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Article

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The effect of audit market deregulation on audit competition and quality

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Abstract

***Purpose**:* This paper examines the effect of minimum audit fee reserve deregulation on audit quality. Specifically, we examine the impact of the 2011 audit fee deregulation in Greece.

Design/methodology/approach: Our sample consists of 120 firms listed on the Athens Stock Exchange, from twelve industries. The period of observation is 10 years, with 1.200 firm-year observations. The examined period is divided into the five years prior to the deregulation (2007-2011) and those after it (2012-2016) to illustrate the impact of the audit deregulation. We use earnings quality as an audit quality proxy, set various independent variables as suggested by existing literature and conduct a difference in difference (DID) analysis and robustness tests. To estimate abnormal accruals we use the same model as Han and Wang (1998).

Findings: Our results indicate a statistically significant negative relationship between audit quality and deregulation, which suggests that augmented competition of audit firms has a negative effect on audit quality.

Originality/value: This study adds the case of Greece to the existing literature on the impact of audit deregulation on audit quality. The results corroborate the stream of research that finds a positive association between audit fee deregulation and audit quality decrease. To the authors' best knowledge, this is the first similar study conducted in a European economy. In addition, our findings suggest that policy makers should carefully plan deregulations especially in jurisdictions with an emerging capital market distinguished by a low degree of supervisory effectiveness and poor investor protection mechanisms.

Keywords: Audit quality, deregulation, audit fees, earnings quality, audit firm competition.

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1. Introduction: audit deregulation and audit quality

The aim of the study is to examine the relationship between audit deregulation and the ensuing audit firm competition on audit quality in the Greek setting, after the 2011 audit regulatory adjustment. Audit regulations aim to guarantee the reliability of financial statements published by firms. Audit deregulation refers to the reduction or elimination of government regulations that oversee the audit industry and it can take numerous forms, such as a reduction in reporting requirements, a simplification of restrictions on audit firms, or a reform of oversight mechanisms.

The enactment of the Sarbanes-Oxley (SOX) Act in 2002 sets a landmark for the regulation of the audit profession. Consequent to the Enron and WorldCom audit failures, the SOX Act stopped the self-regulation of the audit profession and issued, among others, government-controlled regulation bodies and limitations on non-audit services that audit firms could provide to audit clients. According to DeFond and Lennox (2011) and Ettredge *et al.* (2011), regulation improved audit quality, leading to less risk of financial fraud and misstatement.

During the previous decade, China and Greece issued deregulations, abolishing minimum audit fee reserves which had been imposed in the ’80s and ’90s respectively. Thus, the cases of China and Greece constitute unique settings to study the impact of minimum audit fee reserve abolition on audit quality. In the case of China, the National Development and Reform Commission (NDRC) announced the discontinuation of the audit fee minimum rate, starting on 1 January 2015 (Cao *et al.*, 2022).

In Greece, audit fees had minimum reserves which were issued by the institute of certified public accountants of Greece (Regarding the establishment and operation of the Institute of certified public accountants, as well as the conditions for registration in a Special Register and practicing the profession of certified public accountant,1992). The audit fee deregulation was enacted on July 2, 2011 according to Greek law 3919/2011 (Principle of professional freedom, abolition of unjustified restrictions on access and exercise professions 2011), eliminating minimum audit fee reserves and preserving minimum audit hours per engagement. Audit fees were now subject to free negotiation between audit firms and clients, which led to augmented fee pressure as many, if not all, audit clients requested a downward renegotiation of audit fees.

In the case of audit fee deregulation, auditors are faced with a dilemma. Given that audit firms are profit-pursuing organizations and, as such, must ensure as many profit-producing engagements as possible, auditors may be willing to sacrifice

audit quality, by succumbing to client pressure for a certain amount of earnings management (De Angelo, 1981). If they do not, they accept the risk of client and related profit loss (Blay, 2005; Chang & Hwang, 2003; Lord, 1992; Trompeter, 1994). On the other hand, if an auditor caves in to client pressure and agrees to earnings management, they face the probability of future litigation and reputational costs (Kunda, 1990; Nelson, 2009). Therefore, an auditor must consider, among others, individual engagement profits, applied client pressure for misstatement, associated risks of litigation, and reputation cost before compromising audit quality.

