length of tenure was found to affect discretionary value (Putri and Rusmanto,

2019). Other studies found that CEO duality and nationality had a negative influence on earnings management using discretionary accrual. However, no significant correlation has been established between CEO turnover and the management of earnings through discretionary accrual (Bouaziz et al., 2020). In their research, Kouiab et al. (2018) concluded that the level of accounting expertise of the CEO had a negative impact on the management of earnings using discretionary accrual.

In summary, CEOs have an essential role in making financial reporting decisions. In this regard, previous studies have yielded mixed results related to CEO characteristics and AEQ. As far as the researcher is aware, there is a lack of research regarding the relationship between CEO reputation and AEQ. Based on the above, the third research question is stated as follows:

Q.3. Does an increase in the CEO's reputation have a positive impact on AEQ?

To respond empirically to the above question, the following hypothesis is made:

H3: The reputation of the CEO has a significant and positive impact on AEQ.

1.3   Environmental uncertainty and accounting estimates quality

Under the IFRS, managers can exercise professional judgement in making financial reporting decisions in two ways (Toumeh and Yahya, 2019): first, by estimating future economic events, such as the allowance for receivables (IFRS 9) and the fair value of investment property (IFRS 13); and second, by the selection of accounting methods and accounting policies. In this regard, managers may use their discretion in selecting an accounting policy, adjusting accounting estimates, and managing accrual accounting to manage firm earnings. For example, Downes et al. (2019) indicate that the IFRS enable managers to

exercise judgement in disclosing the company's future cash flows through discretionary accrual. Accounting estimations are subjective due to the following characteristics (Galal, 2022):

-The use of professional judgement by managers in making accounting estimates.

-The inherent uncertainty in accounting estimates, such as changes in a competitive environment and technological changes.

As such, management discretion and measurement uncertainty are issues inherent to AEQ (IASB, 2018; ISA 540; Lau, 2021). EU is an arbitrary aspect of making accounting estimates, as it arises from a variety of hard-to-measure sources. EU depends on various external factors (e.g., government regulations and macroeconomics) that are not easily predicted (Johnston et al., 2018). Increasing measurement uncertainty does not affect the value relevance of accounting information (IASB, 2018). Consequently, professional judgement is essential for improving the quality of accounting estimates, especially in terms of globalization, economic uncertainty, and other environmental factors (Fomina et al., 2022).

Several earlier researchers investigated the effect of EU on discretionary accrual. For example, Cui et al. (2020), Surbakti and Sudaryati (2021) and Yung and Root (2019) reported that the level of EU has a positive and significant influence on discretionary accrual. Kim and Yasuda (2021) concluded that the level of EU has a negative and significant impact on discretionary accrual. In contrast, Ghani et al. (2017) found that the level of EU does not significantly affect discretionary accrual.

In summary, there are mixed results regarding the relation between the level of EU and accounting estimates quality as measured by discretionary accrual. Given the above, the fourth research question is:

Q.4. Does increasing EU have a significant impact on the extent of accounting estimates?

To respond empirically to the above question, the following hypothesis is presented:

H4: The level of EU has a significant impact on the extent of accounting estimates.

The IFRS do not include a specific comprehensive approach for using professional judgement in the accounting and measurement of any element of financial statements. Conversely, the auditor is responsible for gathering and evaluating evidence related to accounting estimates and the verification of adequate disclosures in financial statements (ISA 540). The extent of the accounting estimation depends on the estimation of uncertainty. For example, prudence is a vital concept in making financial reporting decisions, and conservatism can be seen as a response to the level of EU. Therefore, prudence is a tool for maintaining the worth of stakeholders and a practical method of managing the EU level (Hejranijamil et al., 2020). When the uncertainty, complexity or subjectivity of accounting estimates is very high, one would expect the procedures for auditing financial statements to be much broader (ISA 540). EU also has a significant effect on the operational risk, earnings volatility and AEQ of an enterprise. The uncertainty inherent in accounting information is reduced when accounting standards give managers enough flexibility to exercise discretion and acknowledge certain events in financial statements (Ozili, 2021). Therefore, in the circumstance of a rise in the level of EU, CEOs who have a strong reputation could be more likely to enhance AEQ (Hu et al., 2020). However, with an increase in EU level, AEQ improves the value relevance of the accounting disclosures (Lau, 2021).

