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## Is earnings management impacted by audit fees and auditor tenure? An analysis of the Big Four audit firms in the US market

**JEL Classification:** M41; M42; K22

**Keywords:** *earnings management; auditor tenure; auditor rotation; audit fees; Big Four*

### Abstract

**Research background:** Audits are intended to ensure the reliability of financial statements, as this is fundamental for different stakeholders. However, both auditor tenure and audit fees could affect the earnings management of companies. In 2014, the European Union established a mandatory audit firm rotation policy. In the United States, although there is still no manda-

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tory regulation in this regard, there has been a large public debate over the advisability of this policy. Another unresolved controversy is whether audit fees determine audit quality.

**Purpose of the article:** The aim of this research is to study the effect of auditor tenure and audit fees on earnings management, i.e., to determine whether a longer-term relationship between the auditor and the audited company, as well as higher audit fees, reduce the audited company's earnings management, thereby making the financial statements more reliable for stakeholders and increasing the quality of the audit report. In addition, the Big Four auditing companies in the United States were analyzed in order to determine the influence of corporate culture.

**Methods:** A sample of companies listed in the S&P 500 stock market index was employed for the analysis, covering the years 2012 to 2021, resulting in a dataset comprising 3,010 observations. To examine the research hypotheses while mitigating the potential bias from omitted variables, a linear regression analysis was conducted using panel data with fixed effects regression. To enhance the robustness of the results, winsorized variables were also employed.

**Findings & value added:** Overall, the results confirm that the quality of financial statements improves as auditor tenure increases, and so implementing a mandatory auditor rotation may not be in a company's best interests. The results also support the market segmentation theory, as higher audit fees are aligned with higher quality financial reporting. Furthermore, by analyzing the Big Four audit companies in the US, it is shown that the influence of audit fees and auditor tenure on earnings management also depends on the internal aspects of the particular audit firm, especially its ethical culture. In sum, US policymakers should neither set limits on audit fees nor enforce a mandatory audit firm rotation similar to that of the EU.

## Introduction

Earnings management (EM) is a strategy used within the limitations allowed by the Generally Accepted Accounting Principles (GAAP) to deliberately manipulate a company's financial reports so that the figures match a pre-determined target (Chang *et al.*, 2022a; Palacios-Manzano *et al.*, 2019; Santos-Jaén *et al.*, 2021). EM is considered a latent threat and an undesirable practice in the economic-financial world (Dechow & Skinner, 2000; Teixeira & Rodrigues, 2022), and many accounting scandals in recent years have involved EM (Al-Absy *et al.*, 2019; Salem *et al.*, 2023). This has prompted widespread interest in reducing these unfair practices as much as possible.

Previous research has shown that as the quality of audit work increases, the manipulation of financial results by audit firms decreases (Chi *et al.*, 2011; Salem *et al.*, 2023; Zgarni *et al.*, 2016). At the same time, auditor independence is essential to ensure the quality of audits and protect stakeholder interests (Jamal & Sunder, 2011). This has led to increased interest among the scientific community to analyze the main threats to auditor independence (Pimentel *et al.*, 2023; Tepalagul & Lin, 2015).

Threats to auditor independence may come from external causes, such as rotations and fees, or internal causes derived from the specific culture of each audit firm (Qader & Cek, 2023).

While fees have not been subject to regulation, EU policymakers are of the opinion that long-term relationships between audit firms and their clients present a considerable risk to the quality of auditing work. This stance, expressed in the European Commission's Green Paper, led to the adoption of the mandatory rotation policy prescribed in the 2014 EU Regulation (Garcia-Blandon *et al.*, 2020). A similar situation exists in China, where auditor rotation is legally established (Hoang *et al.*, 2022). In contrast, the United States do not have a law mandating the rotation of auditors, although the Public Company Audit Oversight Board (PCAOB) has previously explored this possibility and has put forth regulations that would necessitate periodic auditor rotation.

The scientific literature offers a large number of studies that focus on external threats to independence, especially on the effect of rotations and audit fees (Duong Thi, 2023; Gandía & Huguët, 2018; Garcia-Blandon *et al.*, 2020; Lohwasser & Zhou, 2023; Nekhili *et al.*, 2022; Salehi *et al.*, 2022; Usman *et al.*, 2022), with inconclusive results. Some authors, such as Zgarni *et al.* (2016), Choi *et al.* (2022b) and Hoang *et al.* (2022), have even focused on analyzing these threats within the so-called Big Four accounting firms. However, few studies have considered that auditor independence also depends on internal aspects such as corporate culture. Thus, audit firms of similar size operating within the same market i.e., under the same economic and regulatory conditions, such as the Big Four in the United States, may lead to different results for external threats to auditor independence and, therefore, to EM. Due to the significance of proper auditing functions in ensuring the dissemination of accurate financial and non-financial information within the economic system, the aim of this research is to focus on understanding how specific external factors, namely fees and rotation, impact auditor independence and, consequently, earnings management. Furthermore, this study aims to determine how these influences may vary among the different audit firms that comprise the so-called Big Four, specifically in the context of the United States. These are the main gaps in this research, as it tries to answer the following research questions: 1) How do auditor rotation and audit fees influence EM? 2) In the same economic and legal contexts, are the effects of these threats different for each audit firm?

This research focuses on the United States as it has been at the forefront of the auditing profession since the aftermath of the Wall Street Crash of 1929.

To answer the research questions, an empirical analysis was conducted on companies included in the S&P 500 for the period 2012–2021. This stock market index was chosen because the United States is a country where there is no legal requirement for auditor rotation, allowing for an unbiased analysis of the issue at hand. Panel data with fixed effects regressions were performed in order to control for endogeneity and the omitted variables problem. The robustness of the results was tested using winsorized variables.

This research contributes to the scientific literature by studying the effect of auditor rotation and audit fees on EM. In addition, the main contribution that this study makes to the existing literature is the analysis of these effects in each of the Big Four audit firms. The results of this research suggest that, in order to improve the quality of financial information and therefore reduce EM, more attention must be paid to the aspects derived from the ethical culture of audit firms than to external threats to independence, as it has been shown that the effect and intensity of external threats on EM depend on the professionalism of the auditors.

This study has significant implications for policymakers, legislators, auditing sectors, companies, other countries, and society as a whole. This research suggests that imposing limits on audit fees or mandatory auditor rotation, as is the case in Europe or China, may not be the best option. Instead, it focuses on the ethical culture within auditing firms to reduce earnings management. This benefits society by improving the quality of financial and non-financial information, strengthening justice and social ethics, and providing advantages to companies and their shareholders by highlighting the benefits of retaining the same auditors and maintaining higher audit fees for information quality. It also underscores the importance of ongoing training in the auditing sector.

The remainder of this article is organized as follows: the second section includes a literature review and the hypothesis formulation; the third section presents the analyzed data and the methodology; the fourth section shows the results; the fifth section includes a discussion of the results; and the sixth section presents the main conclusions.

## Literature review and hypothesis development

### *Audit fees and EM*

The connection between audit fees and EM or audit quality has been explored in previous literature, as EM is considered a countermeasure of audit quality (Ali *et al.*, 2022; Hoang *et al.*, 2022). However, the findings obtained are contradictory.