Intense fee pressure could have a serious impact on the desired audit quality (Gramling, 1999) provided by audit firms for many reasons. First, less revenue per engagement may result in the allocation of fewer resources. This may, in turn, result in fewer or less experienced personnel and limited access to advanced audit tools per engagement. Second, fee pressure may lead to tight timetables per audit potentially leading to insufficient scrutiny, lack of peer review and overall low audit quality (Otley and Pierce, 1996). Third, prolonged fee pressure may pose difficulties for audit firms to retain experienced and skilled auditors in their ranks. High quality auditors may seek and find jobs in other industries with more competitive salaries. High rates of audit personnel turnover may, in turn, affect audit quality, since every new auditor needs a lot of time training and familiarizing with the client's operations and financial reporting (Van Linden *et al.*, 2022). Finally, yet importantly, in order to retain clients or secure future business, audit firms may be tempted to jeopardize their independence, which is a crucial component of audit quality (Munter, 2021).

The above analysis indicates that the regulation or deregulation of the audit market may have major implications on audit quality. Impaired audit quality is a critical concern, as it can result in financial misstatements, which not only undermine the quality of the financial statements but also erode stakeholder trust in financial markets. Declined trust may have adverse effect on share value and returns (Wielhouwer, 2015). In conclusion, policymakers must approach the implementation of regulations with caution because the balance between fostering a competitive audit environment and quarantining robust oversight is delicate.

The present research comes to fill a gap in the existing literature with the study of the impact of the deregulation of minimum audit fee reserves on audit quality in the case of Greece. The results will enhance knowledge on the topic and help policy makers and regulators in their decision-making.

Our study period spans from 2007 to 2016. In the above period, apart from the global financial crisis (2007-2008), Greece also experienced a fiscal crisis (2009-2018). From the above analysis, we can infer that throughout our study period Greek economy was distressed. At first by the global financial crisis and afterwards

by the Greek fiscal crisis. We conducted a Difference in Difference analysis (DID). Therefore and due to the fact that throughout the study period Greek economy was experiencing some sort of crisis, the deregulation of the audit profession in 2012 was the primary factor influencing audit quality in the years that followed (2012-2016). In order to examine the impact of the deregulation of minimum audit fee reserves in Greece on audit quality, we use a sample of 120 firms listed in the Athens Stock Exchange, for 10 years (2007-2016), from twelve industries, with 1.200 firm-year observations. As an audit quality proxy, we use earnings quality (Choi *et al.*, 2010; Francis and Yu, 2009; Higgs and Skantz, 2006; Lim and Tan, 2008; Reichelt and Wang 2010). We use various independent variables as suggested by existing literature and conduct various robustness tests (Caramanis & Lennox, 2008; Corbella *et al.,* 2015). To estimate abnormal accruals we use the Han and Wang (1998) model. The results suggest a statistically significant negative relationship between audit quality and deregulation.

The remainder of the paper proceeds as follows. Section 2 presents the literature review. Section 3 describes the research methodology, and Section 4 reports and analyzes our empirical results. Finally, section 5 concludes with the main findings of the study and suggests implications for regulators and policy makers.

2. Literature review

2.1 Relation of audit fees and audit quality

Financial statement users are interested in financial statement quality and fees charged in audit engagements. Concerns over the impact of audit firms' reduced fees on audit quality have been expressed by a number of regulators. In 2011, the Public Company Accounting Oversight Board (PCAOB) pointed out that "Serious questions have been raised both about the quality of these [e.g., Lehman Bros.] financial institutions' financial reporting practices and about the quality of audits that permitted those reporting practices to go unchecked". In addition, Lynn Turner, former Chief Accountant at the Securities and Exchange Commission (SEC) observed the impact of impressively reduced audit fees on investors: "investors get nervous when a company in their portfolio, particularly one that is in hard times, wins a steeply lower fee." (McCann, 2010). Daniel Goelzer, former acting chairman of the PCAOB, raised concerns over the impact of audit fee reductions on audit rigor, warning audit firms that "It's been widely reported that audit committees are expecting auditors to share in the economic pain that companies are feeling, by agreeing to fee reductions. The PCAOB, however, will be watching to see whether that pressure tempts audit firms to ease up on the rigor of audits" (Whitehouse, 2010). Paul George, head of the UK's Financial Reporting Council's Professional Oversight Board, similarly observed the negative impact on audit quality of downward fee pressures commenting that "a general downturn in

audit work might see firms concentrate on their bottom line at the expense of audit quality" (Nargi, 2009).