In summary, EU is an important factor in making accounting estimates. Very little research has been conducted into the impact of EU level on the relation

between accounting standards quality and AEQ. Based on the above, the fifth and sixth research questions are as follows:

Q.5. Does the EU level moderate the relation between the quality of accounting regulations and AEQ?

Q.6. Does the EU level moderate the relation between financial reporting standards application quality and AEQ?

To give an empirical answer to the above questions, the following hypotheses were developed:

H5: EU level has a significant effect on the relationship between accounting regulations quality and AEQ.

H5a: EU level has a significant effect on the relationship between IFRS adoption and AEQ.

H5b: EU level has a significant effect on the relationship between IAAS adoption and AEQ.

H6: EU level has a significant effect on the relationship between financial reporting standards application quality and AEQ.

H6a: EU level has a significant effect on the relationship between auditing quality and AEQ.

H6b: EU level has a significant effect on the relationship between CEO reputation and AEQ.

Accounting estimates have an impact on the assessment of financial position, performance and decision making by stakeholders. As a result, regulators place an obligation on firms to disclose critical accounting estimates for financial statement items. As such, these estimates enhance disclosure quality by providing managers with the tools to communicate forward-looking

information to stakeholders (Nangih and Anichebe, 2021). Moreover, EU affects the capacity of financial reporting to provide credible information to market participants. For example, a rise in the level of EU increases the asymmetry of information about future cash flows by altering investor preferences for share prices (Pires and Maria-Ceu, 2022; Rashidi, 2021). In this regard, auditors use KAMs to disclose potential management biases in accounting estimates. Further studies are needed to investigate the impact of AEQ on the value relevance of accounting information, particularly in the context of a rising level of EU (Lau, 2021). This study proposes that the interrelationship between EU level and the extent of accounting estimates can enhance the value relevance of accounting disclosure. Given this proposal, the final question in the study is:

Q.7. Is the relation between EU level and the scope of accounting estimates reflected in share prices?

To give an empirical answer to the above question, the following hypothesis was developed:

H7: The interrelationship between EU level and the scope of accounting estimates has a significant impact on share prices.

3. Research design

3.1 Measurement of variables and study models

3.1.1 Measurement of accounting estimate quality

In line with Ball and Lakshmanan (2005) and Downes et al. (2019), this study uses discretionary accrual as a proxy for AEQ. There are two steps in estimating the value of discretionary accrual. The first step is to compute the total accrual according to the following model (1):

$$\text{TAC }_{it} = \text{NI }_{it} - \text{CFO }_{it} \qquad (1)$$

The second step is to compute the discretionary accrual using model (2) (Dechow et al., 1995):

$$TAC_{it}/A_{it-1} = \beta_1 (1/A_{it-1}) + \beta_2 \{(\Delta REV_{it} - \Delta REC_{it})/A_{it-1}\} + \beta_3 (PPE_{it}/A_{it-1}) + \varepsilon_{it} \quad (2)$$

After estimating the total accounting accrual, the amount of discretionary accrual is derived from the residual of model (2) above. Definitions of the components of all the models can be found in Table 1 below.