According to the concept of audit market segmentation, as suggested by Gandía and Huguet (2018), audit firms employ different approaches and provide differing degrees of audit quality, and so their ability to prevent EM activities will vary. Based on this theory, Eshleman and Guo (2014), Usman *et al.* (2022), Le and Moore (2023), and Lohwasser and Zhou (2023) consider that higher audit fees result in improved audit quality, thus reducing the possibility of EM. Likewise, many studies have indicated that increased audit fees may result in audit firms making more effort to prevent EM (Martínez & Moraes, 2017; Salehi *et al.*, 2019).

Regarding abnormal audit fees i.e., those that exceed the estimated fees determined by the attributes of the company and the audit itself (Asthana & Boone, 2012), Alhadab (2018) suggests that an increase in abnormal audit fees is the primary factor that leads to better audit quality. This, in turn, limits the ability of managers to manipulate reported earnings or engage in real EM. In line with the above, Hossain and Wang (2022) have shown that low abnormal audit fees have a negative impact on audit quality.

Regarding mandatory audit firm rotations, Gandía and Huguet (2021) included both voluntary and mandatory audits in a study involving Spanish SMEs, and discovered that the quality of voluntary audits is better when the fees paid for the performance of the auditing work are lower. However, in the case of mandatory audits, the quality increases as the fees increase.

As audit fees depend on a large number of factors related to the clients (i.e., size, audit complexity, litigation risk, and corporate governance) and auditors (i.e., tenure, expertise, and quality), Chang *et al.* (2021) analyzed this relationship taking all these factors into account and found the existence of a negative relationship between audit fees and EM.

However, based on bonding theory, Asthana and Boone (2012) show that an increase in positive abnormal fees leads to a decrease in audit quality due to the client's bargaining power, which allows the client to influence

the outcome of the audit to a greater extent. In the same vein, Chi *et al.*, (2011) found that a correlation may exist between higher audit fees and increased levels of EM. Similarly, authors such as Schelleman and Knechel (2010), Kwon *et al.* (2019), and Choi *et al.* (2022a) have shown that auditors may apply a surcharge to their fees in response to a rise in EM conducted by companies. In this sense, Greiner *et al.* (2017) provide evidence that aggressive EM activities significantly influence auditor pricing behavior, consistent with the audit framework associating engagement risk with audit fees.

On the other hand, according to the theory of bribery, auditors may conduct their audit procedures to meet client expectations (intentional bias) in order to secure their position as the client's audit firm for the future (Alhadab, 2018). Alternatively, high audit fees may compromise auditor independence, which could allow for more manipulation of earnings (Alhadab, 2018).

Finally, authors such as Garcia-Blandon *et al.* (2020) and Chang *et al.* (2022b) found no significant relationship between the two variables. Therefore, to address the inconsistency, the following hypothesis is formulated:

H1: *There is a negative relationship between audit fees and EM.*

#### *Auditor tenure and EM*

There has been a long and heated debate in the accounting world about whether audit firm rotation should be made mandatory (Chi *et al.*, 2011), leading, among other things, to a great deal of research on the effect of auditor rotation and EM (Davis *et al.*, 2009; Lin & Yen, 2022), with mixed results (Lin & Yen, 2022). While longer auditor tenure may help auditors become more familiar with their clients' operations and thus improve the quality of their audits, it can also result in closer, more amicable relationships with management, potentially compromising auditor independence (Chi *et al.*, 2011). This has given rise to two opposing points of view regarding auditor rotation, with its supporters and detractors (Salehi *et al.*, 2022).

The theory of influence or bias suggests that a close and long-standing relationship between an auditor and their client may result in unintentional favoritism towards the client in the auditing process (Alhadab, 2018). For this reason, supporters of mandatory audit firm rotation argue that it can help auditors resist pressure from corporate executives, as a prolonged

working relationship between auditors and clients may result in the auditors being influenced by the client, which undermines their neutrality and independence. Furthermore, auditors tend to maintain their clients because they want to offset the expenses incurred during the early years of engagement with a new client (Salehi *et al.*, 2022), which can seriously impair their independence. In addition, rotation after an excessively long association can foster auditor independence and professional skepticism. Moreover, new auditors can perform higher quality work by adopting a fresh approach to the work. Several studies have supported this idea, revealing that long-term relationships between auditors and clients may influence the auditors. Thus, according to research carried out by Chi *et al.* (2011), there is a positive correlation between the length of auditor tenure and EM. Similar results have been found by other authors, such as Bamahros and Wan Hussin (2015), Firth *et al.* (2012), and Zgarni *et al.* (2016) and Tran *et al.* (2023), which suggests that mandatory audit firm rotation could have its advantages.

On the contrary, new auditors who are not yet familiar with their clients are more likely to miss financial misreporting. In this vein, according to Carcello and Nagy (2004), the implementation of compulsory audit firm rotation may have negative implications for the quality of auditing, with their research suggesting that the likelihood of fraudulent financial reporting is higher during the first three years of association between the auditor and the client. Another argument against the rotation of auditors is based on the idea that the influence of auditor rotation on the quality of financial reporting is due, in part, to the new perspectives and ideas that incoming auditors bring. Nevertheless, these fresh viewpoints are typically not visible and are frequently assumed (Lin & Yen, 2022). In the literature review, studies that argue against the rotation of auditors to improve audit quality were included. Lin and Yen (2022), for example, state that auditor rotation is not significantly associated with accruals quality when there is no change in key audit matters after the rotation.

Similarly, Kuang *et al.* (2020) found no evidence to support the notion that compulsory auditor rotation enhances audit quality. Instead, their findings indicate that there is an elevated chance of significant misstatements occurring after a compulsory rotation of the audit partner, particularly if the audit firm's tenure is brief. Garcia-Blandon *et al.* (2020) reveal that firms with an auditor tenure exceeding ten years do not exhibit inferior auditing quality compared to other companies. In fact, this research pro-

vides some indication of superior auditing quality for such firms. Likewise, researchers such as Nekhili *et al.* (2022), Duong Thi (2023), Hsu and Liao (2023), and Le and Moore (2023) found that the longer the auditor tenure, the lower the EM. This therefore implies that auditor rotation does not reduce EM.

On the other hand, Manry *et al.* (2008) took the middle ground and showed that there is a notable and unfavorable link between audit tenure and the assessment of discretionary accruals for smaller clients. In contrast, auditor tenure does not have a significant correlation with projected discretionary accruals for larger clients.

Finally, Abu Afifa *et al.* (2023), found no relationship between auditor tenure and earnings management.

