



Unintended Consequences of Enforcement: Assessing the Impact of Internal Control Weakness Reporting on Audit Quality in G20 Countries

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Resumo/Abstract

This study aimed to examine the impact of the enforcement environment and reporting of Internal Control Weaknesses (ICW) on audit quality. Employing a differences-in-differences (DiD) approach, we analyzed a comprehensive dataset comprising 27,457 listed companies in the G20 group from 2000 to 2022. Our findings revealed notable improvements in audit quality following the adoption of ICW standards, as evidenced by metrics such as earnings management through small profits and the accuracy of analysts' earnings forecasts. A robust enforcement environment plays a significant role in enhancing audit quality. However, it also uncovered unintended consequences, whereby the stringent enforcement environment led to increased earnings management through discretionary accruals and reduced the accuracy of analysts' forecasts after the adoption of ICW standards. These findings underscore the importance of effective supervision and the formulation of appropriate norms to continuously enhance governance indicators and ensure transparency.

Modalidade/Type

Artigo Científico / Scientific Paper

Área Temática/Research Area

Auditoria e Tributos (AT) / Auditing and Tax



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Abstract

This study aimed to examine the impact of the enforcement environment and reporting of Internal Control Weaknesses (ICW) on audit quality. Employing a differences-in-differences (DiD) approach, we analyzed a comprehensive dataset comprising 27,457 listed companies on the G20 group from 2000 to 2022. Our findings revealed notable improvements in audit quality following the adoption of ICW standards, as evidenced by metrics such as earnings management through small profits and the accuracy of analysts' earnings forecasts. A robust enforcement environment plays a significant role in enhancing audit quality. However, it also uncovered unintended consequences, whereby the stringent enforcement environment led to increased earnings management through discretionary accruals and reduced the accuracy of analysts' forecasts after the adoption of ICW standards. These findings underscore the importance of effective supervision and the formulation of appropriate norms to continuously enhance governance indicators and ensure transparency.

Keywords: Audit quality, Internal Control Weaknesses, accounting enforcement, legal system.

1. INTRODUCTION

The Sarbanes-Oxley Act (2002) (SOX) was enacted in response to the corporate fraud cases that occurred in the early 2000s. Its implementation aimed to enhance the Internal Control System (ICS), Corporate Governance (CG), Accounting, and Audit Quality (AQ) of companies listed in the United States (Huang et al., 2009).

Auditors and supervisory bodies play a crucial role in promoting the quality of financial information (Ruhnke & Schmidt, 2014). However, concerns about auditors' role and responsibility have led to expectation gaps and inadequate audit report content. Measures such as restatements and total provisions are used to assess audit quality (Rajgopal et al., 2021).

In this context, Internal control mechanisms enhance accounting information quality, investor protection, and corporate sustainability (Su et al., 2022). High-quality ICS restrict manipulation, reduce reporting errors, and mitigate risks. Accounting standards facilitate communication between managers and investors, providing cost-effective information for decision-making (N. C. Brown et al., 2014).

Furthermore, regulatory changes and interventions aim to improve corporate governance and enhance AQ (Asghar et al., 2020; Boulhaga et al., 2022; Zittei et al., 2021), with enforcement playing a crucial role in the regulatory landscape (Leuz, 2010). As highlighted in Barth et al. (2012) and Caban-Garcia et al. (2017), reporting practices vary due to factors such as legal systems, cultural differences, and reporting incentives. Therefore, the comparability of reports across jurisdictions remains a challenge (Leuz, 2010). The Accounting Oversight Board of Listed Companies (PCAOB) inspection process, enhances AQ, reduces earnings management, and ensures compliance according to Lamoreaux (2016) and Rajgopal et al. (2021).

In this context, accounting standards and robust ICS are essential for improving financial reporting quality and providing reliable information to investors. Regulatory interventions and enforcement mechanisms strengthen these practices, promoting transparency



and business sustainability. So, this study aims to analyze the enforcement environment and the reporting of Internal Controls Weaknesses on Audit Quality.

We investigated the impact of adopting the standard for reporting ICW on 27,457 companies within the G20 group. To compare the effects in different enforcement institutional environments, we classified the sample into high and low enforcement formats. Following P. Brown et al. (2014), logistic and Ordinary Least Squares (OLS) models were employed to analyze the data using the Differences in Differences (DiD) regression framework.

The results of this study can inform regulators in formulating effective policies and enforcement strategies to enhance AQ and promote transparency in financial reporting. Understanding the influence of the enforcement environment on the adoption of accounting standards helps regulators tailor their approaches to promote compliance and improve financial reporting practices, fostering trust and reliability in financial markets.

The insights provided by this study are relevant to stakeholders, including investors and financial analysts, enabling them to make more informed decisions based on reliable financial information. Robust enforcement mechanisms are crucial in ensuring the accuracy and integrity of financial reporting, safeguarding stakeholder interests. This study's implications and contributions extend beyond academia, providing valuable insights to enhance AQ, promote transparency, and foster trust in financial markets.

2. HYPHOTESSES DEVELOPMENT

2.1. Audit Quality and Internal Control Weaknesses

In response to significant corporate meltdowns in the early 2000s, regulators have prioritized improving the corporate governance environment. example, the enactment of the Sarbanes-Oxley Act aimed to enhance the Internal Control System (ICS), Corporate Governance (CG), Accounting, and Audit Quality (AQ) for companies listed on US stock exchanges (Huang et al., 2009).

However, cases of fraud and accounting failures have raised concerns among users of financial information regarding the role and responsibility of auditors. According to Ruhnke & Schmidt (2014), there is a growing perception that audit reports lack adequate content to support decision-making by users. In measuring AQ, researchers commonly utilize two types of proxies: outcome-based measures that evaluate the quality of auditing results, and input-based measures that focus on other metrics (Rajgopal et al., 2021).

Perception-based measures, such as earnings response rates, can capture audit quality in more comprehensive and less error-prone ways than financial reporting measures, but they are indirect measures. The restatements and total provisions consistently and positively predict each of the six purported audit deficiencies put forward by the authors and therefore represent the best representation for poor audit quality (Rajgopal et al., 2021). Thus outcome-based audit quality proxies by Rajgopal et al. (2021) are the choice for this study, given their importance for measuring the impact of adopting an accounting standard.