From the above concerns, we can infer that financial statement users link audit fees to audit and financial statement quality. In a number of previous researches a positive link is suggested between audit fees and audit quality. That is why low audit fees can lead to lower audit effort and thus to lower audit and financial statement quality (Asthana & Boone, 2012; Caramanis & Lennox, 2008; Frankel *et al.,* 2002; Gupta *et al.*, 2011; Hoitash *et al*., 2007; Srinidhi & Gul, 2007). Ettredge *et al.* (2014) observe that fee pressure is positively and significantly associated with accounting misstatements and reduced audit quality. Dopuch and King (1996) report that audit quality is lower when the degree of lowballing (low audit fees at the first year of a new client in anticipation of future years' low audit cost) is relatively high. In addition, when there is no lowballing or its extent is not considered high, audit quality is not affected. Defond *et al.* (2002), using the issuance of going concern opinion as an audit quality proxy, find that higher total audit fees are associated with better audit quality.

On the other hand, in several studies no significant association is stated between audit fees and audit quality. These results are based on the theory of market-based incentives (such as reputation, litigations, and other mechanisms), which deter auditors from violating the trust placed in them by investors, lenders, customers, and others and uphold audit quality despite audit fee cuts (Ball, 2009; DeAngelo, 1981a). Ashbaugh *et al.* (2003) document no material association between audit quality and audit fees when audit quality proxies are adjusted to firm performance. Chung and Kallapur (2003), using audit fee-based client importance proxies, find no significant association between audit quality and audit fees. Reynolds *et al.* (2004) do not observe a positive association between the fee ratio and abnormal accruals and argue that the findings in Frankel *et al.* (2002) could be driven by small-to-medium-sized high-growth firms. Chen *et al.* (2013) examine the impact of audit fee cuts on non-banks, on several measures of earnings quality but do not find a significant association. Krishnan and Zhang (2014) study the relationship between audit fee cuts and banks' financial reporting quality. Focusing on upward earnings management, they do not establish that audit fee cuts could affect audit quality. Finally, Chen *et al.* (2018) investigate the relationship between audit fee cuts during the global financial crisis and, amongst others, audit quality and find no significant difference in audit quality between firms that received an audit fee cut during, or before the global financial crisis and those that did not.

In contrast, a rise in audit fees can lead to the demise of the auditor's independence due to economic bonding between client and auditor. In existing literature, this assumption is mainly confirmed when an engagement is combined with non-audit fees. For instance, according to Frankel *et al.* (2002), when non-audit fees are high relative to the total audit fees, auditor independence is compromised. Furthermore,

audit fees are negatively associated with earning management proxies. The negative relation holds true only for firms with relatively brief auditor tenure, up to three years (Gul *et al.*, 2007) or for firms with weak governance (Larcker and Richardson, 2004). Concerning UK firms, Ferguson *et al.* (2004) find that non-audit services compromise auditor independence. Hoitash *et al.* (2007) report that expected and unexpected audit fees are negatively associated with accrual quality. Furthermore, Choi *et al.* (2010) find an asymmetric relationship between unexpected audit fees and audit quality measured by abnormal accruals. The results show that abnormal audit fees are negatively associated with audit quality for observations with positive abnormal audit fees, while there is no significant relationship for observations with unexpected negative audit fees. Srinidhi and Gul (2007) examine the effect of both audit and non-audit fees on accrual quality and conclude that audit fees result in higher accrual quality, whereas non-audit fees lead to economic bonding and consequent loss of audit quality. In addition, the rate of deterioration in accrual quality is smaller at high values of non-audit fees. Finally, Kanagaretnam *et al.* (2010) find similar results concerning earnings management via abnormal loan loss provisions of small banks, which pay higher abnormal fees to the auditor. These findings suggest that economic bonds, developed between the auditor and the audited eroded auditor independence and, consequently, audit quality deteriorated.

In conclusion, according to existing literature, the relationship between audit fees and audit quality is not yet determined, and seems to be sample-related.