To sum up, the results from previous research on the connection between auditor rotation and audit quality are conflicting and uncertain. For this reason, the following hypothesis is proposed:

*H2: There is a negative relationship between auditor tenure and EM.*

According to Puxty (1993), laws and regulations alone are not enough to ensure the independence of audit firms as, besides external factors such as auditor tenure or fees, auditor independence may be threatened by factors specific to the audit firm itself, i.e., aspects of their own particular identity. As a result, researchers have also been concerned with those mechanisms that support auditor independence regardless of these threats (Bauer, 2015). Puxty (1993) argues that cultural and socio-economic factors significantly impact on the concept of auditor independence. In this vein, Alberti *et al.* (2022) argue that the culture of the auditing firm influences the quality of the audit work. Similarly, Hudaib and Haniffa (2009) found that auditors view independence based on their social interactions at three levels: personal (the auditor's own ethical values, reputation, and self-reflection), organizational (the culture of the audit firm), and societal (the socio-economic and political structure of the country where the audit firm operates). This research focuses on the organizational level and specifically on cultural ethics at the same societal level in the US.

The concept of ethical culture is a component of the broader organizational culture. Although organizational culture impacts many different areas, such as group innovation, job contentment, and work ethics, ethical culture is especially crucial when evaluating discretionary matters with



ethical implications (Treviño *et al.*, 2001). Ethical culture is a complex combination of different formal and informal systems that may encourage either ethical or unethical behavior (Svanberg & Öhman, 2016). Moreover, Kung and Huang (2013) discovered that auditors tend to favor relativism over idealism in ethics due to the practical nature of the auditing profession. As a result, relativist auditors may be less inclined to denounce their clients' unethical actions, which means that the theoretical idealism of auditor independence may not be reflected in practice. According to Bauer (2015), being exposed to a robust ethical culture could be linked to increased auditor impartiality. Likewise, Svanberg and Öhman (2016) suggest that auditors working at firms that prioritize ethics are better able to maintain their objectivity than those who work at firms that do not. Based on the same premise, many authors, such as Albaqali and Kukreja (2017), Barrainkua and Espinosa-Pike (2018), and Pimentel *et al.* (2023) have shown how cultural ethics favor auditor objectivity. This implies that audit firms should strive to cultivate a strong ethical culture to minimize the risk of auditors being influenced in their judgments. Finally, Zhang and Wei (2022) demonstrated that the level of ethical culture within an audit firm has a strong negative correlation with the degree of EM. Similarly, Acar (2023) showed that the nationality or cultural background of the audit company has a greater influence on EM.

Furthermore, other factors specific to the audit firm, such as processes and formal structure, the audit as a business, working papers, and image management, influence auditor independence (Reiter & Williams, 2004). These identity factors lead to different responses to EM from each audit firm. For this reason, it can be posited that the influence of audit fees and auditor tenure on EM differs for each audit firm. Therefore, the following hypotheses are established:

H<sub>3</sub>: *The influence of audit fees on EM differs for each audit firm.*

H<sub>4</sub>: *The influence of auditor tenure on EM differs for each audit firm.*

To summarize, within the domain of audit fees, auditor tenure, and earnings management, researchers, drawing from various theories such as audit market segmentation, bonding theory, bribery theory, and influence theory, among others, have encountered empirical challenges and obtained varying results. Studies in this area are divided, with some indicating

a positive impact of audit fees and/or auditor tenure on earnings management, some suggesting a negative impact, and some concluding that there is no causal relationship between these variables. These studies have employed a range of methodologies, including regression analysis, case studies, and experiments.

One emerging area of interest pertains to the role of cultural ethics within audit firms and its potential influence on auditor independence and earnings management. This introduces complexity into empirical investigations involving surveys, content analyses, and cross-national studies.

Our study aims to examine how audit fees and auditor tenure affect earnings management, while considering the mediating role of cultural ethics. We aim to bridge the gap between the existing literature and our research methodology to provide a comprehensive understanding of this empirical context, thereby guiding the subsequent sections on data collection, measurement techniques, and statistical analyses.

## **Research methods**

The methodology employed in this research, as detailed below, aligns with the prevalent approach for studies of this nature. Initially, accrual earnings management was calculated using the Dechow method (de Souza *et al.*, 2022; Elshafie, 2023; Ghaemi Asl & Ghasemi Doudkanlou, 2022; Lassoued & Khanchel, 2021; Marais *et al.*, 2023). Subsequently, panel data regression analysis was applied (da Silva Flores *et al.*, 2023; Pinheiro de Sá *et al.*, 2021; Sundkvist & Stenheim, 2022; Tran *et al.*, 2023). The empirical analysis of this work was conducted on companies listed in the S&P 500 index, covering the period from 2012 to 2021. This ten-year timeframe was chosen for its ability to yield robust and reliable results. Moreover, it represents the most recent data available at the time of data extraction. It is important to note that some companies do not close their accounting periods on December 31, and the official presentation and publication of annual accounts can take several months following the close of the fiscal year. The data were obtained from the Eikon database, which is used both for professional purposes by financial analysts and for research by academics (Valls Martínez *et al.*, 2022c). After eliminating those observations with missing data for any of the study variables, the final sample was comprised of 3,010 observations. Table 1 displays the composition of the sample by auditor,

with just six auditors working for the companies that comprise the S&P 500 index, and only four comprising 99.24% of the total: Ernest & Young (34.19%), Price Waterhouse Coopers (30.70%), Deloitte (20.60%), and KPMG (13.75%). Therefore, this paper will not only analyze the global market, but also each of the Big Four audit firms in particular.

The variables included in the study were selected in accordance with the established objectives. The dependent variable is earnings management (EM), which was calculated based on a Dechow model.

Previous studies have assessed earnings management (EM) in various ways (Dechow *et al.*, 2010). Among these, the modified Jones model, initially proposed by Dechow *et al.* (1995) as a variation of the original Jones model, has often been employed (Palacios-Manzano *et al.*, 2019) to calculate unexpected accruals. This model relies on a statistical approach utilizing information from the balance sheet and income statement, making it less subjective than other methods based on non-financial indicators. This method primarily focuses on revenue recognition, making it suitable for identifying earnings management practices aimed at manipulating earnings in order to show higher profits or lower losses. In addition, Dechow's method is widely accepted by the scientific community (Elshafie, 2023; Ghaemi Asl & Ghasemi Doudkanlou, 2022; Marais *et al.*, 2023).

Initially, overall accruals are computed by taking the difference between net income and cash flow from operations or by subtracting depreciation from working capital accruals. The total accruals are subsequently subjected to regression analysis against variables acting as indicators of regular accruals (such as revenue/receivables) to account for normal working capital requirements. The regression also incorporates gross fixed assets to adjust for standard depreciation. These indicators are identified using an "estimation period" i.e., a period deemed free of systemic EM. The estimation period sample is used to obtain these indicators, which are then employed to estimate normal (or expected) accruals in the sample that require further investigation. The unexpected accruals are then determined by calculating the difference between the total accruals and the estimated normal accruals. According to Healy and Wahlen (1999), unexpected accruals represent the unexplained component of total accruals.

As profit management can be carried out through accruals that increase or decrease income, this study, in line with previous research such as Bowen *et al.* (2008), Palacios-Manzano *et al.* (2019), and Wang *et al.* (2018), used absolute discretionary accruals to measure the degree of earnings

management. The greater the absolute value of the discretionary accruals, the greater the level of earnings management and the poorer the quality of the accounting information.

