Journal of Accounting & Organizational Change

The relationship between the number of branches of audit firms and audit market competition

Sajjad Abdollahzade, Mahmoud Lari DashtBayaz and Mahdi Salehi
Department of Accounting, Faculty of Economics and Administrative Sciences, Ferdowsi University of Mashhad, Mashhad, Iran

Received 17 April 2025
Revised 30 June 2025
5 August 2025
Accepted 6 August 2025

Abstract

Purpose – The purpose of this study is to evaluate the relationship between the number of branches of auditing firms and the level of competition in the audit market. Furthermore, considering the theoretical framework and prior research on the mergers of auditing firms, this study investigates the impact of such mergers on the primary hypothesis to determine how mergers influence the relationship between branch count and market competition.

Design/methodology/approach – The collected data were categorized using Microsoft Excel and analyzed using STATA statistical software. The spatial scope of the study comprised all auditing firms registered with the Iranian Association of Certified Public Accountants. The temporal scope spanned from 2015, marking the occurrence of the first mergers, to 2022. Changes in the number of branches and other control variables were examined within this period.

Findings – The results indicate a positive and significant relationship between the number of branches of audit firms and audit market competition, as measured by the Herfindahl–Hirschman Index (HHI) and the Entropy Index. Both indicators demonstrated that increased auditing firms' branches lead to heightened competition in the audit market. Moreover, the findings confirmed that the mergers of auditing firms also influence the relationship between branch count and market competition.

Originality/value – Based on the theoretical framework and previous studies, researchers and policymakers have recognized the significance of healthy competition in improving the quality of services and products such as audit reports. Historically, special attention has been devoted to fostering competition in the audit market.

Keywords Audit market competition, Number of branches of auditing firms, Mergers

Paper type Research paper

1. Introduction

Competition is a fundamental concept in market-based economies and plays a vital role in enhancing efficiency, optimizing resource allocation and improving the quality of services. Shleifer and Vishny (1997) argue that product market competition is one of the most powerful forces driving efficiency in the global economy. In line with this, De Villiers *et al.* (2013) assert that in competitive markets, pricing tends to be more realistic and closely aligned with underlying economic fundamentals. Accordingly, revisiting definitions and key determinants of competition – particularly within service-oriented professions such as auditing – can provide valuable insights into the structure of the market and the strategic behavior of its participants.

In a competitive audit market, auditors exhibiting opportunistic behavior are compelled to moderate such tendencies to maintain long-term client relationships, as the loss of clients in a competitive environment may jeopardize their professional survival (Rashidi, 2021). In this context, Florou *et al.* (2020) suggest that the greater a firm's reputation and influence in the audit market, the stronger its bargaining power in fee negotiations – resulting in higher audit

Journal of Accounting & Organizational Change

1832-5912
DOI 10.1108/JAOC-04-2025-0118

fees. These findings reflect the existence of diverse perspectives regarding the impact of audit market competition on audit fees and audit quality.

Nevertheless, the audit market possesses characteristics akin to monopolistic competition, in which audit firms compete not only on the basis of pricing but also in terms of service quality (Dekeyser *et al.*, 2021). Furthermore, Ciconte, Knechel, and Schelleman (2015) argue that competition in the audit industry is not limited to price or quality alone but also involves engagement volume. As the number of competitors declines, the intensity of such competition diminishes. Several studies suggest that auditors tend to focus more on price competition than on enhancing audit quality (Chang, Guo and Mo, 2019). These behavioral patterns have raised concerns among regulatory bodies and policymakers – particularly in developed economies – regarding the adverse implications of audit market concentration and the dominance of large firms (European Commission, 2010). One potential outcome of intensified market competition is the phenomenon of opinion shopping, whereby clients switch audit providers with the intent of influencing audit judgments, thereby indirectly undermining auditor independence (Lennox, 1998). Accordingly, Suwarno *et al.* (2020) showed that intensified competition in the audit market may weaken auditor independence.

Although some empirical evidence indicates that increased competition among audit firms may lead to lower audit fees (Hallman *et al.*, 2022), geographic expansion through the establishment of branch offices brings its own set of challenges. These include difficulties in internal control and coordination among branches, with some central offices potentially losing oversight over their regional operations (Wang *et al.*, 2016; Liu and Zhang, 2008). Nevertheless, geographical diversification can also yield significant advantages. For instance, regional distribution enables audit firms to better address heterogeneous client needs and enhance market positioning through increased adaptability to local conditions (Chu *et al.*, 2018).