3.1.2 Measurement of environmental uncertainty

This study uses the coefficient of variation (CV) as a proxy of firm EU level (Ghosh and Olsen, 2009; Huang et al., 2017; Magerakis and Ahsan, 2021), as in model (3):

$$EU_{it} = CV(S_{it}) = \sqrt{\frac{\sum_{i=1}^{3} (S_{it} - S_{mean})/3}{S_{mean}}} \quad (3)$$

3.1.3 Measurement of CEO reputation

There are two approaches to measuring CEO reputation (Conte, 2020). First is the ability approach, which highlights the skills and capacities of a CEO in achieving the firm's goals (Baik et al., 2011). Second is the symbolic image approach, which represents the ability of media coverage to generate reputable CEOs. In accordance with the first approach, this research employs investment efficiency as a proxy for the reputation of a CEO (Dong et al., 2020; Gan, 2019; Ullah et al., 2021). The efficiency of investment is measured using the absolute residual value according to model (4) (Chen et al., 2011):

$$\text{Invest}_{i,t} = \beta_0 + \beta_1 \text{NEG}_{i,t-1} + \beta_2 \text{RevGrowth}_{i,t-1} + \beta_3 \text{NEG}_{i,t-1} * \text{RevGrowth}_{i,t}$$

3.1.4 Measurement of standards quality

The adoption of the IFRS and IAAS in the Kingdom of Saudi Arabia came into force in 2017. This study uses the adoption of the IFRS and IAAS as proxies for the quality of accounting regulations.

3.1.5 Hypothesis testing models

Model (5) was built to test the first three study hypotheses:

$$\text{DAC}_{i,t} = \beta_0 + \beta_1 \text{AUDIT}_{i,t} + \beta_2 \text{STAND}_{,t} + \beta_3 \text{CEORep}_{i,t} + \beta_4 \text{Size}_{i,t} + \beta_5 \text{Age}_{i,t} + \beta_6 \text{Sector}_{1-9}$$
$$+ B_7 \text{LEV}_{i,t} + \beta_8 \text{CFO}_{i,t} + \varepsilon_{it}. \tag{5}$$

Model (6) was built to test the fourth hypothesis:

$$\text{DAC}_{i,t} = \beta_0 + \beta_1 \text{EU}_{i,t} + \beta_2 \text{Size}_{i,t} + \beta_3 \text{Age}_{i,t} + \beta_4 \text{Sector}_{1-9} + \beta_5 \text{LEV}_{i,t} + \varepsilon_{it}. \tag{6}$$

Model (7) was developed to test hypotheses five and six:

$$\text{DAC}_{i,t} = \beta_0 + \beta_1 \text{EU}_{i,t} + \beta_2 \text{AUDIT}_{i,t} + \beta_3 \text{STAND}_{i,t} + \beta_4 \text{CEORep}_{i,t} + \beta_5 \text{EU}_{i,t} * \text{AUDIT}_{i,t}$$
$$+ B_6 \text{EU}_{i,t} * \text{STAND}_{i,t} + \beta_7 \text{EU}_{i,t} * \text{CEORep}_{i,t} + \beta_8 \text{Size}_{i,t} + \beta_9 \text{Age}_{i,t} + \beta_{10} \text{Sector}_{1-9}$$
$$+ \beta_{11} \text{LEV}_{i,t} + \beta_{12} \text{CFO}_{i,t} + \varepsilon_{it}. \tag{7}$$

Model (8) was developed to test the seventh hypothesis:

$$\text{SP}_{i,t} = \beta_0 + \beta_1 \text{EU}_{i,t} + \beta_2 \text{DAC}_{i,t} + \beta_3 \text{EU}_{i,t} * \text{DAC}_{i,t} + \beta_4 \text{Size}_{i,t} + \beta_5 \text{Age}_{i,t} + \beta_6 \text{Sector}_{1-9}$$
$$+ \beta_7 \text{LEV}_{i,t} + \beta_8 \text{NI}_{i,t} + \varepsilon_{it}. \tag{8}$$

3.2 Definition of the variables

Table 1 shows the variables considered in this research.