Based on the above, the EM variable was obtained by following the process established by Dechow *et al.* (1995):

$$TAC_{it} = (\Delta CA_{it} - \Delta Cash_{it}) - (\Delta CL_{it} - \Delta STD_{it}) - Dep_{it}, \quad (1)$$

where:

$TAC_{it}$  the total accruals of the company  $i$  in the period  $t$ .

$\Delta CA_{it}$  the variation in total current assets.

$\Delta Cash_{it}$  the variation in cash and cash equivalents.

$\Delta CL_{it}$  the variation in total current liabilities.

$\Delta STD_{it}$  the variation in long-term debt included in current liabilities.

$Dep_{it}$  the depreciation and amortization expenses.

Next, in line with previous research (Durana *et al.*, 2021; Larcker & Richardson, 2004; Palacios-Manzano *et al.*, 2019; Valaskova *et al.*, 2021), this study applies the modified Jones (1991) model in its cross-sectional form to estimate the non-discretionary part of the total accruals:

$$\frac{TAC_{it}}{A_{i,t-1}} = \beta_0 + \beta_1 \frac{\Delta REV_{it}}{A_{i,t-1}} + \beta_2 \frac{PPE_{it}}{A_{i,t-1}} + \varepsilon_{it}. \quad (2)$$

In addition, a yearly regression analysis is conducted to compare total accruals with the change in revenues ( $\Delta REV$ ), and the level of the gross property, plant and equipment ( $PPE$ ), adjusted by lagged total assets ( $A_{i,t-1}$ ) to mitigate issues of heteroskedasticity (Dechow *et al.*, 1995).

Then, with the regression parameter estimates ( $(\hat{\beta}_0, \hat{\beta}_1, \hat{\beta}_2)$ ), the non-discretionary accruals ( $NDCA$ ) for each firm in the sample is calculated by modifying the change in sales for the change in accounts receivable ( $\Delta AR$ ) to account for the potential manipulation of sales by the firms through alterations in credit terms (Dechow *et al.*, 1995):

$$NDCA_{it} = \hat{\beta}_0 + \hat{\beta}_1 \frac{\Delta REV_{it} - \Delta AR_{it}}{A_{i,t-1}} + \hat{\beta}_2 \frac{PPE_{it}}{A_{i,t-1}}. \quad (3)$$

Next, the residual of the total accruals is referred to as the discretionary accruals for firm  $i$  in year  $t$  ( $DACC_{it}$ ). Finally, the measure used for  $EM_{it}$  was obtained from the absolute value of discretionary accruals.

In accordance with the hypotheses proposed, *Auditor tenure* (ATEN) and *Audit fees* (AFEE) were considered as independent variables. Additionally, with the aim of exploring the relationship between the main characteristics of the board of directors and EM, the following variables were also considered as regressors: the percentage of *non-executive board members* (NEBM), *board members re-election years* (BMRY), *board size* (BSIZ), *board meeting attendance* (BMA), *duality* (DUA), and *board member compensation* (BMCO). Finally, the following financial variables were used as control variables (Valls Martínez *et al.*, 2022a; Valls Martínez *et al.*, 2022b): level of *indebtedness* (INDE), *operating profit margin* (OPM), and *book value per share* (BVS). Table 2 shows descriptions for all the variables.

The linear regression technique was applied to test the research hypotheses. With the aim of addressing the problem of obtaining biased estimators due to the existence of omitted variables in the analysis, panel data with fixed effects regressions were used, after applying the Hausman test (Hausman, 1978) to select between fixed and random effects.

Model 1 was used to analyze the relationship between *Auditor tenure* and EM:

$$EM_{it} = \beta_0 + \beta_1 \cdot ATEN_{it} + \beta_2 \cdot NEBM_{it} + \beta_3 \cdot BMRY_{it} + \beta_4 \cdot BSIZ_{it} + \beta_5 \cdot BMA_{it} + \beta_6 \cdot DUA_{it} + \beta_7 \cdot BMCO_{it} + \beta_8 \cdot INDE_{it} + \beta_9 \cdot OPM + \beta_{10} \cdot BVS + \alpha_i + \phi_t + \varepsilon_{it} \quad (4)$$

where  $i$  is the company,  $t$  is the year,  $\alpha_i$  controls the cross-cutting effects due to the unobserved characteristics of the company,  $\phi_t$  controls the temporary effects, and  $\varepsilon_{it}$  is the random disturbance of the estimation.

Similarly, Model 2 analyzes the relationship between *Audit fees* and EM:

$$EM_{it} = \beta_0 + \beta_1 \cdot AFEE_{it} + \beta_2 \cdot NEBM_{it} + \beta_3 \cdot BMRY_{it} + \beta_4 \cdot BSIZ_{it} + \beta_5 \cdot BMA_{it} + \beta_6 \cdot DUA_{it} + \beta_7 \cdot BMCO_{it} + \beta_8 \cdot INDE_{it} + \beta_9 \cdot OPM + \beta_{10} \cdot BVS + \alpha_i + \phi_t + \varepsilon_{it} \quad (5)$$

In addition, Model 3 analyzes simultaneously the effects of the two independent audit variables on EM:

$$EM_{it} = \beta_0 + \beta_1 \cdot ATEN_{it} + \beta_2 \cdot AFEE_{it} + \beta_3 \cdot NEBM_{it} + \beta_4 \cdot BMRY_{it} + \beta_5 \cdot BSIZ_{it} + \beta_6 \cdot BMA_{it} + \beta_7 \cdot DUA_{it} + \beta_8 \cdot BMCO_{it} + \beta_9 \cdot INDE_{it} + \beta_{10} \cdot OPM + \beta_{11} \cdot BVS + \alpha_i + \phi_t + \varepsilon_{it} \quad (6)$$

Next, as the extreme values of the different variables could bias the results obtained, the continuous variables were winsorized, replacing 1% of the highest and lowest observed values with their contiguous values. In this way, the stability of the results was tested. When the number of observations is high, as in the sample of this research, it is sufficient to winsorize at the 0.01 level to dilute the impact of extreme values that could otherwise distort the results, as suggested in the literature (Haque, 2017; Luo *et al.*, 2012; Valls Martínez *et al.*, 2022b).

Finally, Model 3 was applied individually to each of the four audit firms with the largest presence in the S&P 500 index, with the purpose of analyzing the differences between them.

To summarize the methodological approach, the study adhered to the following steps:

1. Calculation of earnings management accruals using the Dechow method, as previously detailed.
2. Computation of descriptive statistics for the variables to facilitate univariate analysis.
3. Examination of Pearson's bivariate correlations to confirm the absence of significant correlations among the regressors, which could potentially lead to collinearity issues in subsequent regression analysis.
4. Estimation of Models 1 to 3 utilizing the original values of the variables retrieved from the database.
5. Re-estimation of Models 1 to 3 employing winsorized variables to evaluate the robustness of the initial findings, thereby mitigating the influence of extreme values.
6. Determination of the means of dependent and independent variables, stratified by audit firm, and subsequent application of an ANOVA test to assess the statistical significance of any observed differences.
7. Estimation of Model 3 for each of the Big Four audit firms to explore whether the relationships between the dependent variable and the independent variables exhibit consistent behavior or diverge based on the auditing company.