In line with this perspective, Simons and Zein (2016) also point to variations in audit fees based on geographical distance. Their findings suggest that low-quality auditors tend to charge higher fees when auditing geographically remote clients, compared to high-quality auditors who are located closer to their clients. These insights further underscore the importance of geographic presence in shaping the operational efficiency and service quality of audit firms.

Given the critical importance of audit market competition and its potential impact on audit quality, this topic has consistently garnered attention from researchers and regulatory bodies (GAO, 2003, 2008; The American Assembly, 2005; Treasury, 2006; PCAOB, 2011, 2017). While market concentration is frequently used as a proxy for measuring competition in the audit market (Brockbank, Do and Lawson, 2023), empirical evidence regarding its effect on audit quality remains mixed (Boone *et al.*, 2012; Eshleman and Lawson, 2017). In this regard, VA Raak (2020) concluded that an increase in the market share of audit firms does not necessarily lead to improvements in audit quality. On the other hand, Suwarno *et al.* (2020) demonstrated that intensified competition in the audit market may undermine auditor independence.

According to Choi *et al.* (2012) and Jensen *et al.* (2015), geographic expansion of audit offices can reduce physical distance from clients, thereby facilitating better engagement and improved access to information. Moreover, studies by PCAOB (2004, 2010) and Pan *et al.* (2023) highlight that a significant portion of audit procedures are performed at client headquarters, underscoring the importance of geographical proximity. Additionally, recent findings by Liu and Zhang (2024) show that audit offices which report more promptly tend to deliver higher audit quality.

As such, geographic expansion not only contributes to operational efficiency and facilitates coordination between audit teams but also promotes service quality enhancement. Thus, physical proximity can be considered a key driver of competition among audit firms – especially in light of the growing regulatory emphasis on audit quality. In contexts where effective

communication is influenced by cultural, linguistic or institutional factors, the strategic expansion of branch offices can be an essential mechanism for attracting clients and increasing market share.

Therefore, the current study investigates the impact of the presence and number of branches of audit firms on audit market competition, considering market share as a metric for the Herfindahl Index and other influential factors such as mergers as a moderating and control variable, firm size and clients, auditor specialization, auditor opinion type, inflation rates and wage rate changes as control variables. Finally, it addresses questions such as: "Has the creation of branches by firms attracted more clients and increased their market share?" and "Is the presence of branches a strategy employed by audit firms to compete in the market?" No research has specifically examined the impact of the presence and number of branches on parameters such as competition, quality and other audit-related factors. Broadly, this study aims to analyze the relationship between the number of branches of auditing firms and their competitive capacity in the audit market. This research seeks to provide a more comprehensive perspective on the structure and characteristics of the audit market, particularly in terms of competition, to emphasize the moderating effect of mergers. The study aims to address regulators' concerns regarding competition in this market by elucidating various dimensions of this topic. The core question of this research revolves around whether the number of branches of auditing firms influences competition in the audit market. Firms' market share, a proxy for competitive capacity, is examined to answer this question. Furthermore, the study explores the potential positive effects of branch numbers, demonstrating that having branches may help attract more clients and create significant competitive advantages. From another perspective, a higher number of branches is expected to facilitate access to auditing services, reduce informational asymmetry, lower customization costs for services and strengthen the presence of local auditors. These factors are anticipated to positively affect audit market competition and improve the standing of audit firms in this market. This research used data from 25 sample audit firms and examined 348 published reports. Based on the theoretical framework regarding the impact of mergers, this study also evaluates the effect of this variable as a moderating factor on the primary variables of the research. The findings, derived from analyzing competition using the Herfindahl-Hirschman Index and the Entropy Index, clearly indicate that the two variables, the number of branches and market competition, have a direct relationship. Additionally, the results reveal that mergers of auditing firms influence the relationship between the number of branches and competition in the audit market.

This paper comprises five additional sections: the theoretical framework and hypothesis development (explaining the relationship between the number of branches of auditing firms and market competition), research methodology, findings from the analysis, conclusions and practical recommendations.