2.2 Deregulation and audit quality

Cao *et al.* (2022) research the impact of the deregulation of minimum audit fee reserves in China on audit quality. According to their results, even though a drop of audit fees of industry specialists was documented, audit effort and audit quality were not impaired. On the other hand, according to Kasai and Takada (2012) the case in Japan was different. Until 2004 the Japanese Institute of certified public accountants issued a table of standard audit fees, which in practice was used as an upper limit of fees. Audit fees were the subject of negotiation between firm managers and audit firms before and after deregulation. Because of deregulation, audit fees in Japan were increased, and interestingly audit quality decreased. This is attributed to the demise of auditor independence, which followed the increase of audit fees.

Crittenden *et al.* (2003) studied the potential association between the pricing power reduction and a change in regulatory restrictions on competitive bidding and advertising of audit firms. They concluded that, with deregulation market-driven competition increased, making it difficult for Tier I firms (nine larger audit firms in the UK) to charge a fee premium for audit services. In Greece, since the audit fee deregulation of 2012, 28 new audit firms (mainly small) have been introduced to

the Greek audit market, inducing a rise of 116% in the number of audit firms in just 7 seven years and a consequential rise to audit market competition. Meanwhile, under audit regulation, with the SOX Act, small, low-quality audit firms were forced to exit the market and the former clients then received better quality audit services (DeFond & Lennox, 2011).

In Greece, audit fee deregulation effectively started in 2012, and, since then, 28 new audit firms (mainly small) have been introduced to the Greek audit market. This rise of 116% in the number of audit firms in just seven years resulted in an intensification of fee pressure towards audit firms and consequently a reduction of audit fees. Given that existing literature outlined above does not reach a definitive conclusion as to the relation between audit fees and audit quality, suggesting that it may be sample-related, or that a decrease of audit fees may result in a decrease of audit quality, our hypothesis is formulated as follows:

H0. *There is a negative association between audit quality and audit deregulation.*

3. Methodology

3.1 Sample construction

Our initial sample consists of 216 firms listed on the Athens stock exchange for the year 2007 to 2016. We excluded

- 19 firms in banking, insurance, and utility industries due to their unique characteristics.
- 40 firms with missing values
- 37 firms in industries with fewer than 10 observations (per industry)

After the above exclusions, our sample consists of 120 firms, for 10 years, from twelve industries, with 1.200 firm-year observations. Since the deregulation was issued in 2011, and the auditors of the financial year 2011 were already appointed before the deregulation, the first financial statements that were audited after free fee negotiations were those of the year 2012. We divided the period into two sub-periods, the period prior to the audit fee deregulation (2007-11) and the one following it (2012-2016).

Table 1. Firms per Industry

Industry	Firms	Year Observations
Industrial goods & services	23	230
Construction & materials	17	170
Consumer Products & Services	20	200
Basic Resources	4	40
Travel & leisure	9	90
Technology	13	130
Food & Beverages	13	130
Financial services	3	30
Real-estate	4	40
Health care	6	60
Media	3	30
Energy	5	50
Total	120	1200

3.2 Model specification

3.2.1 Dependent variable

Consistent with prior research, we measure audit quality as the client's earnings quality (Higgs & Skantz, 2006; Lim & Tan, 2008; Francis & Yu, 2009; Reichelt & Wang, 2010; Choi *et al.,* 2010). We choose abnormal accruals (ABHW), a commonly used proxy for earnings quality following Han and Wang (1998). To calculate (ABHW) we first regress change in sales ($\Delta Si,t$) over change in working capital ($\Delta WCi,t$) accruals with year fixed effects, and measure (ABHW) as the residuals (ε) scaled with total assets (equation 1):

$$\Delta Si,t = \alpha + \beta \Delta WCi,t + \text{Year Fixed Effects} + \varepsilon \quad (1)$$

$$\Delta WCi,t = WCi,t - WCi,t\text{-}1 \quad (2)$$

$$WCi,t = (\text{Current Assets } t - \text{Cash and Short-Term Investments } t) - (\text{Current Liabilities } t - \text{Debt in Current Liabilities } t) \quad (3)$$

3.2.2 Independent variables

The aim of our study is to determine if the deregulation of minimum audit fee reserves has any impact on audit quality. In order to reach our goal, we introduced to our model a dummy variable (Deregulation) which equals 0 when the year is regulated (2007-2011) and 1, when the year is deregulated (2012-2016). According to our hypothesis, the variable Deregulation will be statistically significant with a

negative coefficient suggesting that deregulation had a negative impact on audit quality.