## **Results**

Table 3 shows the mean, median, and standard deviation of each variable, as well as the minimum and maximum values. The EM variable shows

a wide degree of dispersion, revealing the diverse behavior of the companies in the sample. The independent variables related to audit, auditor tenure, and audit fees vary notably, which allows us to contrast the research hypotheses previously stated.

Regarding the variables related to the board of directors, almost 86% of the directors are non-executive members, the re-election of directors is conducted more or less annually, the average size of the board is 11 members, the average attendance at board meetings by directors is over 80%, and almost all CEOs are members of the board of directors. Finally, director compensation differs widely among companies. Regarding the financial variables, the average debt of the companies is close to 32% and the average operating margin is almost 17%, showing high variability, as does the book value per share.

The Pearson correlation matrix, shown in Table 4, reveals that there are no high correlations between the regressors that could give rise to subsequent collinearity problems. The two audit variables under study correlate negatively and significantly with the dependent variable, such that the longer the auditor has been involved with the audited company and the higher the audit fees, the lower the degree of EM practices.

Similarly, a higher percentage of non-executive directors, a larger board size, higher director attendance at board meetings, and greater director compensation are significantly related to lower EM. Conversely, the longer the period of re-election of directors, i.e., the longer the members sit on the board of directors, the more EM occurs. However, having the company CEO on the board of directors appears to have no significant influence on EM.

The financial variables show a negative relationship with the dependent variable, but only indebtedness and operating margin are significant, such that higher indebtedness and higher operating margin are related to lower EM.

Table 5 reports the results of Regression Models 1, 2, and 3. In all cases, at 1% significance level, *Auditor tenure* (ATEN) and *Audit fees* (AFEE) have a negative influence on EM, confirming Hypotheses 1 and 2. Thus, a longer auditor tenure with the audited company and higher audit fees are significantly associated with reduced earnings management, indicating a closer alignment of financial statements with the actual business performance. Fixed effects were used, following the results of Hausman's test, which remained below 0.05 in all the models. In addition, panel data

were more appropriate than pooled data, according to Breusch Pagan's test. The proposed models were adequate, based on the  $F$ -statistic. On the basis of the Akaike (Akaike, 1974) and Bayesian (Schwarz, 1978) criteria, according to which lower values indicate a better model, the most appropriate model was Model 3, which includes both independent audit variables. The  $R^2$  coefficient indicates that 61.28% of the variance of the dependent variable was explained, which is a good fit of the model. The acceptable value of  $R^2$  varies depending on the field of study and should also be assessed in light of the significance of the regressors. However, values exceeding 70%, in absolute terms, are generally regarded as indicative of a strong or substantial model fit (Hair *et al.*, 2014; Ozili, 2023; Ratner, 2009; Valls Martínez & Martín Cervantes, 2021).

Furthermore, it was observed that the variables *Non-executive board members* (NEBM) and *Board member compensation* (BMCO) exhibit a significant negative relationship with EM at a 1% significance level. Consequently, a higher presence of non-executive board members and increased director remuneration are associated with reduced instances of accounting manipulation aimed at concealing the company's economic and financial status. However, no significant relationship with the dependent variable was identified for the other regressors.

To test the robustness of the results, the three models were recalculated with the continuous variables winsorized at 1%. The results obtained were similar, as shown in Table 6, and no noteworthy variation was obtained.

Table 7 reports the mean values of the dependent variable (EM) and the two independent variables under analysis (ATEN and AFEE) as a function of the auditor.

The results of the ANOVA tests performed show that there is a significant relationship, at a 1% significance level, between the values of these variables as a function of the auditing company. This led us to perform regression Model 3 individually for each of the four most representative auditing companies of the S&P 500 index, in order to analyze possible differences in the results for each auditor. Table 8 provides the results of the individualized regressions.

Ernest & Young reported similar results to those obtained in the global model for AFEE, NEBM, and BMCO. However, ATEN showed a positive and non-significant relationship. Price Waterhouse Coopers presented similar results to the general model, but with a lower level of significance: AFEE was significant at 5% level, ATEN and BMCO at 10% level, and



NEBM was not significant. Deloitte presented a significant negative relationship for ATEN and BMCO, and a non-significant relationship for AFEE and NEBM. Finally, KPMG showed a significant negative relationship for ATEN and AFEE, but only at the 10% level, while the relationship was not significant for the board variables. Therefore, the results show how the effect of fees and turnover on EM differs for each of the audit firms that make up the so-called Big Four, due to the internal aspects of each of these firms, confirming Hypotheses 3 and 4. Hence, it is recommended that a comprehensive investigation into the organizational culture and ethical practices of audit firms be conducted to gain a deeper understanding of the variations in their behavior.

Figure 1 shows the scatter plot and the line of fit for the EM and ATEN variables in the overall sample and for each of the four auditing companies. Similarly, Figure 2 displays the relationship between EM and AFEE. A stronger relationship is observed for the AFEE variable than for ATEN, as evidenced by the higher regression beta values. Consequently, it can be asserted that EM practices are influenced to a greater extent by audit fees than by the duration of the auditor-auditee relationship, although a long-lasting relationship is significantly associated with reduced accounting manipulation. However, it is important to note that this general statement should be qualified based on the specific Big Four firms analyzed, as audit fees are not found to be significant in the case of Deloitte.

## **Discussion**

Based on a sample of companies included in the S&P 500 index for the period 2012–2021, the effect of auditor tenure and audit fees on the manipulation of earnings was analyzed. In addition, individual results were obtained for each of the so-called Big Four audit firms.

At a global level, the results confirm that the longer the auditor tenure, the higher the quality of the results. Therefore, these results are in line with those authors who argue against mandatory auditor rotation, as greater experience at the company facilitates the detection of accounting practices aimed at manipulating financial results (Duong Thi, 2023; Garcia-Blandon *et al.*, 2020; Hsu & Liao, 2023; Kuang *et al.*, 2020; Le & Moore, 2023; Lin & Yen, 2022; Nekhili *et al.*, 2022). Therefore, these results contradict those that, based on the theory of influence, advocate the establishment of a mandato-

ry auditor rotation (Bamahros & Wan Hussin, 2015; Firth *et al.*, 2012; Tran *et al.*, 2023; Zgarni *et al.*, 2016). These authors believe that a close and long-lasting relationship between the auditor and their client may reduce the quality of audit work due to unintentional favoritism, thereby increasing the likelihood of management errors. In contrast, an appropriate auditor rotation policy would foster auditor independence and professional skepticism.

Regarding auditor fees, the results confirm that the higher the fees, the higher the quality of financial information. Thus, the results are in line with market segmentation theory (Gandía & Huguet, 2018), according to which auditors allocate more resources to their work when they receive higher fees, and are therefore more likely to reduce EM (Eshleman & Guo, 2014; Le & Moore, 2023; Lohwasser & Zhou, 2023; Martínez & Moraes, 2017; Salehi *et al.*, 2019; Usman *et al.*, 2022). The results contradict those of studies based on bonding theory (Asthana & Boone, 2012), which states that the bargaining power of clients causes higher audit fees to facilitate EM (Chi *et al.*, 2011; Choi *et al.*, 2022a). Likewise, these results also contradict those of studies based on the theory of bribery, which states that higher audit fees may compromise auditor independence in order to satisfy the interests of clients (Alhadab, 2018). Likewise, these results are in contrast to the perspective of scholars who, relying on the bonding theory, argue that elevated audit fees may compromise the quality of the work performed by enhancing the client's bargaining power (Asthana & Boone, 2012; Choi *et al.*, 2022; Greiner *et al.*, 2017; Kwon *et al.*, 2019; Schelleman & Knechel, 2010).