Table 1: Variables

Symbol	Description/Calculation	Previous literature
TACi,t	Total accounting accrual.	Das et al., 2017; Dechow et al., 1995; Downes et al., 2019; and Sudaryati, 2021
NI$i,t$	Earnings before interest and tax.	
CFOi,t	Cash flow from operating activities.	
DACi,t	Absolute values of the discretionary accrual.	
A$i,t-1$	Natural log of total assets.	
Δ REVi,t	Changes in sales.	
Δ RECi,t	Changes in accounts receivable.	
PPEi,t	Fixed assets.	
EU$i,t$	Environmental uncertainty measured using model (3).	Johnston et al., 2018; Sun and Price, 2016
Si,t	Total sales divided by total assets.	
Smean	Average of total sales to total assets during a regular three years.	
Investi,t	Total investment measured as follows: {(Property, Plant and Equipment + research development expenditures - sale of fixed assets) / total assets}	Chen et al., 2011; Dong et al., 2020; Gan, 2019; Ullah et al., 2021
NEG$i,t-1$	Dummy variable equal to 1 for a negative sales increase, and 0 otherwise.	
RevGrowth$i,t-1$	Annual sales increase ratio.	
NEG*RevGrowth$i,t-1$	Interaction variable between NEG and RevGrowth.	
AUDIT i,t	Dummy variable equal to 1 for a Big 4 firm, and 0 otherwise.	Kamouche, 2020
STAND i,t	Dummy variable equal to 1 for financial reporting prepared and audited in accordance with the IFRS and IAAS, and 0 otherwise.	
CEORepi,t	CEO's reputation as measured using model (4).	Dong et al., 2020; Gan, 2019; Ullah et al., 2021
Sector$1-9$	Industry sectors from 1 to 8.	Dong et al., 2020
Levi,t	Leverage, measured as total liabilities divided by total assets.	Ullah et al., 2021
Sizei,t	Natural log of total assets.	Dong et al., 2020
Agei,t	Natural log of the firm's age.	Ullah et al., 2021
SP$i,t$	The firm's price two weeks from the date of release of financial reports.	Deef, 2022

i	Number of firms (from 1 to 107)
t	Year-end (from 2015 to 2021)

3.3 Selecting samples and collecting data

The study sample contains 107 non-financial companies listed on the Saudi Stock Exchange between 2015 and 2021. The selected sample includes eight industrial sectors and 749 observations. Table 2 summarizes the study sample. The materials and the retailing and production of goods sectors represent, respectively, 35% and 18% of the final selected sample. The capital goods industry makes up 10% of the final sample. Telecommunications and transportation services and the commercial consumer and professional services industry each represent 9% of the final sample. The remaining industries represent 19% of the final sample selected.

Table 2: Study sample

Industrial sectors	Number of companies per sector	Ratio by sector (%)
Materials	37	35
Retailing and production of goods	19	18
Capital goods	11	10
Telecommunication and transportation services	10	9
Commercial consumer and professional services	10	9
Energy	8	7
Health care and drug production	6	6
Real estate management and development	6	6
Total	107	100

4. Empirical results

4.1 Correlation analysis

Table 3 shows a low level of correlation between the study variables (less than 80%). These results demonstrate that there is no correlation between the independent variables of the models. In addition, a significant correlation exists between the EU level and DAC. EU is significantly negatively correlated with AUDIT, Sector, Age, CFO, LEV, and SP. Conversely, there is no correlation between Size, STAND, CEORep and EU. There is also no correlation between STAND, CEORep, AUDIT and DAC.