Except our main variables, we used control variables as suggested by existing literature (Caramanis & Lennox, 2008; Corbella, *et al.,* 2015). Table 2 presents our independent variables.

Table 2. Independent Variables

Variable	Type	Equals
Deregulation	Dummy	1 for deregulated years (2012-2016) and 0 for regulated years (2007-2011)
Big 4	Dummy	1 if the audit firm is a Big 4 0 otherwise
Size	continuous	Log (total assets)
Leverage	continuous	Log (total liabilities minus cash holdings scaled by total assets)
Current	continuous	Log (the ratio of current assets to current liabilities)
C.F.O.	continuous	Cash flows from operations scaled by total assets
Loss	Dummy	1 if the company incurred a loss in the previous period and 0 otherwise
Sales Growth	Continuous	Sales growth calculated as (Net sales t –Net sales t−1) /Net sales t−1
R.O.A.	Continuous	Return of assets
Switch to big 4	Dummy	1 if a switch of the audit firm from non big4 to big4 incurred the present year 0 otherwise
Switch from big 4	Dummy	1 if a switch of the audit firm from big4 to non big4 incurred the present year 0 otherwise

3.2.3 Model equation

Concluding our methodology presentation, our model equation will be:

$$ABHW_{i,t} = a + Deregulation + Big\ 4 + Size + Leverage + Current + C.F.O. + Loss + Sales\ Growth + R.O.A. + Switch\ to\ big\ 4 + Switch\ from\ big\ 4 + \varepsilon \quad (4)$$

We will calculate the regression of equation 4 using random effects in the statistical software R. The following section presents the results of the regression.

4. Results

4.1 Descriptive statistics

Our depended variable “ABHW” has a mean of $1.99e^{-13}$ and a standard deviation of 0.22567. The hypothesis variable “Deregulation” has a mean of 0,5 which is consistent with our sample build up. The variable “Size” has a mean of 8.20. Interestingly, 22.75% of the sample’s firms are audited by a Big 4 audit firm.

Table 3 presents the descriptive statistics of our sample.

Table 3. Descriptive statistics

Variable	MAX	MIN	MEAN	STDEV	Observations	VIF
ABHW	2.636	-3.348	1.99E-13	0.226	1200	
Deregulation	1	0	0.5	0.500	1200	1.169
Size	10.239	6.731	8.200	0.648	1200	1.254
Leverage	9.896	-0.701	0.595	0.561	1200	1.246
Current	31.108	0.023	1.56	1.736	1200	1.209
C.F.O.	0.611	-0.2265	0.034	0.078	1200	1.174
Loss	1	0	0.436	0.496	1200	1.471
Sales Growth	37.989	-0.999	0.052	1.191	1200	1.003
R.O.A.	1.182	-1.029	-0.014	0.118	1200	1.404
Big4	1	0	0.228	0.419	1200	1.259
Switch to big 4	1	0	0.011	0.104	1200	1.052
Switch from big 4	1	0	0.008	0.091	1200	1.022

4.2 Regression results

Table 4 presents the results of our model regression using random effects.

Table 4. Random effect regression results

Coefficients	Estimate	Std. Error	z-value	Pr(>|z|)
(Intercept)	19.009	1.741	10.92	< 2.2e-16 ***
Deregulation	-0.601	0.117	-51417	2.723e-07***
Size	-0.302	0.213	-14177	0.156
Leverage	0.059	0.116	0.508	0.612
Current	-0.108	0.116	-0.930	0.352
C.F.O.	-1.703	0.750	-2.271	0.023*
Loss	-0.271	0.138	-1.962	0.050*
Sales Growth	-0.042	0.102	-0.413	0.679
R.O.A.	0.24	0.477	0.503	0.615
Big4	-0.151	0.238	-0.633	0.527
Switch to big 4	-0.466	0.528	-0.882	0.378
Switch from big 4	0.448	0.512	0.875	0.382
Signif. codes: 0 '***' 0.001 '**' 0.05 '*'				
Total Sum of Squares:	1269.4			

Coefficients	Estimate	Std. Error	z-value	Pr(>|z|)
Residual Sum of Squares:	732.76			
R-Squared:	0.423			
Adj. R-Squared:	0.412			
Chisq: 60.294 on 11 DF, p-value: 8.176e-09				
#Hausman Test				
chisq = 11.733, df = 10, p-value = 0.303				

As we can see in table 4 variables Loss and C.F.O. are statistically significant at 5% level, while our main independent variable "Deregulation" is statistically significant at below 0% level. In addition, the Estimate of our main variable is negative. Thus, the regression results verify our hypothesis. In addition, according to the estimation in table 4, in deregulated years audit quality dropped by 0.6 compared with regulated ones. The R-Squared of our regression explains 42.29% of the dependent variables' variation.