This way, the implementation, evaluation, and monitoring of ICS serve as key determinants of the quality of financial reporting. High-quality ICS effectively restrict the intentional manipulation of externally reported information, reduce the risk of random errors in reporting procedures and estimations, and mitigate risks associated with business strategies and operations that can potentially impact the quality of reported information (N. C. Brown et al., 2014). In this scenario, accounting standards play a crucial role in reducing information asymmetry by facilitating communication between a company's managers and investors



(Gordon & Hsu, 2018). Su et al. (2022) also emphasize the effectiveness of internal control audits in improving the accuracy and conservatism of accounting information, as well as in forecasting earnings management and financial analysts' predictions.

Recognizing the evident need for regulatory intervention, the International Auditing and Assurance Standards Board (IAASB) endorsed the International Standard on Auditing (ISA) 265 - Communicating deficiencies in internal control to those responsible for governance and management. This endorsement represents an international endeavor to improve the corporate governance (CG) landscape, inspired by the Enron case in 2001 (Asghar et al., 2020; Boulhaga et al., 2022; Zittei et al., 2021).

Effective internal control measures can reduce profit manipulation, enhance companies' operating profits, and mitigate market risks, thereby fostering sustainable business development. Companies with high-quality internal controls can effectively deter manipulations that deviate from production and business objectives, ultimately improving overall business performance (Su et al., 2022).

Employing a differences-in-differences research design, P. Brown et al. (2014) found that German companies experienced an increase in timely loss recognition and a decrease in earnings smoothing after the adoption of the standard mandating the disclosure of deficiencies in internal controls.

In conclusion, accounting standards and robust internal control systems are integral to enhancing the quality of financial reporting and ensuring the integrity and reliability of the information provided to investors. Regulatory interventions and compliance requirements further strengthen these mechanisms, contributing to overall transparency and the sustainability of businesses. Thus, our hypothesis 1 is that:

H₁: The adoption of the ICW standard positively affects audit quality.

It is important to note that reporting practices vary significantly among companies and countries, even when they are subject to the same accounting standards (e.g. P. Brown et al., 2014). These differences in reporting practices can be attributed to various factors that shape companies' reporting incentives (Leuz, 2010).

2.2. The Impact of Regulatory Enforcement on Audit Quality

Investor protection measures, outlined in corporate law, are closely tied to the development of stock markets (La Porta et al., 2006). Stock exchanges have the authority to enforce sanctions, such as expulsion or exclusion of companies, to ensure compliance. Criminal penalties also serve as a crucial regulatory aspect, deterring fraudulent practices (Leuz, 2010). Extensive research in accounting has recognized the significance of institutional frameworks across countries, classifying them based on political, economic, and legal systems to provide a comprehensive understanding of their impact (P. Brown et al., 2014).

Several factors significantly influence book values, including managerial incentives, oversight, regulatory and litigation environments (Barth et al., 2012). The financial reporting system, encompassing accounting standards, interpretation, auditing practices, enforcement, and litigation, also plays a vital role in shaping accounting values and their comparability (Barth et al., 2012). However, Abdullatif and Al-Rahahleh (2020) contend that the absence of clear guidelines on specific information to be reported by managers and auditors often leads auditors to withhold any potentially conflicting disclosures to maintain client relationships.



The literature suggests that, in addition to accounting standards, the characteristics of reported numbers are influenced by factors like the legal system and its application (Choi et al., 2018; Gordon & Hsu, 2018). This implies that financial disclosure is also influenced by national culture (Caban-Garcia et al., 2017). Furthermore, the categorization of countries based on legal origin or cultural region supports the idea that historical factors play a significant role in shaping institutional development (Leuz, 2010). Previous studies investigating the impact of institutions on accounting standards implementation have primarily focused on sets of standards such as US GAAP/IFRS. Gordon and Hsu (2018) expand on this research by examining the effects of institutions on the implementation of a specific accounting standard.

In line with this, the Sarbanes-Oxley Act (SOX) mandates the inspection of auditors by the Public Company Accounting Oversight Board (PCAOB) for both domestic and foreign auditors of SEC-registered companies (Lamoreaux, 2016; Su et al., 2022). The primary goal of the auditor inspection program is to enhance audit quality by creating ex ante incentives for auditors to improve (AQ). The possibility of a PCAOB inspection serves as a pre-commitment for auditors to disclose audit work papers at the regulator's discretion. Additionally, the PCAOB has the authority to impose fines and sanctions on individuals and audit firms involved in auditing SEC registrants (Lamoreaux, 2016). Therefore, hypothesis 2 states that:

H₂: Earnings Restatement are lower in environments with stronger enforcement measures.

The anticipated outcome of these normative changes is an improvement in audit quality (Kitiwong & Sarapaivanich, 2020; Pinto et al., 2020; Zeng et al., 2021). Additionally, the PCAOB provides guidance to certified accountants conducting internal control audits as required by Section 404 of the SOX. Subsequently, the independent auditor is then required to express an opinion on management's assessment and provide an opinion on the effectiveness of internal controls over financial reporting (Shapiro & Matson, 2008).

Lamoreaux (2016) observed that earnings management, as indicated by discretionary accruals, was reduced during the period of PCAOB audits for clients of auditors subject to inspection. This finding suggests a negative association between inspection and earnings management. However, it remains unclear whether the decline in earnings management activity was driven by client responses to increased regulatory risk or by the auditors' response to regulatory risk. It is possible that both auditors and clients adapt to the regulatory risk associated with PCAOB inspections. Thus, our hypothesis 3 is as follows:

H₃: The earnings management through discretionary accruals is less in high enforcement environments.

According to N.C. Brown et al. (2014), the findings indicate a significant negative coefficient for the ICW variable, indicating a decrease in small profits (avoided losses) among German companies after the implementation of the ICW standard. The differences-in-differences (DID) estimation also reveals a negative interaction between the country variable and the ICW variable. These findings provide evidence of reduced loss prevention following the adoption of the standard in a high accounting enforcement country. Thus, our hypothesis 4 is that:



H4: The earnings management through small profits is lower in high enforcement environments.