2. Theoretical framework and literature review: hypothesis development

2.1 Market competition

Competition is the cornerstone of market economies. No market can function efficiently without sufficient interaction among its participants (Vnukova, Opeshko, and Mamedova, 2020; Kolodiziev *et al.*, 2021; Vargas *et al.*, 2019; Setyo *et al.*, 2021). As one of the foundational concepts in economic theory, competition plays a critical role in analyzing the structure of service markets such as auditing. According to the theory of competitive markets, active engagement among market participants can enhance economic efficiency, promote optimal resource allocation and improve the quality of services provided (Sirojiddin *et al.*, 2022).

However, the audit market structure often resembles a model of monopolistic competition rather than perfect competition, due to the dominance of large audit firms (OECD, 2010). Prior research has yielded mixed findings regarding the implications of audit market concentration. For instance, studies such as Cho (2025) and Makarenko *et al.* (2021) highlight potential benefits of concentration, including economies of scale and enhanced audit quality.

Conversely, reports by Oxera (2006, 2018) and the European Commission (2010) underscore the adverse effects of high market concentration, such as increased systemic risk and diminished auditor independence. These contradictory findings have led scholars to treat market concentration indices as conditional proxies for measuring audit market competition, with an emphasis on interpreting them within appropriate theoretical frameworks (DeFond and Zhang, 2014).

In contrast, the Government Accountability Office (2003, 2008) also presented findings indicating the absence of evidence regarding the negative impact of audit market concentration.

According to Ernstberger *et al.* (2020), audit market concentration fosters cost efficiencies through economies of scale and heightens inter-firm competition, which collectively contribute to reduced audit fees. In line with this, Wen *et al.* (2023) report that, although previous research has yielded inconsistent evidence on the association between audit market competition and audit pricing, their empirical results support a significant and robust relationship between competition levels and audit fees.

Another significant issue related to concentration metrics is the practical challenge of appropriately defining the market. Defining the relevant market can be complex and time-consuming (OECD, 2012).

In this regard, Cho (2025) suggests that in more competitive audit markets, auditors with faster reporting speeds may prioritize timeliness over rigorous audit procedures as a strategy to attract and retain clients. While this may explain the accelerated reporting, another important factor contributing to faster audit report issuance is the presence of local audit offices. These offices, due to their geographical proximity to clients, facilitate more effective professional interaction, faster access to documentation and more efficient exchange of information. Such attributes help streamline audit execution and enhance the timeliness of audit reports by reducing delays in data transfer and enabling more efficient audit performance. Therefore, the operational features of local offices can be considered as significant contributors to improved audit report timeliness. This view is also supported by the findings of Truong (2023), who highlights the role of such conditions in enhancing audit efficiency.

As a result, industry concentration measures are often used as a surrogate indicator for measuring market competition. Previous academic research has explored audit market competitiveness by examining the relationship between audit market concentration, audit fees, and audit quality (Wang and Chui, 2015; Chang, Guo and Mo, 2019). Nevertheless, while audit market concentration has been widely used as a valid proxy for assessing competition (Hallman, Kartapanis and Schmidt, 2022) and is also used in the present study to evaluate the competitive environment, prior literature has acknowledged certain limitations associated with this measure. For instance, DeFond and Zhang (2014), in their foundational review of archival auditing research, pointed out that "the relationship between audit market concentration and competition is unclear" (p. 311). Thus, although concentration metrics can offer a relative view of competition, they may not fully capture the multifaceted and dynamic nature of competition within the audit market.

2.2 Challenges of branch existence and proliferation

Recent studies – particularly within the framework of spatial economics – have highlighted the significant impact that the geographic location of audit offices can have on audit costs,

quality and effectiveness (Truong, 2023; Chen *et al.*, 2016). The presence of local branches facilitates professional interaction and reduces physical distance, thereby improving audit timeliness, enhancing access to localized information and lowering logistical costs (Dong and Robinson, 2018; López and Rich, 2017). From this perspective, the establishment of regional branches serves not only an operational purpose but may also represent a sustainable competitive advantage for audit firms.