Table 3. Correlation analysis of research variables

	EU	CEORep	DAC	AUDIT	STAND	Size	Sector	Age	LEV	CFO	SP
EU	1	-.047	.002	-.047	-.117	-.035	-.152	-.152	-.112	-.090	-.099
		.201	.043	.003	.501	.345	.000	.000	.002	.014	.007
CEORep		1	.026	.116	-.424	.009	-.019	-.019	-.025	.025	.259
			.470	.001	.000	.812	.612	.612	.491	.487	.000
DAC			1	-.188	-.021	.893	-.102	-.102	.175	.843	.101
				.000	.562	.000	.005	.005	.000	.000	.006
AUDIT				1	-.232	.201	-.131	-.131	.194	.191	.232
					.000	.000	.000	.000	.000	.000	.000
STAND					1	.013	.128	.128	.063	-.014	-.130
						.717	.000	.000	.083	.695	.000
Size						1	-.094	-.094	.175	.892	.082
							.010	.010	.000	.000	.026
Sector							1	1.000	-.200	-.036	-.010
								.000	.000	.325	.781
Age								1	-.200	-.036	.141
									.000	.325	.000
LEV									1	.081	.061
										.027	.099
CFO										1	.184
											.000
SP											1

4.2 Analysis of study findings

Table 4 summarizes the statistical findings from the four models (from model (5) to model (8)). Model (5) was designed for empirical testing of the first three study hypotheses. Table 4 shows that model (5) is significant (at the 5% level of confidence) and adjusted R^2 is 75.8%. The coefficient and significance level of STAND are 90627 and .183, respectively. This result indicates that there is no impact of the type of accounting standards on AEQ. In other words, AEQ is not influenced by the adoption of the IFRS rather than Saudi accounting standards and AEQ is not influenced by the adoption of the IAAS rather than Saudi auditing standards. This result is similar to that obtained in Doukakis (2014). As a result, H1 is rejected. Consequently, the adoption of international standards (IFRS and IAAS) has an insignificant impact on AEQ. Similarly, the coefficient and significance level of AUDIT are -3928 and .040, respectively. This finding indicates that there is a positive effect of AUDIT on DAC. In other words, increasing audit quality leads to a decline in the discretionary accrual level. This outcome is similar to that in Lau (2021). Therefore, H2 is supported, and audit quality positively influences AEQ. Furthermore, the coefficient and significance level of CEORep are 3456 and .973, respectively. The finding indicates that CEORep does not have an effect on DAC. Consequently, H3 is not supported. Thus, AEQ is not influenced by CEORep. In addition, the coefficients for Size, Sector, Age,

CFO and LEV are .025, -3454, -3139, .077 and 9355, respectively; the significance levels for these variables are .000, .814, .173, .000 and .261, respectively. This finding indicates that both Size and CFO have a significant and positive relation with DAC, but Sector, LEV and Age do not have an effect on DAC.

Table 4 shows that model (6) is significant (at the 5% level of confidence) and adjusted R^2 is 79.8%. The coefficients and significance levels of EU are 248215 and .040, respectively. This outcome indicates that the extent of the accounting estimates is positively influenced by the EU level. This suggests that a rise in EU level leads to the increasing use of accounting estimates. These results are similar to those obtained by Cui et al. (2020), Surbakti and Sudaryati (2021) and Yung and Root (2019). Therefore, H4 is supported. Furthermore, the coefficients for Size, LEV, Age and Sector are 0.032, 17372, -30064, -30064 and -570, respectively. the significance levels for these variables are .000, .134, .139 and .806, respectively. This finding indicates that Size has a significant and positive relation with DAC, but there is no effect of LEV, Age, and Sector on DAC.

Table 4 shows that model (7) is significant (at the 5% level of confidence) and the adjusted R^2 is 80%. The coefficient and significance of EU * STAND are 436629 and .258, respectively. This indicates that EU * STAND does not have any effect on AEQ. Consequently, H5 was rejected.