Based on the influence of the quality of Internal Control Systems (ICS) on the accuracy of earnings forecasts, it is observed that the implementation of the Sarbanes-Oxley Act (SOX) has a significant impact on enhancing the precision of analysts' forecasts, thereby leading to greater transparency in company information (Su et al., 2022). Considering that reported numbers are influenced by various factors, including enforcement, the legal system, and its application (Choi et al., 2018; Gordon & Hsu, 2018), we propose the following hypothesis:

H5: The analyst forecasts are more accurate in high enforcement environments.

Achieving comparability in financial reports across jurisdictions faces challenges due to various factors such as differences in capital markets, securities regulation, investor protection, supervisory systems, and economic development (Leuz, 2010).

Enforcement and legal origins play a significant role in adherence to accounting standards, with civil law countries and low enforcement showing weaker compliance compared to common law countries with high enforcement (Barth et al., 2012). Accounting indicators tend to be more similar within groups of countries with common law legal origins and high enforcement (P. Brown et al., 2014).

The success of accounting regulation relies on effective implementation and enforcement, and the ongoing debate in the literature centers around the interplay between rules-based and principles-based accounting standards, emphasizing the importance of rules and their execution (Leuz, 2010).

In addition, the incentives for adopting accounting standards are influenced by the demand for high-quality reporting and the political forces within a jurisdiction, including the level of government involvement in the codification and enforcement of accounting standards and regulations. The characteristics of accounting information vary based on the incentives associated with a country's institutional factors, such as the regulatory system, legal environment, and supervision (Gordon & Hsu, 2018). Based on the aforementioned factors and considerations, the following hypothesis is proposed:

H6: The adoption of the standard for Internal Control Weaknesses in high enforcement countries resulted in a substantial improvement in audit quality.

3. RESEARCH DESIGN

3.1. Sample selection

We analyzed data of a sample of 27,457 listed companies during the period from 2000 to 2021. The dataset used for this analysis was sourced from the Refinitiv-Eikon database. To enable meaningful comparisons on enforcement dimensions, a deliberate selection was made to exclusively utilize data from the 19 countries that constitute the G20 group. This selection was motivated by their representation of approximately two-thirds of the global population and around 85% of the global economy (Lei & Rui, 2016).

Table 1 present an overview of the countries included in these analyses, along with the year of standard adoption for ICW. Additionally, we also highlight studies that have examined various impacts associated with the adoption of these standards.



Table 1

Synthesis of country, year of adoption, legal system and ICW's studies in the sample's countries

Country	Adoption year	Accounting Enforcement ¹	Studies on ICWs
<i>Panel A – Common Law Countries</i>			
Australia	2004	High	(N. C. Brown et al., 2014)
Canada	2006	High	(Su et al., 2022)
United Kingdom	2000	High	(N. C. Brown et al., 2014; Su et al., 2022)
United States	2004	High	(N. C. Brown et al., 2014; Shapiro & Matson, 2008; Su et al., 2022)
<i>Panel B – Code Law</i>			
Argentina	2001	Low	(Caban-Garcia et al., 2017)
Brazil	2009	Low	(Zittei et al., 2021)
China	2012	High	(N. C. Brown et al., 2014; Su et al., 2022)
France	2003	High	(N. C. Brown et al., 2014)
Germany	1998	High	(N. C. Brown et al., 2014; Su et al., 2022)
India	2006	Low	(Caban-Garcia et al., 2017)
Indonesia	2004	Low	(Kiswanto et al., 2020)
Italy	2006	High	(N. C. Brown et al., 2014; Caban-Garcia et al., 2017)
Japan	2008	High	(N. C. Brown et al., 2014; Su et al., 2022)
Mexico	2006	Low	(Caban-Garcia et al., 2017)
Republic of Korea	1999	Low	(Caban-Garcia et al., 2017)
Russia	2009	Low	(Kondrashova Natalia G., 2017)
Saudi Arabia	2010	-	(Su et al., 2022)
South Africa	2004	High	(Dzomira, 2020)
Turkey	2006	Low	(Koçak & Demirool, 2013)

Note: ¹ classifications according to P. Brown et al. (2014) and Gordon and Hsu (2018), accounting enforcement is not available for Saudi Arabia. European Union wasn't considered on the sample given the diversity on enforcement classification between group countries.

To mitigate the impact of outliers, we applied winsorization the continuous independent variables between 1% and 99%. Furthermore, to fulfill the assumptions of normality and heteroscedasticity in the residuals of both models, we applied a Box-Cox transformation to the discretionary accruals from Kothari et al. (2005) (KLW) and Earnings Forecast Accuracy (ACCY) variables.

3.2. Empirical Model

We utilized available data from Refinitiv to determine the AQ proxies used in this study. Consistent with the approach taken by Zeng et al. (2021), we considered four proxies: (i) Discretionary Accruals (KLW), (ii) Earnings management from Small Profits (SP), (iii) Financial Restatement (Rest), and (iv) Analysts Forecasts Accuracy (ACCY). Given that we analyzed multiple proxies for AQ, including KLW, SP, ACCY, and Rest, the sample size varied for each specific model. Table 2 provides details on the subsample used for each AQ dependent variable in the respective estimated models.

To investigate the impact of ICW standards adoption, we applied the DiD approach. Following the procedures used by P. Brown et al. (2014) and Lamoreaux (2016), we applied a Propensity Score Matching (PSM) technique to select a comparable sample of companies from both treatment and control groups, as recommended by Li and Luo (2023).

The models employed in this study, as outlined in Equations 1, 2 and 3, allowed us to evaluate the relationship between standard adoption and the respective audit quality proxies.