However, the expansion of branches can also introduce substantial challenges, particularly in terms of auditor independence and quality control. Studies such as Choi *et al.* (2010) and Wang and Chui (2015) suggest that semi-autonomous branches, driven by revenue incentives, may accept high-risk clients, ultimately undermining the overall credibility of the audit firm. In the same context, Reynolds and Francis (2000) argue that although branches operate under the name of the parent firm, they are functionally treated as individual business units. As a result, branches often enjoy significant autonomy in client acceptance, operational decisions and audit reporting, which may lead to considerable informational asymmetry at the firm level.

Establishing branches also necessitates recruiting employees with specific educational qualifications, providing adequate training or incorporating more experts into audit teams. Pan *et al.* (2023) highlight that audit production requires auditors to spend considerable time at the client's location. The time spent commuting between the audit office and the client's premises significantly impacts audit costs. Hou and Robinson (2006) argue that product market competition is a robust mechanism for efficient resource management. They contend that if managers squander excessive resources in a competitive market environment, their firms will struggle to compete and may eventually face bankruptcy.

Wang *et al.* (2016) found that branches with poorer governance were more likely to accept listed clients whose audit opinions had been modified by the previous audit firm compared to branches with better governance. Regarding the initial acceptance of clients whose previous auditors had issued modified audit opinions, branches with weaker governance showed a reduced tendency to issue modified audit opinions compared to their better-governed counterparts. The study's findings highlight that weaker branch governance within audit firms leads to poorer quality control outcomes for branch-level engagements. Simultaneously, these results emphasize the necessity for professional organizations and regulatory bodies to pay close attention to branch governance and the quality of branch audits.

2.3 Advantages of establishing and expanding audit firm branches

Prior literature has predominantly focused on market concentration and structural indicators, while the role of geographical infrastructure – particularly the spatial distribution of audit branches – has received limited direct attention in models of market competition. Studies such as Chang *et al.* (2019) and Agarwal and Hauswald (2010) have highlighted the informational advantages of local auditors, yet the causal and structural link between the number of branches and the intensity of market competition remains underexplored. This research gap underpins the significance of the present study.

Moreover, complementary theoretical frameworks, such as game theory, suggest that suboptimal geographic expansion in settings of imperfect competition can lead to reduced operational efficiency and adverse outcomes for service quality (Numan and Willekens, 2012). Therefore, examining the relationship between geographic branch expansion and audit market competitiveness not only is theoretically relevant but also carries important implications for regulation and oversight.

According to spatial economics theory, firms' price elasticities are also influenced by the geographic positioning of their competitors in the product space. In line with this theoretical perspective, the presence of audit firm branches can reduce geographic distances and facilitate

more effective information exchange and interactions between auditors and clients. This concept has also been examined in prior studies through the lens of local auditors and their proximity to client firms. Consequently, the unequal significance of location and the role of spatial clustering – as instruments of spatial and physical policy in a broad sense – are recognized as key drivers that enhance competitiveness across various sectors and regions (Feldman and Francis, 2006; Asheim *et al.*, 2006; Simmie, 2006).

However, beyond spatial dimensions, the critical role of social factors in strengthening competitiveness must also be acknowledged. These include inter-firm relationships, as well as the social and knowledge networks that exist among operational units (Currid and Williams, 2010). This implies that the spatial determinants of competitiveness do not exert a uniform effect across all activities and geographic contexts.

Dong and Robinson (2018) indicated that geographic distance substantially affected the promptness of both audit reports and financial reporting. Moreover, the study revealed that the impact of geographic distance was more significant for smaller enterprises than for bigger ones. The researchers emphasized that geographic proximity between organizations and audit firms may increase social exchange between auditors and clients. This closeness cultivates enhanced confidence between auditors and senior management, facilitating improved comprehension and involvement in the company's activities. Conversely, such participation declines when significant geographic distance increases audit risk. This situation frequently requires supplementary audit procedures and more examination, affecting audit prices. From this viewpoint, increased geographic distance between an audit firm and its client correlates with elevated audit expenses. This increase results from diminished auditor presence, intensified audit procedures during on-site visits and related logistical difficulties. According to Chang *et al.* (2019), increased geographic distance typically leads to fewer auditor visits but necessitates more rigorous audit processes during each visit, dramatically elevating audit fees.