Therefore, in the case of an increase in EU level, the type of accounting standards, whether these are the IFRS or Saudi Arabian accounting standards, does not influence AEQ. In the case of an increase in EU level, the type of auditing standards, whether the IAAS or Saudi auditing standards, does not influence AEQ. In addition, EU * CEORep and EU * AUDIT have coefficients of 817294 and 687677, respectively. Moreover, the significance of EU * CEORep and EU * AUDIT is .034 and .032, respectively. This suggests that, in the case of an increase in EU level, the Big 4 auditing firms allow their clients to increase the extent of the accounting estimates compared to other auditing firms. This result is similar to that found in Deb et al. (2022), Honkamäki et al. (2022), Nagar et al. (2019) and Zhang et al. (2018). As a result, H6a is supported. Therefore, the connection between audit quality and AEQ is significantly affected by EU level. Inaccuracy of accounting estimates may lead to misstatements in financial statements (Nangih and Anichebe, 2021). Hence, the Big 4 audit firms enable clients to increase discretionary accrual to reduce audit risk and legal disputes. In these situations, the expansion in discretionary accrual is not considered opportunistic behaviour by the audit firms or their clients. But, it is a tool for communicating messages to stakeholders regarding the level of EU and audit risks associated with financial reporting. Moreover, the above results reveal that, in the case of an increase in EU level, a CEO with a good reputation avoids further investment. With great EU uncertainty, companies with reputable CEOs

will suffer underinvestment, and, under rising EU, reputable CEOs overestimate in terms of accounting estimates to mitigate this. As a result, there is an expansion in discretionary accrual to communicate messages to shareholders about the management's ability to respond to substantial EU. In other words, an increase in EU level creates at least two incentives for a CEO with a good reputation: first, to avoid participating in high-risk capital projects; and second, to expand the discretionary accrual to communicate messages about increased EU level, business risks, and financial risks surrounding the firm's activities. Therefore, an increase in EU level significantly affects the relation between CEO reputation and AEQ. These results are in line with those in Hejranijamil et al. (2020), Hu et al. (2020) and Ozili (2021). H6b is supported.

Table 4 shows that model (8) is significant (at the 5% level of confidence) and the adjusted R^2 is 17.1%. The coefficients for Sector, LEV, CFO, DAC and NI are .358, .941, 3.014 and .879, respectively; the significances for Sector, LEV, CFO, DAC and NI are .000, .002, .041 and .000, respectively. The outcome indicates that SP is positively affected by LEV, CFO, DAC and NI. In addition, the coefficient and significance of Age are -1.359 and .008, respectively. This result indicates that SP is negatively affected by Age. Conversely, the coefficient and significance of EU are -6.844 and .191, respectively. This suggests that there is no association between EU and SP. The coefficient and significance of EU *

DAC are   -2.254 and .030, respectively. This result shows that the interaction between EU and AEQ is reflected in the share price. This indicates that a rising EU level motivates parties related to the preparation of financial statements (auditors and clients) to broaden the extent of accounting estimates. This result is consistent with those for model (5). An increase in EU level results in a rise in the value of discretionary accrual because of the overstatement of accounting estimates. Expanding accounting estimates conveys a message to the market about the business risk associated with increased environmental uncertainty. This message is reflected in the share price. Consequently, in cases of increasing EU, increased discretionary accrual is explained as beneficial behaviour. This outcome is similar to the findings in Nangih and Anichebe (2021), Rashidi (2021) and Surbakti and Sudaryati (2021). Consequently, H7 is supported.