As additional analyses we estimated these Equations for the variables of discretionary accruals from Dechow et al. (1995) and Jones (1991).

$$AQ_{it} = \beta_0 + D_1POST_{jt} + D_2PCAOB_{jt} + D_3POST_{jt} * PCAOB_{jt} + \sum_{k=1}^{17} \beta_k Controls + \varepsilon_{it} \quad (Eq. 1)$$

Where: AQ_{it} : Audit Quality proxies for the company i in the year t ; $POST_{jt}$: Internal Control Weaknesses standard adoption of the country j in the year t ; $PCAOB_{jt}$: PCAOB supervision in the country j from the year t ; Controls: control variables adopted in this study based on previous empirical evidence, mentioned on Appendix A; ε_{it} is the error term for the company i in the year t .

$$AQ_{it} = \beta_0 + D_1POST_{jt} + D_2HighAE_j + D_3POST_{jt} * HighAE_j + \sum_{k=1}^{17} \beta_k Controls + \varepsilon_{it} \quad (Eq. 2)$$

Where: $HighAE_j$: country j with High Accounting Enforcement.

$$AQ_{it} = \beta_0 + D_1POST_{jt} + D_2ComLaw_j + D_3POST_{jt} * ComLaw_j + \sum_{k=1}^{17} \beta_k Controls + \varepsilon_{it} \quad (Eq. 3)$$

Where: $ComLaw_j$: Common Law country j .

Our analysis focused on examining the impact of differences in standard adoption at various stages of development on proxies for AQ. Specifically, we utilized OLS regressions for KLW and ACCY dependent variables, while logistic regressions were employed for SP and Rest, proxies for AQ.

Table 2
Sample composition for each estimated model

	Equation		
	(1)	(2)	(3)
Initial sample	465565	465565	465565
(-) Financial, public administration, management, and other services sectors	130929	130929	130929
<u>Initial sample available</u>	<u>334636</u>	<u>334636</u>	<u>334636</u>
Earnings management – KLW	334636	334636	334636
(-) Observations without available data to estimate DA model	23598	23598	23598
Subsample – DA model	311038	311038	311038
<u>Subsample for DA model post PSM</u>	<u>93176</u>	<u>176062</u>	<u>191204</u>
Earnings management - SP	334636	334636	334636
(-) Observations without available data to estimate SP model	0	0	0
Subsample – SP model	334636	334636	334636
<u>Subsample for SP model post PSM</u>	<u>100752</u>	<u>190662</u>	<u>204474</u>
Analysts' forecasts – ACCY	334636	334636	334636
(-) Observations without available data to estimate ACCY model	225570	225570	225570
Subsample – ACCY model	109066	109066	109066
<u>Subsample for ACCY model post PSM</u>	<u>51302</u>	<u>33130</u>	<u>89212</u>
Earnings Restatement - (Rest)	334636	334636	334636
(-) Observations without available data to estimate Rest model	287416	287416	287416
Subsample – Rest model	47220	47220	47220
<u>Subsample for Rest model post PSM</u>	<u>33460</u>	<u>11360</u>	<u>40330</u>



To measure the first proxy, for earnings management, KLW, we employed the model proposed by Kothari, Leone, and Wasley (2005). This model has been widely used in prior literature on AQ and earnings management, as indicated by Rajgopal et al. (2021). In accordance with their methodology, we calculated KLW as the residuals obtained from the regression model estimated using Equation 4.

$$\text{Accr}_{it} = \alpha_1 \left(\frac{1}{\text{TA}_{it-1}} \right) + \alpha_2 \left(\frac{\Delta \text{NR}_{it} - \Delta \text{AR}_{it}}{\text{TA}_{it-1}} \right) + \alpha_3 \left(\frac{\text{PPE}_{it}}{\text{TA}_{it-1}} \right) + \alpha_4 \left(\frac{\text{ROA}_{it-1}}{\text{TA}_{it}} \right) + \varepsilon_t \quad (\text{Eq. 4})$$

Where: Accr: Total accruals; CA: Current Assets; CASHE: Cash and equivalents; CL: Current Liabilities; LFST: Short term loans and financing; TaxPay: Tax payable; Deprec: Depreciation; TA: Total assets; NR: Net revenue; PPE: Plant, property and equipment; AR: Accounts receivable; ROA: Return on assets.

The estimation of discretionary accruals as an audit quality (AQ) metric is consistent with previous studies conducted by Donelson et al. (2020), Santos et al. (2020), and Teucher and Ratzinger-Sakel (2022).

Regarding the second proxy, Small Profits (SP) as a measure of earnings management, we defined it as a binary variable. Specifically, it takes a value of 1 when the Return on Assets (ROA) falls within the range of zero to one percent, and 0 otherwise. This approach aligns with the findings of Teucher and Ratzinger-Sakel (2022) and Zeng et al. (2021), who emphasized that companies often manipulate earnings to meet regulatory requirements and report small profits. Moreover, this metric serves as an indicator of investors' surprise regarding profit metrics.

The third proxy, Restatement (Rest), was also operationalized as a binary variable, taking a value of 1 if the financial statement has been restated, and 0 otherwise. This choice is consistent with the observations made by Donelson et al. (2020), Kitiwong and Sarapaivanich (2020), Zeng et al. (2021), and Rajgopal et al. (2021), who have demonstrated that restatements indicate poor audit quality and highlight instances where auditors mistakenly issued unqualified opinions.

Analysts' Forecasts Accuracy (ACCY) was measured as the difference between forecasted earnings per share (EPSForecast) and actual earnings per share (EPSActual), scaled by the lagged share price (Pricet-1). This measurement approach is in line with studies conducted by Su et al. (2022) and Venturini et al. (2022). They argue that higher audit quality enhances the reliability of earnings reporting, enabling analysts to make more accurate predictions of future earnings compared to companies that have undergone substandard audits. Therefore, a higher audit quality is reflected in a smaller deviation from zero for ACCY, indicating more accurate earnings forecasts.

As Leuz (2010) concluded [9], there are substantial enforcement differences across the world. Therefore, this study chose to analyze the enforcement of legal origin (Common/Code Law), enforcement from the perspective of accounting regulation (High/Low Accounting Enforcement), and the corresponding enforcement of PCAOB inspection for audit procedures.

We used enforcement proxies operationalized as dummy variables, taking a value of 1 for countries classified as treatment (Common Law, High Accounting Enforcement, and PCAOB supervision) and 0 otherwise. According to Kitiwong and Sarapaivanich (2020), Pinto et al. (2020), and Zeng et al. (2021), the institutional environment influences audit quality, especially in emerging economies where investor protection is lower compared to developed economies. In summary, we expected higher audit quality in the treatment groups.