The increase in audit firms or branches introduces diversity in geographic locations and distances from client companies. Local auditors often possess an informational advantage, reducing information asymmetry between local auditors and their clients. This advantage arises because local auditors can more easily access client-related information than non-local auditors. Furthermore, local auditors establish stronger relationships with clients and obtain specific company-related news from local media, significantly enhancing the company's ability to oversee (Agarwal and Hauswald, 2010; Choi *et al.*, 2012; Petersen and Rajan, 2002).

The theoretical literature on auditing and auditor rotation highlights that geographic proximity between audit firms and their client companies can strengthen mutual trust between auditors and senior management, while simultaneously promoting better knowledge sharing and enhancing opportunities for organizational learning (Chen *et al.*, 2016). Given that a significant portion of the audit process involves the evaluation of internal controls, the physical distance between auditors and clients – though relatively underexplored – can have important implications for audit quality, execution efficiency and overall audit costs (López and Rich, 2017).

In this context, Pan *et al.* (2023) note that a substantial part of audit activities is conducted at the client's headquarters, meaning that auditors' travel time and related logistics directly affect the total cost of audit services. Furthermore, López and Rich (2017) document a positive association between the disclosure of internal control information and geographic distance, underscoring the importance of physical proximity in facilitating effective audit outcomes.

These findings align closely with the assumptions of spatial economics theory. Drawing on the perspectives of Hotelling and Kasper, the geographic location of firms within a

competitive landscape plays a significant role in shaping strategic behavior, pricing decisions and client acquisition. Specifically, Numan and Willekens (2012) argue that when competitors are located near one another in the product space, equilibrium prices tend to converge toward marginal costs. This suggests that the geographic clustering of audit firm branches may enhance market competition, reduce service costs and improve audit quality.

However, from the standpoint of game theory, firms may also pursue suboptimal geographic expansion strategies in an effort to increase revenue, even when such actions lead to diminished operational efficiency.

Accordingly, given the operational, informational and competitive advantages associated with regional presence and branch establishment, a central research question emerges:

Do audit firms exhibit a strategic tendency to expand their geographic presence *and establish new branches in pursuit of greater market share and higher revenue?*

2.4 Mergers in the auditing industry

The term "merger" denotes amalgamating and integrating two entities into a singular one. This process has gained popularity among audit firms due to its numerous advantages, such as market entry, enhanced research and development, access to advanced technological resources, economies of scale and increased market share. The extraordinary frequency of mergers and consolidations among audit companies underscores this tendency. The recurrent multi-million-dollar mergers among the major international audit firms highlight the increasing importance of mergers and integrations in implementing worldwide strategy. The competitive landscape in the auditing sector is frequently evaluated by analyzing the market share of audit firms, which may be affected by several factors, including mergers. As mergers between firms are common in the audit market and have been the subject of extensive research, it is essential to evaluate the interventionist effect of this phenomenon on the central hypothesis. From a legal perspective, the longstanding precedent of the U.S. Supreme Court indicates that when a merger results in a firm acquiring a significant market share and leading to considerable market concentration, such an outcome may ostensibly be deemed unlawful. According to monopoly theory, the temptation for collusion among large audit firms tends to increase as market concentration intensifies. Prior research and existing literature have consistently raised concerns regarding the impact of mergers on audit market competition and, conversely, the potential for increased market concentration. Notably, several empirical studies have reached similar conclusions, namely, that consolidation in the audit industry often leads to higher market concentration (Wolk *et al.*, 2001; Thavapalan *et al.*, 2002; Carson *et al.*, 2012).

In Iran, according to Article 105 of the Fifth Development Plan Law, mergers of commercial companies are permissible as long as they do not lead to market concentration or create monopolistic power. This legal framework sets a foundation for evaluating such commercial events in the auditing market. Past studies have consistently reported increased market concentration following significant mergers, such as the 1998 merger of PwC and the 2002 collapse of Arthur Andersen (Dubaere, 2008). Feldman and Francis (2006) observed that mergers among audit firms during the 1980s and 1990s increased market concentration among major auditors. However, newer studies suggest relatively stable concentration levels may result from shorter research periods. The current literature often measures competition in the audit market under the implicit assumption that there is an inverse relationship between market competition and market concentration. Nonetheless, Defond and Zhang (2014) point out that the relationship between audit market concentration and competition remains ambiguous. Many firms have pursued mergers to maintain or enhance their market share, ensuring their position among the leading audit firms. The mergers of the 1980s led to significant disparities in the sizes of the largest and smallest firms within the "Big Eight." Experts among the Big Four firms