In addition, according to existing literature the control variables C.F.O. and Loss are statistically significant (at 5% level). The estimations of both of the above-mentioned control variables are negative, suggesting a negative relationship between them and audit quality. On the other hand, the control variables size, current, leverage, sales growth and ROA are not statistically significant.

Our study extends to a five-year period after the deregulation. Audit firms in the following years after those covered by our study, may have improved their efficiency, found new, more effective audit methods and regained lost audit quality. Innovation after all needs time and effort to be achieved. In our opinion, a future study of the audit quality in the years after 2016 to this day and the ability of audit firms to regain the lost audit quality will present high interest. Table 5 presents the correlation matrix.

Table 5. Correlation matrix

	ABHWi	Deregulation	Assets	Levarage	CURRENT	CFO	LOSS	SALES.GR	ROA	Big4	SWITCHit.to.big.4	SWITCHit.from.big.4
ABHWi	1.00	-0.06**	0.00	0.00	0.03	-0.02	-0.01	0.01	0.01	0.00	0.00	-0.01
Deregulation	-0.06**	1.00	-0.07**	0.17***	-0.02	-0.03	0.35***	0.02	-0.13***	-0.02	-0.07**	0.07**
assets	0.00	-0.07**	1.00	-0.11***	-0.03	0.15***	-0.15***	0.02	0.17***	0.38***	0.06*	0.02
Levarage	0.00	0.17***	-0.11***	1.00	-0.33***	-0.17***	0.31***	-0.02	-0.23***	-0.07**	0.01	0.07**
CURRENT	0.03	-0.02	-0.03	-0.33	1.00	0.08***	-0.21***	0.02	0.21***	0.12***	-0.02	-0.03
CFO	-0.02	-0.03	0.15***	-0.17***	0.08***	1.00	-0.21***	0.02	0.35***	0.09***	-0.01	0.01
LOSS	-0.01	0.35***	-0.15***	0.31***	-0.21***	-0.21***	1.00	-0.01	-0.43***	0.01	0.02	0.05*
SALES.GR	0.01	0.02	0.02	-0.02	0.02	0.02	-0.01	1.00	0.03	-0.01	0.00	-0.02
ROA	0.01	-0.13***	0.17***	-0.23***	0.21***	0.35***	-0.43***	0.03	1.00	0.04	-0.06**	-0.09***
Big4	0.00	-0.02	0.38***	-0.07***	0.12***	0.09***	0.01	-0.01	0.04	1.00	0.19***	-0.05*
SWITCHit.to.big.4	0.00	-0.07**	0.06*	0.01	-0.02	-0.01	0.02	0.00	-0.06**	0.19***	1.00	-0.01
SWITCHit.from.big.4	-0.01	0.07**	0.02	0.07*	-0.03	0.01	0.05*	-0.02	-0.09***	-0.05*	-0.01	1.00

Notes: *** significant at 1% level, ** significant at 5% level, * significant at 10% level. Spearman correlation coefficients are shown below the diagonal and Pearson correlation coefficients are shown above the diagonal.

4.3 Robustness test

In order to test the robustness of our results, we calculated our model using different types of regressions. We recalculated our model using pooling and Oneway (individual) effect Random Effect Model (Hausman-Taylor's transformation) - Instrumental variable estimation (Baltagi's transformation).

The results from the robustness tests are identical to the results of our main analysis. In both robustness tests, the variable Deregulation is statistically important at 0% level and negative. Thus, the robustness tests also verify our hypothesis that the deregulation of minimum audit fee reserves in Greece had a negative impact on audit quality. The control variables C.F.O. (cash flows from operations scaled by total assets) and Loss (1 if the company incurred a loss in the previous period and zero otherwise) are statistically important at 5% level in the Oneway (individual) effect Random Effect Model (Hausman-Taylor's transformation) - Instrumental variable estimation (Baltagi's transformation) analysis. In pooling, except the variable Deregulation, only the control variable size is statistically significant at 0.1% level.