Finally, we considered the interaction between the dichotomous proxy for standard on Internal Control Weakness (ICW) adoption (POST) and treatment variables to capture the effect of internal control regulation on countries with high enforcement. We expect to observe negative effects on discretionary accruals (D_1 and D_3 on KLW), earnings management for small profits (SP), restatements (Rest), and analyst forecast accuracy (ACCY) after the adoption of the standard, indicating a lower level of discretionary accruals, less manipulation in reporting small profits to avoid income loss, a reduced probability of mandatory financial restatements, and more accurate analyst forecasts.

4.RESULTS AND DISCUSSION

4.1. Descriptive Statistics and Correlation Analyses (Interest Variables)

Table 3 presents descriptive statistics for variables in the full sample and treatment groups. Mean difference tests reveal significant p-values across treatments, supporting Leuz's (2010) findings. Notably, the earnings management variable (discretionary accruals) demonstrates higher means in high enforcement groups, contrary to existing literature. Similar patterns are observed for ACCY and Rest. However, it should be acknowledged that this analysis lacks the PSM procedure, which ensures group homogeneity but limits a global analysis of available observations.



Table 3
Descriptive statistics

Variables	Total Sample		PCAOB _{jt}			HighAE _j			ComLaw _j		
	N	N = 334,636	0	1	p-value ³	0	1	p-value ³	0	1	p-value ³
<i>Panel A - Quantitative Variables¹</i>											
KLW _{it}	311,038	-0.01(0.39)	-0.01(0.32)	0.01(0.66)	<0.001	-0.01(0.22)	-0.01(0.44)	<0.001	-0.01(0.20)	0.00(0.64)	<0.001
ACCY _{it}	109,066	0.09(0.34)	0.09(0.31)	0.12(0.40)	<0.001	0.10(0.33)	0.09(0.34)	<0.001	0.06(0.25)	0.14(0.43)	<0.001
SIZE _{it}	334,636	18.81(2.37)	18.82(2.20)	18.73(3.17)	<0.001	18.41(2.00)	18.97(2.49)	<0.001	19.10(1.95)	18.16(3.03)	<0.001
ROA _{it}	334,636	-0.09(0.56)	-0.04(0.39)	-0.39(1.06)	<0.001	0.01(0.19)	-0.14(0.65)	<0.001	0.02(0.17)	-0.34(0.94)	<0.001
LEVER _{it}	334,636	-0.10(13.43)	-0.05(12.79)	-0.37(16.59)	<0.001	0.12(8.57)	-0.19(14.93)	<0.001	0.12(7.74)	-0.61(21.30)	<0.001
BTM _{it}	334,636	3.11(7.25)	3.03(6.64)	3.54(10.03)	<0.001	3.01(7.46)	3.15(7.17)	<0.001	2.98(6.25)	3.41(9.13)	<0.001
CFO _{it}	334,636	-0.01(0.29)	0.02(0.22)	-0.13(0.51)	<0.001	0.05(0.13)	-0.03(0.33)	<0.001	0.05(0.12)	-0.13(0.47)	<0.001
<i>Panel B - Qualitative Variables²</i>											
SP _{it}	334,636	236,738(71%)	210,000(74%)	26,738(53%)	<0.001	71,135(75%)	165,603(69%)	<0.001	186,434(80%)	50,304(49%)	<0.001
Rest _{it}	47,220	476(1.0%)	220(0.7%)	256(1.5%)	<0.001	21(0.4%)	455(1.1%)	<0.001	138(0.7%)	338(1.2%)	<0.001
POST _{jt}	334,636	282,544(84%)	235,545(83%)	46,999(93%)	<0.001	89,111(93%)	193,433(81%)	<0.001	190,663(82%)	91,881(90%)	<0.001
Big4 _{it}	310,934	135,840(44%)	108,404(41%)	27,436(59%)	<0.001	26,817(30%)	109,023(49%)	<0.001	82,515(38%)	53,325(56%)	<0.001
AUD _{it}	310,934				<0.001			<0.001			<0.001
ANBIG4 _{it}		175,094(56%)	156,023(59%)	19,071(41%)		63,257(70%)	111,837(51%)		133,805(62%)	41,289(44%)	
DIT _{it}		35,825(12%)	30,100(11%)	5,725(12%)		7,136(7.9%)	28,689(13%)		24,721(11%)	11,104(12%)	
EY _{it}		40,801(13%)	30,691(12%)	10,110(22%)		5,523(6.1%)	35,278(16%)		24,078(11%)	16,723(18%)	
KPMG _{it}		30,085(9.7%)	24,947(9.4%)	5,138(11%)		5,200(5.8%)	24,885(11%)		18,361(8.5%)	11,724(12%)	
PWC _{it}		29,129(9.4%)	22,666(8.6%)	6,463(14%)		8,958(9.9%)	20,171(9.1%)		15,355(7.1%)	13,774(15%)	
LCS _{it}	323,538				<0.001			<0.001			<0.001
Introduction _{it}		53,186(16%)	42,244(15%)	10,942(23%)		13,163(14%)	40,023(17%)		26,657(12%)	26,529(28%)	
Growth _{it}		77,636(24%)	67,625(24%)	10,011(21%)		22,706(25%)	54,930(24%)		58,275(26%)	19,361(20%)	
Mature _{it}		133,053(41%)	114,828(42%)	18,225(39%)		37,440(40%)	95,613(41%)		100,204(44%)	32,849(35%)	
Shake-Out _{it}		37,406(12%)	33,382(12%)	4,024(8.5%)		11,372(12%)	26,034(11%)		29,135(13%)	8,271(8.7%)	
Decline _{it}		22,257(6.9%)	18,317(6.6%)	3,940(8.4%)		7,907(8.5%)	14,350(6.2%)		14,217(6.2%)	8,040(8.5%)	
Emerg _j	334,636	109,546(33%)	109,546(39%)	0(0%)	<0.001	56,000(59%)	53,546(22%)	<0.001	109,546(47%)	0(0%)	<0.001
COV _t	334,636	45,121(13%)	38,543(14%)	6,578(13%)	0.002	13,284(14%)	31,837(13%)	<0.001	31,995(14%)	13,126(13%)	<0.001
Subprime _t	334,636	26,193(7.8%)	21,827(7.7%)	4,366(8.7%)	<0.001	7,515(7.9%)	18,678(7.8%)	0.4	17,907(7.7%)	8,286(8.1%)	<0.001