The results show that the effect of the two external factors analyzed (audit fees and auditor tenure) on the manipulation of financial results also depends on internal aspects of the auditing company (Albaqali & Kukreja, 2017; Barrainkua & Espinosa-Pike, 2018; Kaptein, 2008). Thus, faced with the same economic and regulatory scenario, as is the case of the Big Four in the US, audit firms report different results in terms of the effect of fees and tenure on EM. Hence, this research demonstrates that auditor independence depends on both external and internal factors.

To sum up, the global findings suggest that longer auditor tenure is associated with enhanced result quality, supporting arguments against mandatory auditor rotation. This contradicts the theory of influence, which posits that close and long-lasting auditor-client relationships may compromise audit quality. Regarding auditor fees, higher fees are found to be associated with improved financial information quality, in line with market

segmentation theory. These results contradict theories proposing that higher fees may facilitate earnings management due to client bargaining power or compromise auditor independence to satisfy client interests. Furthermore, the study highlights that the impact of external factors, such as audit fees and auditor tenure, on financial manipulation also depends on internal aspects of auditing firms, illustrating the multifaceted nature of auditor independence.

## **Conclusions**

In summary, this study examined the impact of auditor tenure and audit fees on earnings management within the S&P 500 index during the period 2012–2021. The results support the idea that longer auditor tenure is associated with higher-quality financial reporting, raising questions about the need for mandatory auditor rotation. Additionally, higher audit fees were found to be linked to improved financial reporting quality, supporting the market segmentation theory. Furthermore, the ethical culture within audit firms, particularly among the Big Four in the United States, was shown to influence how auditor tenure and audit fees affect earnings management. Consequently, this study suggests that U.S. policymakers may not need to impose limits on audit fees or enforce mandatory auditor rotation, as is the practice in the European Union.

This study also helps to solve the dilemma concerning mandatory auditor rotation, as well as whether audit fees influence EM. Nevertheless, the great added value of this research is that it went a step further and analyzed how, in addition to external factors (auditor tenure and fees), the independence of the auditors and, therefore, the manipulation of the results may be threatened by aspects of the auditing entity itself, especially the ethical culture of the company.

This study has interesting implications for both policymakers and legislators. The results suggest that implementing a cap on audit fees or introducing a mandatory auditor rotation system, as practiced in Europe or China (Hoang *et al.*, 2022), may not be advisable. Furthermore, our findings indicate that, in order to reduce earnings management (EM), further research should be conducted on the internal aspects of audit firms related to their ethical culture. This research demonstrates that the professionalism of auditors plays a crucial role in determining the direction and intensity of

the impact of external variables (fees and rotation) on independence and, consequently, the quality of financial reports.

Furthermore, this research carries significant implications for the auditing sector, as promoting a culture of ethics and professionalism leads the sector to focus on continuous improvement in the quality of auditors' work through ongoing training. Additionally, given the pivotal role auditors play, there are also implications for society at large. Enhancing audit quality by fostering an ethical culture can lead to improved financial and non-financial information provided by audited companies. This is of immense significance for the functioning of economic systems based on the principle of freedom of enterprise. Beyond upholding the principle of legality, it represents a conspicuous and highly consequential public interest in the current global economic system.

Moreover, this research provides significant implications for audited companies, particularly for their shareholders who rely on quality information. Based on our findings, shareholders can see that the continued presence of the same auditors holds positive implications for their interests, and that high audit fees contribute to maintaining information quality. Similarly, this study offers insights for countries with audit regulations differing from those of the United States, suggesting that imposing limits on fees or auditor tenure may not be beneficial. Instead, policies that enhance the ethical culture within auditing firms may yield more favorable outcomes.

Finally, improving audit quality benefits the judicial powers by providing them with more reliable and accurate information to resolve economic-related judicial disputes. This strengthens justice, social ethics, and accountability within the judicial system.

#### *Limitations and future research*

This research has certain limitations, offering opportunities for future research endeavors. The main limitation is the sample composition, which consists of companies listed in the United States. While this approach allows for an in-depth examination within the U.S. context, it may only partially capture the cultural and legal nuances of other regions. Consequently, the findings of this study may not be universally applicable, and it is essential to recognize that varying cultural norms, legal frameworks, and business practices in different parts of the world could potentially yield

different outcomes. Therefore, future research that encompasses a more diverse and globally representative sample of companies from various economic and cultural backgrounds would provide a more comprehensive understanding of the relationships between auditor tenure, audit fees, and earnings management on a global scale.

Furthermore, following the previous recommendation, as this study utilizes a sample of companies from one of the world's major economic environments, including companies listed in emerging countries in the sample would provide highly valuable insights into the research. Moreover, as the current economic environment is so dynamic and globalized, a potential limitation to the scope of this research is the period used for data collection, spanning the period from 2012 to 2021. While this period provides significant insight into events and trends during that time frame, there may have been substantial changes in the economic, legal, and business environment after the year 2021. The recent effects of the COVID-19 pandemic, the economic consequences of the conflict between Russia and Ukraine, issues stemming from cyberattacks on major corporations, and the ongoing concern about climate change have transformed the global economic landscape (León-Gómez *et al.*, 2022). Therefore, it is important to acknowledge that the results and conclusions may only partially capture the current dynamics of the market and auditing regulations. Future research could consider gathering more up-to-date data to maintain the relevance of the findings in a constantly evolving environment.

Finally, given that the organizational culture and ethics of each auditing company have a decisive influence on the results, the main line of future research should analyze these aspects. In short, it is a matter of studying abstract concepts that are not directly observable but are instead inferred through specific indicators. Therefore, one future research line would be to conduct surveys aimed at defining such constructs and their influence on the quality and reliability of the audit report.

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## Annex

**Table 1.** Sample description

Auditor	Frequency	Percentage
Ernest & Young	1029	34.19
Price Waterhouse Coopers	924	30.70
Deloitte	620	20.60
KPMG	414	13.75
Grant Thornton	20	0.66
BDO International	3	0.10

**Table 2.** Definition of variables

Abbreviation	Variable	Definition
EM	EM	Dechow's EM
ATEN	Auditor tenure	The number of years during which the auditor remains with the company
AFEE	Audit fees	Logarithm of audit fees
NEBM	Non-executive board members	Percentage of non-executive board members
BMRV	Board members reelection years	Number of years after which the members of the board of directors must be reelected
BSIZ	Boar size	Number of board members
BMA	Board meeting attendance	The average overall attendance percentage of board committee meetings as reported by the company
DUA	Duality	Dummy variable, 1 if the CEO is a board member, and 0 otherwise
BMCO	Board members' compensation	Logarithm of total compensation of the board members
INDE	Indebtedness	Percentage of total debt to total equity
OPM	Operating profit margin	Earnings before interest and taxes from ordinary company operations
BVS	Book value per share	Total equity divided by the number of shares

Note: Monetary amounts are expressed in thousands of dollars.