Table 6 presents the results of our model regression using pooling.

Table 6. Pooling regression results

Coefficients	Estimate	Std. Error	z-value	Pr(>|z|)
(Intercept)	19.328	1.0468	18.465	< 2,2e-16 ***
Deregulation	-1.010	0.174	-57975	1,094e-08 ***
Size	-0.345	0.128	-26971	0,007 **
Leverage	-0.159	0.147	-10761	0,282
Current	-0.246	0.136	-1.817	0,070
C.F.O.	-1.055	1.082	-0.976	0,330
Loss	-0.107	0.198	-0.542	0,588
Sales Growth	0.074	0.157	0.470	0,639
R.O.A.	0.245	0.731	0.335	0,738
Big4	-0.167	0.212	-0.786	0,432
Switch to big 4	0.061	0.799	0.077	0,939
Switch from big 4	-0.030	0.789	-0.039	0,969
Signif. codes: 0 '***' 0.001 '**' 0.05 '*'				
Total Sum of Squares:	2325.3			
Residual Sum of Squares:	2122.1			
R-Squared:	0.087			

Coefficients	Estimate	Std. Error	z-value	Pr(>|z|)
Adj. R-Squared:	0.071			
F-statistic: 5.171 on 11 and 594 DF, p-value: 8.703e-08				

Table 7 presents the results of our regression model using Oneway (individual) effect Random Effect Model (Hausman-Taylor's transformation) - Instrumental variable estimation (Baltagi's transformation).

In addition, we tested our model for omitted variables. Deregulation variable remains statistically important at 5% with negative coefficient after the exclusion of not statistically important variables. Furthermore, we tested for omitted-variable bias using Ramsey's RESET test for both linear and non-linear relationships. The results indicate that omitted variables are not causing model misspecification. The results are presented at the paper's Appendix.

Furthermore, we are interested on how audit competition and quality is affected by an audit fee deregulation. Given the above, there is no theoretical justification that causation could go in either direction and affect the quality of our results. In addition, based on previous literature, there is no theoretical justification for a causal relationship in the opposite direction.

Table 7 Hausman-Taylor's transformation regression results

Coefficients	Estimate	Std. Error	z-value	Pr(>|z|)
(Intercept)	18.834	1.742	10.811	<2.2e-16***
Deregulation	-0.577	0.116	-4.954	7.268e-07***
Size	-0.284	0.213	-1.336	0.182
Leverage	0.070	0.116	0.600	0.549
Current	-0.082	0.116	-0.710	0.477
C.F.O.	-1.687	0.750	-2.251	0.024*
Loss	-0.271	0.137	-1.976	0.048*
Sales Growth	-0.028	0.101	-0.276	0.782
R.O.A.	0.175	0.473	0.370	0.712
Big4	-0.188	0.239	-0.785	0.433
Switch to big 4	-0.427	0.528	-0.808	0.419
Switch from big 4	0.439	0.508	0.865	0.387
Signif. codes: 0 '***' 0.001 '**' 0.05 '*'				
Total Sum of Squares:	790.8			
Residual Sum of Squares:	605.16			

Coefficients	Estimate	Std. Error	z-value	Pr(>|z|)
R-Squared:	0.089			
Adj. R-Squared:	0.072			
Chisq: 57.956 on 11 DF. p-value: 2.217e-08				

4.4 Other calculations

4.4.1 Big 4 and audit quality

We introduced the variable Big 4 to our model (1, if the audit firm is a Big 4, 0 otherwise), in order to test if Big 4 audit firms influence audit quality. According to Jiang *et al.* (2019) the Big N effect to audit quality remains controversial despite the numerous studies conducted on this subject. Lawrence *et al.* (2011) and DeFond *et al.* (2017) present exactly opposite results. Our regression data show that the Big 4 variable is not statistically significant in any of the regressions run. Thus, according to our results, in Greece, there does not seem to be any difference as far as audit quality is concerned whether Big 4 or non-Big4 audit firms are involved.