Note: ¹Mean (Standard Deviation); ²Events that occurred (% events); ³Welch Two Sample t-test/ Kruskal-Wallis rank sum test; N: number of observations; PCAOB_{jt}: PCAOB supervision in the country j from the year t; HighAE_j: country j with High Accounting Enforcement; ComLaw_j: Common Law country j; KLW_{it}: discretionary accruals by Kothari et al. (2005) model; ACCY_{it}: analysts forecast accuracy; SIZE_{it}: company size; ROA_{it}: return on assets; LEVER_{it}: leverage; BTM_{it}: book to market; CFO_{it}: cash from operations; SP_{it}: small profits; Rest_{it}: earnings restatement; POST_{jt}: standard adoption for internal control weaknesses; Big4_{it}: dummy variable equal 1 for Big4 auditor, 0 otherwise; AUD_{it}: categorical variable identifying Big4 auditor; LCS_{it}: Life Cycle Stage according to Dickinson (2011); Emerg_j: dichotomous proxy for emerging economies; COV_t: period t influenced by COVID-19 pandemic; and Subprime_t: period t economically influenced by the subprime crisis.



Regarding the quantitative control variables, only size and BTM are higher in high enforcement groups. ROA, LEVER, and CFO were perceived to have significantly lower mean values. The auditor type variables reveal that for PCAOB supervision, high accounting enforcement, and common law legal origin, the percentages of observations with a Big4 auditor are 18%, 19%, and 18% higher, respectively, than the low enforcement groups of control.

In Table 4 we analyze correlation matrix from Spearman and Pearson. For dichotomous variables (e.g. event and treatment groups) we will consider just Spearman correlation as recommended by test requirements. On correlation between AQ proxies and independent variables, just DA from Kothari et al. (2005) (KLW_{it}) wasn't significant for all treatment groups.

Table 4
Correlation matrix from Spearman and Pearson

^{1/2}	PCAOB_{jt}	ComLaw_j	HighAE_j	POST_{jt}	KLW_{it}	ACCY_{it}	SP_{it}	Rest_{it}
PCAOB_{jt}		0.62****	0.24****	0.07****	0.03****	0.02****	-0.13****	0.03****
ComLaw_j	0.62****		0.39****	0.15****	0.01	0.14****	-0.17****	0.02****
HighAE_j	0.24****	0.39****		-0.06****	0.00	-0.05****	-0.06****	0.02****
POST_{jt}	0.07****	0.15****	-0.06****		0.02***	0.11****	-0.07****	-0.03****
KLW_{it}	0.02**	-0.01	0.00	0.01		-0.06****	0.04****	-0.01*
ACCY_{it}	0.00	0.06****	-0.01*	0.04****	-0.04****		-0.41****	0.00
SP_{it}	-0.13****	-0.17****	-0.06****	-0.07****	0.03****	-0.34****		0.00
Rest_{it}	0.03****	0.02****	0.02****	-0.03****	-0.01	0.00	0.00	

Note: ¹Pearson Correlation ²Spearman Correlation; **** p < 0.001; *** p < 0.01; ** p < 0.05; * p < 0.10.

The other audit quality proxies (ACCY, SP, and Rest) showed a significant correlation of at least 1% with all the analyzed enforcement measures. The signals were not what was expected, however, they were low correlations. The highest was between SP and ComLaw, at 17% and with a negative sign. These results, confirming that there is a correlation, but that it is low, and with a sign opposite to that expected for ACCY and Rest, corroborate Barth et al. (2012) in the sense that they did not find the impact they expected from enforcement for the proxies that are also used to measure AQ.

The adoption of the Internal Control Weaknesses (POST) norm showed a significant correlation at 0.1% with the AQ proxies, however the signal only confirmed as expected for SP and Rest, proxies considered by Rajgopal et al. (2021) as the most efficient to measure the quality of the audit. These findings lead to the understanding that after the adoption of the standard, an improvement in the quality of the audit was also noticed, corroborating N. C. Brown et al., (2014) and Su et al. (2022), respectively.

4.3. Regression Analyses for Differences-in-Differences Approach

On regression analyses in Table 5 we observe results for KLW. The models showed statistical significance and predictive power. For Equations 1 and 3, the fixed effects model is the most appropriate, and for Equation 2, the model with random effects. Additional analyzes were performed for the DA proxies of Jones (1991) and Dechow et al. (1995). The results of these tests were similar to those observed for the explained variable KLW.



Table

Regression analyses for KLW AQ proxy

	E.S	KLW _{it} (Eq.1)	KLW _{it} (Eq.2)	KLW _{it} (Eq.3)
Intercept		3.47 *** (0.03)	3.49 *** (0.01)	3.55 *** (0.02)
POST _{jt}	-	0.02 * (0.01)	-0.00 (0.00)	-0.00 (0.01)
PCAOB _{jt}	-	-0.06 (0.04)		
POST _{jt} *PCAOB _{jt}	-	0.05 (0.04)		
HighAE _j	-		-0.02 ** (0.01)	
POST _{jt} *HighAE _j	-		0.00 (0.01)	
ComLaw _j	-			-0.08 *** (0.02)
POST _{jt} *ComLaw _j	-			0.07 *** (0.02)
N		82246	159779	169393
R2		0.07	0.68	0.07
adj.R2		0.07	0.68	0.07
p.value		0.00	0.00	0.00

Note: *** p < 0.001; ** p < 0.01; * p < 0.05; Bold p < 0.10. Clustered robust standard errors. Panel with fixed effects for sector, year and country. N: number of observations; E.S.: Expected signal.

The adoption of the standard increased earnings management through discretionary accruals (KLW) on Eq.1. Even in common law countries (ComLaw), where this level of enforcement reduces the KLW. After the adoption of the standard (POST*ComLaw) the positive coefficient (significant at 5%) reveals that even in the ComLaw countries the impact was to increase earnings management by discretionary accruals. Contradicting the findings from P. Brown et al. (2014).