Table 4: Summary of model results

	Model (5)			Model (6)			Model (7)			Model (8)		
Significance	.000			.000			.000			.000		
Adjusted R-squared	.758			.798			.800			.171		
R-squared	.760			.800			.803			.181		
R	.850			.894			.896			.358		
F statistic	393.78			593.1			272.3			8.113		
Dependent variable	DAC			DAC			DAC			SP		
Variables	Coefficient	T statistic	Sig.	Coefficient	T statistic	Sig.	Coefficient	T statistic	Sig.	Coefficient	T statistic	Sig.
AUDIT	-3928	-2.063	.040	*	*	*	1.071	1.294	.196	*	*	*
STAND	90627	1.33	.183	*	*	*	1.524	1.648	.100	*	*	*
CEORep	3456	1.034	.973	*	*	*	85736	.637	.524	*	*	*
Size	.025	17.52	.000	.032	52.7	.000	.032	51.728	.000	-2.813	-.569	.570
Age	-3139	-1.36	.173	-30064	-2.12	.134	32555	.273	.123	-1.359	-2.672	.008
Sector	-3454	-.236	.814	-570	-.245	.806	185	.079	.937	.358	4.321	.000
LEV	9355	1.12	.261	17372	.070	.139	19028	.245	.125	.941	3.147	.002
CFO	.077	6.19	.000	*	*	*	*	*	*	*	*	*
EU	*	*	*	248215	3.752	.040	7.042	2.676	.044	-6.844	-1.308	.191
EU * CEORep	*	*	*	*	*	*	817294	2.728	.034	*	*	*
EU * AUDIT	*	*	*	*	*	*	687677	2.147	.032	*	*	*
EU * STAND	*	*	*	*	*	*	436629	1.131	.258	*	*	*
DAC	*	*	*	*	*	*	*	*	*	3.014	2.047	.041
NI	*	*	*	*	*	*	*	*	*	.879	4.299	.000
EU * DAC	*	*	*	*	*	*	*	*	*	-2.254	-2.256	.030
* Not applicable												

4.3 Additional tests

The study used two supplementary tests. First, the study used a one-way ANOVA test to verify that the values of discretionary accrual differ significantly between the financial reports audited by the Big 4 and those audited by other accounting firms. Table 5 shows that the average discretionary accrual differs significantly between financial reports audited by the Big 4 firms and financial reports audited by other accounting firms. In addition, the mean discretionary accrual in the financial reports audited by the Big 4 firms is 855646 and the mean discretionary accrual for financial reports audited by other auditing firms is 165432. This result suggests that the Big 4 auditing firms allow their customers to extend the discretionary accounting accrual compared to other auditing firms, especially in cases of increasing EU. This outcome is in line with the above results for study model (7).

Table 5: Discretionary accrual: one-way ANOVA test

	N	Mean	Std. deviation	Std. error	95% Confidence interval for the mean		Minimum	Maximum
					Lower bound	Upper bound		
Other audit firms	355	165432	352601	18714	128627	202236	1442	2697081
Big 4 audit firms	394	855646	2459420	123903	612049	1099243	762	2505736
Total	749	528508	1831882	66935	397104	659912	762	2057368

ANOVA					
	Sum of squares	df	Mean square	F	Sig.
Between groups	8.896	1	8.896	27.448	.000
Within groups	2.421	747	3.241		
Total	2.510	748			

Second, the study used a paired-samples t-test to compare the values and direction of discretionary accrual used in financial statements prepared under international standards (IFRS and IAAS) and those prepared using Saudi standards (accounting and auditing standards). Table 6 shows that the differences in discretionary accrual means between the two groups is

insignificant (0.211). This finding is in line with the above outcomes of research models (5) and (7).

Table 6: Discretionary accrual :results of the paired-samples t-test

Paired samples statistics

		Mean	N	Std. deviation	Std. error mean
Pair 1	BEFORE IFRS	-54291	749	1539065	56236
	AFTER IFRS	32745	749	1123717	41059

Paired samples correlation

	N	Correlation	Sig.
Pair 1 BEFORE IFRS & AFTER IFRS	749	.001	.978

Paired-samples t-test

	Paired differences							
	Mean	Std. deviation	Std. error mean	95% Confidence interval of the difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Pair 1 BEFORE IFRS - AFTER IFRS	-87036	1904705	69596	-223664	49591	-1.251	748	.211