4.4.2 Audit firm changes from and to big 4 firms

The relationship between audit firm switches and audit quality is complex and can depend on various factors. In some cases, changing audit firms may contribute to improvements in audit quality, while in other cases, the impact may be less clear. To measure the switch effect on audit quality from a Big 4 audit firm and to a Big 4 audit firm we added two variables to our model. The Switch_to_big_4 variable (1, if a switch of the audit firm from non big4 to big4 occurred the present year, 0 otherwise) and the variable Switch_from_big_4 (1, if a switch of the audit firm from big4 to non big4 occurred in the present year, 0 otherwise).

The results of all our regressions show that both variables associated with the switch of an audit firm to and from a Big 4 audit firm are not statistically significant (table 4). Thus, switches from and to a Big 4 audit firm do not seem to affect audit quality.

5. Conclusion

5.1 Key findings

In this paper, we studied the case of the deregulation of minimum audit fee reserves in Greece. We used a sample of 120 firms, from twelve industries, for 10 years, with 1.200 firm-year observations. Our proxy of audit quality was earning

management; our dependent variable was abnormal accruals following Han and Wang (1998) and our controls were numerous control variables according to existing literature. Using a DID model design we concluded that augmented audit competition created by deregulation in Greece had a negative effect on audit quality.

Intense fee pressure could explain the drop in audit quality. In the regulated period, only minimum fees restricted price negotiations between audit firms and clients, as an upper limit of audit fees was not imposed. After deregulation, some clients must have requested a downward audit fee renegotiation. According to our results, the intensity of the encountered fee pressure could not allow audit firms to maintain audit quality at the same levels as in the regulated period. Fewer resources available per engagement, tight timetables, loss of experienced auditors by audit firms and lessening independence could explain the descent of audit quality.

The study corroborates the findings of Kasai and Takada (2012) in the Japanese settings, who also found that, after the deregulation of audit fees, audit quality decreased. On the other hand, our study contradicts the findings of Cao *et al.* (2022), who conclude that, after audit fee deregulation in China, audit effort and audit quality was not impaired.

5.2 Theoretical – practical implications

Our findings support the belief that the deregulation of audit fees in Greece had a negative impact on audit quality. According to Wielhouwer (2015) the drop of audit quality will result in a lower trust of investors to financial markets and a corresponding loss of share value and returns. Thus, regulators should carefully study before changing regulations to a small, competitive audit market, especially when it is addressed to capital markets characterized as emerging and distinguished by a low degree of supervisory effectiveness and investor protection mechanisms.

The present paper enhances our knowledge on the impact of the deregulation of the audit profession to audit quality, adds to the existing literature the study of the deregulation of minimum audit fee reserves in Greece, and helps policy makers and regulators in their decision-making process.

5.3 Limitations – future research

The economic recessions of the global financial crisis and of Greek fiscal crisis may have influenced our results. In addition, our study limits its results in only one jurisdiction.

Future research could examine if in the years following our research, audit firms have managed to develop more efficient audit procedures in order to achieve a rise in audit quality despite limited resources. Also, the impact of the Greek fiscal crisis on audit quality is not yet sufficiently researched.

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Appendix: Omitted variable test results.

Model 22: Random-effects (GLS), using 1200 observations
Included 120 cross-sectional units
Time-series length = 10
Dependent variable: ABHWt

	Coefficient	*Std. Error*	*z*	*p-value*	
const	0.241	0.176	1.367	0.1718	
Deregulation	−0.552	0.249	−2.210	0.0271	**

Mean dependent var	−0.034	S.D. dependent var	4.337
Sum squared resid	22461.880	S.E. of regression	4.328
Log-likelihood	−3460.425	Akaike criterion	6924.850
Schwarz criterion	6935.030	Hannan-Quinn	6928.685
rho	0.230	Durbin-Watson	1.234

Null hypothesis: the regression parameters are zero for the variables
assets, Levarage, CURRENT, CFO, LOSS, SALESGR, ROA, Big4, SWITCHittobig4, SWITCHitfrombig4
Test statistic: F(10, 1188) = 0.267, p-value 0.987
Omitting variables improved 3 of 3 information criteria.

Ramsey RESET test results using powers of the fitted values of ABHWt (linear)

H0: model has no omitted variables
F(3, 1185) = 2.22
Prob > F = 0.083

Ramsey RESET test using powers of the independent variables of ABHWt (nonlinear)

H0: model has no omitted variables
F(18, 1170) = 1.03
Prob > F = 0.421