The analysis of these results (Table 4) confirms Hypothesis 4 of this study. Thus, corroborating (Lamoreaux, 2016), the environment of high enforcement and the perspectives of High Accounting Enforcement and Common Law leads to less practice of earnings management by discretionary accruals, reducing DA in these groups by 0.02 and 0.08 respectively.

Table 6 shows the results for the study equations in relation to the Small Profits (SP) proxy. They are logistic regression models when the explained variable is dichotomous. The area under the curve (AUC) was greater than 0.8 in the three models, classifying them as perfectly predictive according to Rajgopal et al. (2021). Accuracy was greater than 76%, with assertiveness of event occurrence (SP) varying between 77% and 87% (sensitivity).

The results reported in Table 6 contribute to confirm hypothesis 1 that the adoption of the standard contributed to improving the quality of the audit with a reduction in earnings management by SP when analyzing equations 1 and 3 for the PCAOB and Common Law treatment groups, respectively. In addition, we can confirm hypothesis 5 of this study, that greater enforcement in PCAOB inspection, and in common law (ComLaw) and high accounting enforcement (HighAE) countries, contributes considerably to improving audit quality. In common law countries, I would point out that this conclusion is only possible because the adoption of the standard for reporting deficiencies in internal controls contributed to the interaction having a negative coefficient, partially corroborating what was proposed by Caban-Garcia et al. (2017).



Table

Regression analyses for SP AQ proxy

	E.S	SP _{it} (Eq.1)	SP _{it} (Eq.2)	SP _{it} (Eq.3)
Intercept		-3.17 *** (0.09)	-5.23 *** (0.08)	-4.00 *** (0.06)
POST _{jt}	-	-0.14 *** (0.04)	0.23 *** (0.04)	-0.05 * (0.02)
PCAOB _{jt}	-	-0.51 *** (0.06)		
POST _{jt} *PCAOB _{jt}	-	0.10 (0.06)		
HighAE _j	-		-0.53 *** (0.04)	
POST _{jt} *HighAE _j	-		-0.40 *** (0.05)	
ComLaw _j	-			0.09 ** (0.04)
POST _{jt} *ComLaw _j	-			-0.09 * (0.04)
N		88485	172552	180612
GL		19.00	19.00	19.00
AIC		73157.94	155727.69	176613.06
AUC		0.866	0.812	0.839
Accuracy		0.8161	0.7670	0.7621
Specificity		0.7148	0.6741	0.7493
Sensitivity		0.8779	0.8111	0.7717
logLik		-36559.97	-77844.84	-88287.53

Note: *** p < 0.001; ** p < 0.01; * p < 0.05; Bold p < 0.10. Clustered robust standard errors. Panel with fixed effects for sector, year and country. AUC: Area under curve; N: number of observations; E.S.: Expected signal.

Another proxy used by the literature to identify and measure audit quality is the accuracy of financial analysts' forecasts. The more accurate the earnings forecast was, the lower the proxy value. Thus, Table 7 presents the results of the OLS regressions with fixed effects.

Table 7

Regression analyses for ACCY AQ proxy

	E.S	ACCY _{it} (Eq.1)	ACCY _{it} (Eq.2)	ACCY _{it} (Eq.3)
Intercept		-5.19 *** (0.25)	-2.24 *** (0.29)	-4.93 *** (0.21)
POST _{jt}	-	0.02 (0.07)	-2.68 *** (0.17)	-0.26 *** (0.07)
PCAOB _{jt}	-	-0.85 ** (0.32)		
POST _{jt} *PCAOB _{jt}	-	0.84 * (0.33)		
HighAE _j	-		-1.80 *** (0.19)	
POST _{jt} *HighAE _j	-		3.08 *** (0.20)	
ComLaw _j	-			0.22 (0.16)
POST _{jt} *ComLaw _j	-			0.30 (0.16)
N		47959	31009	83667
R2		0.24	0.29	0.25
adj.R2		0.24	0.29	0.25
p.value		0.00	0.00	0.00

Note: *** p < 0.001; ** p < 0.01; * p < 0.05; Bold p < 0.10. Clustered robust standard errors. Panel with fixed effects for sector, year and country. N: number of observations; E.S.: Expected signal.

The results for the POST variable corroborate previous literature on the subject, such as in Su et al. (2022) in which the authors infer that the adoption of the standard for better control of internal controls would lead to better audit quality, and consequently closer profit forecasts performed, confirming H1.

Hypothesis 2 is only confirmed when considering the high enforcement variables, therefore, in countries with PCAOB supervision and high accounting enforcement, audit quality is higher, and this finding is in line with P. Brown et al. (2014), Leuz (2010), Rajgopal



et al. (2021) and Su et al. (2022). However, when interacting with the variable adoption of the norm for internal controls, the coefficient, despite continuing to be significant, becomes positive, contrary to Barth et al. (2012) and Su et al. (2022), which had inferred that countries with high enforcement after the adoption of the standard, they would present a greater increase in the quality of the audit in relation to countries with low enforcement.

Earnings restatement is an output-based proxy to measure the quality of the audit, in this we have that when the external audit is of high quality the company does not need to incur restatement (Lamoreaux, 2016; Rajgopal et al., 2021). Table 8 presents the results of the logistic regressions with the DiD approach for equations 1, 2, and 3, with the occurrence of representation or not as the explained variable (Yes = 1, No = 0).

Table 8
Regression analyses for Rest AQ proxy

	E.S	Rest _{it} (Eq.1)	Rest _{it} (Eq.2)	Rest _{it} (Eq.3)
Intercept		-13.86 *** (1.00)	-28.74 (302.94)	-17.26 *** (1.36)
POST _{jt}	-	-0.40 (0.33)	10.91 (302.92)	-0.38 (0.25)
PCAOB _{jt}	-	0.39 (0.41)		
POST _{jt} *PCAOB _{jt}	-	0.01 (0.43)		
HighAE _j	-		12.68 (302.93)	
POST _{jt} *HighAE _j	-		-10.91 (302.93)	
ComLaw _j	-			0.48 (0.52)
POST _{jt} *ComLaw _j	-			0.22 (0.53)
N		31334	10630	37709
GL		20.00	20.00	20.00
AIC		3207.03	542.05	2937.37
AUC		0.794	0.866	0.766
Accuracy		0.6286	0.8438	0.5626
Specificity		0.626431	0.844279	0.560535
Sensitivity		0.835962	0.744681	0.847015
logLik		-1583.52	-251.02	-1448.68

Note: *** p < 0.001; ** p < 0.01; * p < 0.05; Bold p < 0.10. Clustered robust standard errors. Panel with fixed effects for sector, year and country. AUC: Area under curve; N: number of observations; E.S.: Expected signal.