**Table 3.** Descriptive statistics

Variable	Mean	Median	SD	Minimum	Maximum
EM	0.104536	0.061119	0.160268	0.000193	2.778731
ATEN	16.398010	18.000000	6.888206	1	33.000000
AFEE	8.980617	8.959633	0.906876	6.030685	11.869900
NEBM	85.879010	88.890000	6.941670	50.000000	100.000000
BMRV	1.375748	1.000000	0.785806	1.000000	4.000000
BSIZ	10.880400	11.000000	3.568861	4.000000	138.000000
BMA	80.769440	75.000000	9.807655	6.000000	100.000000
DUA	0.986379	1.000000	0.115932	0.000000	1.000000
BMCO	14.813980	14.852350	0.550181	10.507800	21.380700
INDE	0.317943	0.302379	0.228908	0.000000	3.915894
OPM	16.996560	16.270000	23.796930	-906.380000	71.980000
BVS	561.538600	17.130000	11601.620000	-87.732000	342621.500000

**Table 4.** Pearson's correlation matrix

Variable	EM	ATEN	AFFE	NEBM	BMRV	BSIZ	BMA	DUA	BMCO	INDE	OPM
ATEN	-0.1045*** (0.0000)										
AFFE	-0.3554*** (0.0000)	0.1421*** (0.0003)									
NEBM	-0.1953*** (0.0000)	0.0761*** (0.0000)	0.2438*** (0.0000)								
BMRV	0.2499*** (0.0000)	-0.1701*** (0.0000)	-0.2348*** (0.0000)	-0.0706*** (0.0001)							
BSIZ	-0.2000*** (0.0000)	0.0498*** (0.0062)	0.2616*** (0.0001)	0.1409*** (0.0000)	-0.1121*** (0.0000)						
BMA	-0.0949*** (0.0000)	0.0007 (0.9709)	0.1150*** (0.0000)	0.0708*** (0.0001)	-0.0643*** (0.0004)	0.0586*** (0.0013)					
DUA	0.0147 (0.4214)	0.0555*** (0.0023)	0.0365** (0.0455)	0.0265 (0.1459)	-0.0022 (0.9053)	0.0483*** (0.0081)	-0.0478*** (0.0088)				
BMCO	-0.2331*** (0.0000)	0.1400*** (0.0000)	0.3053*** (0.0000)	0.1685*** (0.0000)	-0.1294*** (0.0000)	0.2446*** (0.0000)	0.0064 (0.7268)	0.0722*** (0.0001)			
INDE	-0.0529*** (0.0037)	-0.0068 (0.7111)	0.0291 (0.1103)	0.1438*** (0.0000)	-0.0285 (0.1186)	0.0416** (0.0225)	0.0290 (0.1119)	-0.0008 (0.9646)	-0.0040 (0.8281)		
OPM	-0.0499*** (0.0062)	0.0168 (0.3569)	-0.0247 (0.1756)	-0.0244 (0.1808)	-0.0625*** (0.0006)	0.0177 (0.3319)	0.0092 (0.6157)	-0.0002 (0.9924)	0.0140 (0.4420)	0.0502*** (0.0059)	
BVS	-0.0196 (0.2827)	0.0608*** (0.0008)	0.0912** (0.0000)	-0.0574** (0.0016)	-0.0223 (0.2203)	0.0431** (0.0180)	0.0881*** (0.0000)	0.0055 (0.7648)	-0.2999*** (0.0000)	-0.0375** (0.0395)	-0.0077 (0.6743)

Note: *p*-value in parentheses.

\*\*\*, \*\* and \* indicate a significance of less than 1 %, less than 5% and less than 10%, respectively.

Number of observations: 3010.

**Table 5.** Panel data regressions (fixed effects)

Variable	Model 1	Model 2	Model 3
Intercept	0.7358449*** (0.000)	1.060568*** (0.000)	1.015911*** (0.000)
ATEN	-0.0022532*** (0.000)		-0.0016708*** (0.010)
AFEE		-0.0401572*** (0.000)	-0.0363895*** (0.000)
NEBM	-0.0019551*** (0.000)	-0.0019986*** (0.000)	-0.0018998*** (0.000)
BMRV	0.0073813 (0.200)	0.0070354 (0.219)	0.0051991 (0.367)
BSIZ	-0.0008357 (0.272)	-0.0007326 (0.334)	-0.0006992 (0.356)
BMA	-0.0000999 (0.731)	-0.0001247 (0.666)	-0.0000767 (0.791)
DUA	0.0281631 (0.192)	0.0249865 (0.245)	0.0266773 (0.214)
BMCO	-0.0295547*** (0.000)	-0.0291317*** (0.000)	-0.0274471*** (0.000)
INDE	-0.0362435* (0.086)	-0.0344958 (0.101)	-0.0301813 (0.152)
OPM	0.0001242 (0.263)	0.000147 (0.184)	0.0001469 (0.184)
BVS	1.06e-08 (0.985)	-2.16e-08 (0.970)	2.80e-08 (0.962)
Adjusted R <sup>2</sup>	0.6096	0.6119	0.6128
F-statistic	9.98*** (0.0000)	11.61*** (0.0000)	11.18*** (0.0000)
Observations	3010	3010	3010
Hausman test	51.65*** (0.0000)	27.97*** (0.0010)	29.80*** (0.0009)
Breusch Pagan test	9.85*** (0.0000)	9.15*** (0.0000)	9.18*** (0.0000)
AIC	-5732.269	-5.750.373	-5756.056
BIC	-5666.162	-5.684.267	-5683.940

Notes: \*\*\*, \*\* and \* indicate a significance of less than 1 %, less than 5% and less than 10%, respectively. AIC and BIC: smaller is better.

**Table 6.** Panel data regressions with winsorized variables (fixed effects)

Variable	Model 1	Model 2	Model 3
Intercept	0.6010918*** (0.000)	0.7952413*** (0.000)	0.7473817*** (0.000)
ATEN	-0.0017553*** (0.000)		-0.0015792*** (0.001)
AFEE		-0.0218287*** (0.001)	-0.0194559*** (0.002)
NEBM	-0.0010791*** (0.001)	-0.0011564*** (0.000)	-0.0010739*** (0.001)
BMRV	0.0067002 (0.118)	0.0077189* (0.070)	0.0062467 (0.145)



**Table 6.** Panel data regressions with winsorized variables (fixed effects)

Variable	Model 1	Model 2	Model 3
BSIZ	-0.0020457 (0.144)	-0.0017136 (0.222)	-0.0018145 (0.195)
BMA	-0.0000712 (0.753)	-0.0001056 (0.641)	-0.0000626 (0.782)
DUA	0.026076 (0.102)	0.0235323 (0.140)	0.0250172 (0.116)
BMCO	-0.0253454*** (0.000)	-0.0268865*** (0.000)	-0.0242713*** (0.000)
INDE	-0.0180813 (0.359)	-0.0144658 (0.468)	-0.0067503 (0.736)
OPM	0.0001974 (0.433)	0.0001394 (0.580)	0.0001698 (0.500)
BVS	-0.0004299*** (0.010)	-0.0003045* (0.088)	-0.0002239 (0.213)
Adjusted R <sup>2</sup>	0.6098	0.6097	0.6110
F-statistic	10.86** (0.0000)	10.77** (0.0000)	10.75** (0.0000)
Observations	3010	3010	3010
Hausman test	76.12** (0.0000)	49.51** (0.0000)	55.49** (0.0000)
Breush Pagan test	8.30** (0.0000)	7.41** (0.0000)	7.45** (0.0000)
AIC	-7563.789	-7562.780	-7572.597
BIC	-7497.682	-7496.673	-7500.481

Notes: \*\*\*, \*\* and \* indicate a significance of less than 1 %, less than 5% and less than 10%, respectively. AIC and BIC: smaller is better.