Based on the above results, this study provides four pieces of empirical evidence. First, the adoption of international standards (IFRS and IAAS) rather than Saudi accounting and auditing standards does not significantly influence AEQ. Consequently, the accounting regulations quality does not significantly influence AEQ. Second, a rising EU level leads to an increase in the extent of accounting estimates. Third, a rising EU level has a significant influence on the relationship between CEO reputation, audit quality and AEQ. A rise in EU level encourages a CEO with a strong reputation to increase discretionary accrual to convey messages to other stakeholders about EU circumstances, business risks, and financial risks surrounding the firm's activities. The Big 4 audit firms were also found to encourage their clients to increase the discretionary accrual to communicate messages to stakeholders about EU circumstances and audit risks associated with financial reporting. In contrast, a rising EU level has no influence on the relation between

accounting regulations quality and AEQ. Fourth, the interaction between the level of EU and AEQ is reflected in the company's share price.

In summary, CEO reputation and audit quality have an influence on enhancing AEQ, especially in the face of growing EU. In addition, the relation between EU level and AEQ is reflected in the company's share price.

5. Conclusion, limitations, recommendations, and future research.

This study sought to investigate the relationship between standards quality and accounting estimates quality (AEQ). The study also examined the impact of an increasing level of environmental uncertainty (EU) on the relation between the quality of standards and the quality of accounting estimates and how this might be reflected in the share price. Agency theory was used to develop a research framework and research hypotheses. Using a sample of companies registered on the Saudi Arabia Stock Exchange, four empirical findings were presented. First, the adoption of international standards (IFRS and IAAS) rather than Saudi accounting and auditing standards did not have a significant influence on the quality of accounting estimates. Consequently, accounting regulations quality does not significantly influence the quality of accounting estimates. Second, a rising level of EU leads to an increase in the extent of accounting estimates. Third, a rising level of EU has a significant influence on the relationship between CEO reputation, audit quality (as mechanisms of standards application), and the quality of accounting estimates. A rising level of EU encourages a CEO with a reputation to increase the extent of accounting estimates to convey messages to stakeholders about the circumstances of the environmental

uncertainty and the business and financial risks surrounding the firm's activities. In addition, the Big 4 audit firms encourage their clients to increase the extent of accounting estimates to communicate messages to stakeholders about the EU circumstances and audit risks associated with the financial reporting. In contrast, a rising EU level has no influence on the relation between accounting regulations quality and the quality of accounting estimates. Finally, the interaction between the level of EU and the quality of accounting estimates is reflected in the company's share price.

The present study provides three contributions to the literature on accounting estimates. First, the study examined empirically the effect of the level of EU on the quality of accounting estimates. Second, the study examined empirically the influence of EU on the relationship between international financial reporting standards application quality and the quality of accounting estimates. Third, the study investigated empirically the influence of the relationship between EU level and the quality of accounting estimates on company share price.

Moreover, the conclusions of this study have vital implications for accounting regulatory bodies and investors. Investors should be careful in their interpretation of an increase in discretionary accrual, as every increase in discretionary accrual should not be construed as opportunistic behaviour by those managing the company. This increase may be the result of increased accounting estimates intended to communicate information to market participants about the firm's risk because of increased environmental uncertainty. In addition, the results of this study reflect the need to issue a

standard containing a comprehensive framework for making accounting estimates under increasingly uncertain environmental conditions.

There are three limitations to this research. First, the results focus on one country. Second, the study sample is limited. Attention must, therefore, be paid to generalizing the research results. Third, the study sample focuses on non-financial firms, and did not include financial firms. Financial firms were excluded from the study sample because they prepare financial reporting using the IFRS and other regulations.

This research focused on discretionary accrual as a proxy for accounting estimates quality. Therefore, accounting conservatism could be proposed as a proxy of the quality of accounting estimates for future research. Comparative studies between various financial markets could be conducted to investigate the influence of EU level on the relationship between standards quality and the quality of accounting estimates. Future research could also examine the influence of the interrelationship between the extent of accounting estimates and EU level on the timing of issuing audit reports.

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