All models showed accuracy greater than 50% and AUC greater than 0.76, with a high explanatory power for the occurrence or not of resubmission. However, the hypotheses that could be confirmed by these regressions (H₁ and H₂) were not confirmed in the face of non-significant coefficients at least 10%. This lack of significance for the variables of interest, as well as for most of the control variables, can be explained by the lack of data for the explained variable Rest. Because, as can be seen in Table 2, the number of observations with this data is approximately only 10% of the initial sample, compromising the robustness of the results for earnings restatement as a proxy for AQ.

Our last hypothesis (H₆), that the adoption of ICW standards in high enforcement countries generated a superior improvement in AQ, could not be confirmed. And for certain AQ proxies this was contradicted. In summary, the high enforcement environment contributed to the increase in earnings management through discretionary accruals and to the reduction in the accuracy of analysts' forecasts after the adoption of standards for publishing ICW. These findings contradict studies such as those by Caban-Garcia et al. (2017), Gordon and Hsu (2018) and Kitiwong and Sarapaivanich (2020), and at the same time corroborate with Barth et al. (2012) and Abdullatif and Al-Rahahleh (2020) in the understanding that there may be an effort



by managers to balance good results with deficiencies in internal controls that, as a result of strong supervision, have become mandatory to be published.

5. CONCLUSION

This study examines the impact of the enforcement environment and Internal Control Weaknesses (ICW) on Audit Quality (AQ) using data from companies listed in G20 countries between 2000 and 2022. The sample includes 334,636 observations (company/year) after excluding financial sector companies. The analysis employs descriptive statistics, correlation analysis, logistic regression, and OLS regression with a differences-in-differences approach. The focus is on the adoption of a standard that requires reporting of internal control weaknesses in the sampled countries. Audit quality proxies utilized are discretionary accruals, small profits, restatements, and analyst forecast accuracy, following Rajgopal et al. (2021).

Hypothesis 1, concerning the adoption of the internal control reporting standard, is supported and aligns with findings from previous studies by Barth et al. (2012), N. C. Brown et al. (2014), Gordon and Hsu (2018), and Kitiwong and Sarapaivanich (2020). These studies suggest an improvement in audit quality, specifically in managing earnings through small profits and the accuracy of earnings forecasts by financial analysts.

Hypotheses 2, 4, and 5 are confirmed, indicating that high enforcement contributes to more accurate earnings forecasts, lower earnings management through discretionary accruals, and reduced earnings management through small profits, respectively. These results are consistent with prior research by P. Brown et al. (2014), Caban-Garcia et al. (2017), Gordon and Hsu (2018), Huang and Ye (2021) Lamoreaux (2016), Leuz (2010), Su et al. (2022), highlighting the positive impact of high enforcement on audit quality across the three treatment groups considered in this study.

However, Hypothesis 6, regarding the adoption of internal control weakness (ICW) standards in high enforcement countries for improved audit quality, could not be confirmed. The study finds that the high enforcement environment increases earnings management and reduces forecast accuracy after ICW adoption, aligning with the findings of Barth et al. (2012) and Abdullatif and Al-Rahahleh (2020) on managers balancing results with internal control deficiencies under strict supervision.

These results have practical implications for regulators aiming to enhance audit quality through standards adoption. They highlight the importance of a high enforcement environment, which contributes to better audit quality, including the adoption of accounting standards and providing stakeholders with greater assurance regarding audit procedures. Additionally, the study emphasizes the need to control for the effects of high enforcement in future empirical research on this topic.

The use of multiple audit quality proxies was necessary due to the absence of a single robust variable in the literature. However, it is important to acknowledge the limitations observed in the analysis, such as limited data availability for the restatement variable and the subjectivity of the audit quality proxies, as highlighted by Rajgopal et al. (2021).



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Appendix A

Control Variables

Variable	Definition
Company size (SIZE)	Natural logarithm of total assets as a proxy, as larger firms are expected to exhibit higher audit quality due to their resources and expertise.
Return on assets (ROA)	Net income scaled by total assets adopted because companies with higher returns may be under pressure to maintain their results, suggesting, in this context, a greater propensity for earnings management practices.
Forecast estimates (Estim)	Number of analysts' earnings forecasts estimates used as control proxy in the models for ACCY AQ metric.
Leverage (LEVER)	Company's ability to use capital structure to achieve better returns, used as a financial proxy.
Book to market (BTM)	Variable measured by the market value of a company relative to its actual worth, this emphasize overpriced companies.
Cash from operations (CFO)	Cash flow from operations scaled by total assets were included based on their associations with earnings management, which serves as an indicator of audit quality in this study.
Big4 auditor (Big4)	While being audited by a Big 4 firm does not guarantee higher audit quality, numerous studies have found positive effects on accounting information quality, such as earnings management and reduced earnings restatements.
Life cycle stages (LCS)	Proxy developed by Dickinson (2011), which considers cash flow signals to determine distinct stages. These stages have been found to influence auditor characteristics (Jain & Agarwalla, 2022) and analysts' forecast accuracy (Venturini et al., 2022).
Emerging countries (Emerg)	Dummy variable coded as 1 for emerging economies. In emerging economies, where investor protection may be lower compared to developed economies, previous studies have emphasized the impact of the institutional environment on audit quality.
Subprime crisis (Subprime)	Dummy variable for the subprime crisis, assuming a value of 1 for the years 2008 and 2009.
COVID-19 pandemic (COV)	Dummy variable for the global incidence of the COVID-19 pandemic, assuming a value of 1 for the years 2020 and 2021.