**Table 7.** Mean of dependent and independent variables by auditor

Auditor	Auditor tenure	Audit fees	EM
Ernest & Young	17.18	8.94	0.11
Price Waterhouse Coopers	15.29	9.09	0.10
Deloitte	17.18	9.03	0.10
KPMG	16.12	8.86	0.09
Grant Thornton	9.80	7.06	0.32
BDO International	7.67	9.08	0.12
ANOVA test	14.09** (0.0000)	24.23** (0.0000)	8.74** (0.0000)

**Table 8.** Panel data regressions by auditor (fixed effects)

Variable	Ernest & Young	Price Waterhouse Coopers	Deloitte	KPMG
Intercept	1.380275*** (0.000)	0.6779429*** (0.000)	1.033517*** (0.000)	0.7080042*** (0.007)
ATEN	0.0013384 (0.383)	-0.0017328* (0.088)	-0.0025666** (0.039)	-0.0027050* (0.076)
AFEE	-0.043887*** (0.010)	-0.0333703** (0.015)	-0.0112279 (0.518)	-0.0330224* (0.055)
NEBM	-0.0035047*** (0.000)	-0.0003905 (0.592)	-0.0013298 (0.221)	-0.0011515 (0.203)
BMRY	0.0030946 (0.809)	0.0063072 (0.469)	0.0196236** (0.144)	0.0021613 (0.839)
BSIZ	-0.0021858 (0.543)	-0.0002576 (0.717)	-0.0035710 (0.402)	-0.0037892 (0.320)
BMA	-0.0007073 (0.261)	-0.0000413 (0.925)	-0.0000750 (0.901)	0.0008470 (0.192)
DUA	0.0240129 (0.542)	0.0015383 (0.966)	0.0402437 (0.403)	0.0378469 (0.435)
BMCO	-0.0323381*** (0.000)	-0.0141121* (0.076)	-0.0427930** (0.009)	-0.0177862 (0.223)
INDE	-0.1801307*** (0.000)	-0.0269369 (0.475)	-0.0295418 (0.680)	0.0425291 (0.159)
OPM	0.0003357** (0.018)	-0.0001131 (0.593)	-0.0030955*** (0.000)	0.0001367 (0.859)
BVS	-0.000921* (0.063)	9.47e-06 (0.978)	1.62e-07 (0.799)	-0.0001047 (0.587)
Adjusted R <sup>2</sup>	0.6241	0.5330	0.6906	0.3930
F-statistic	7.74*** (0.0000)	1.96** (0.0294)	3.84*** (0.0000)	2.11** (0.0193)
Observations	1029	924	620	414
Breusch Pagan test	7.80*** (0.0000)	6.87*** (0.0000)	12.51*** (0.0000)	3.23*** (0.0000)

Notes: '\*\*\*', '\*\*' and '\*' indicate a significance of less than 1 %, less than 5% and less than 10%, respectively.  
AIC and BIC: smaller is better.

**Figure 1.** Scatter plots and fitted values EM – auditor tenure

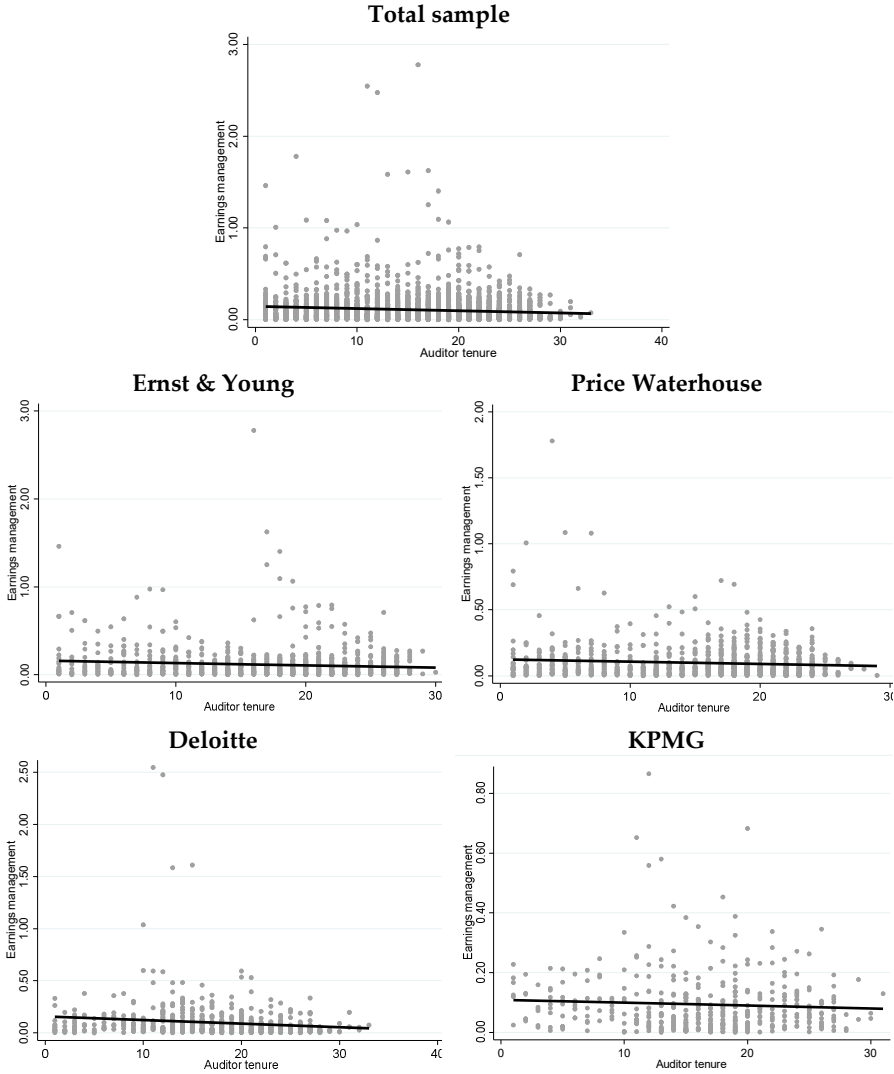


Figure 2. Scatter plots and fitted values EM – audit fees.