believe mergers are the most practical approach to expanding operations through internal growth. For example, the audit market in the UK has been heavily and consistently concentrated. Over the past decade, this concentration has primarily resulted from the merger of PricewaterhouseCoopers and Lybrand in 1998 and the integration of Arthur Andersen UK into Deloitte in 2002 (Oxera, 2006). The 1998 merger of Coopers and Lybrand was a landmark event for the accounting profession, significantly influencing both the Herfindahl Index and the merged entity's market share. With foresight, Oxera (2006) highlights that the PwC merger led to a price increase of approximately 12% over two consecutive years – 8% for the entire market in the first year and an additional 4% specifically for the merged firm's clients in the following year. The merger of Coopers and Lybrand resulted in the establishment of PricewaterhouseCoopers, the second-largest auditing firm, offering a broad array of financial services. The combined revenues of the two firms, with 135,000 personnel and a total of 8,500 partners, reached $13bn. During 1996, Coopers and Lybrand observed a 7% increase in audit fees, while their revenues saw a 10% rise. As discussed earlier, one of the challenges associated with branch expansion is the lack of effective control over branches. Wang and Chui (2015) emphasize this issue, noting that under the influence of market forces and policy changes in recent years, Chinese audit firms have experienced a wave of mergers. These mergers led to rapid firm growth and a significant increase in the number of branches. Since 2011, the Chinese Institute of Certified Public Accountants (CICPA) has required audit firms to disclose governance-related information regarding their branches (Wu and Chen, 2012). This requirement underscores the necessity for strong governance during the swift expansion of audit networks, where oversight and control over branches become progressively more difficult.

2.5 Relationship between the number of audit firm branches and audit market competition

The expansion of audit firms through the establishment of additional branches leads to greater geographic dispersion, thereby reducing the physical distance between auditors and their client firms. This geographic proximity facilitates auditors' access to client information and fosters more frequent and effective interactions with senior management. As a result, audit teams are better positioned to obtain timely and firm-specific information (Choi *et al.*, 2012; Jensen, Kim and Yi, 2015).

In contexts where audit fees and costs are closely linked to the strategic location of audit providers, competition among firms often manifests through the offering of client-specific audit fees for tailored services. Clients tend to prefer auditors who either quote the lowest fees – indicating price-based competition – or whose standardized audit procedures better align with the specific needs of the firm. In such cases, firms that can provide customized services without extensive adjustments to their standard audit approach benefit from lower customization costs and gain a competitive advantage (Simons and Zein, 2016).

According to standard economic theory, increased competition among service providers leads to reduced costs and improved efficiency (Hallman *et al.*, 2022). Accordingly, a broader geographic footprint, enabled by branch expansion, is expected to reduce audit-related expenses such as travel, personnel compensation, mission-related costs and even the costs of auditor switching.

From the perspective of game theory, Nemmaoui *et al.* (2023) suggest that a strategic equilibrium exists between service providers and clients. Their model indicates that some providers may prioritize maximizing revenue by acquiring even suboptimal or irrational clients, as increasing the overall client base – regardless of quality – can still enhance revenue. This theoretical insight provides a rationale for the sometimes non-optimal, revenue-driven expansion of audit firm branches.

Spatial economics theory, including the foundational work of Hotelling (1929), Shapiro (1989), and Wolfgang Kasper, also supports the notion that the geographic placement of firms influences market structure and pricing dynamics. According to this literature, the physical proximity of competing service providers affects their price elasticity and competitive strategies. Notably, Numann and Willekens (2012) argue that when competitors are spatially closer, equilibrium prices tend to converge toward marginal costs, signaling more intense price competition and narrower profit margins.

Empirical evidence reinforces the strategic significance of branch location. As highlighted by the Public Company Accounting Oversight Board (PCAOB, 2010, 2011, 2017) and Pan *et al.* (2023), a substantial portion of audit production occurs at the client site, often at the company's headquarters. Therefore, the travel time and logistical burden associated with site visits directly influence audit costs. Locating branches near clients becomes a critical factor in mitigating these costs.

In addition to direct cost savings, branch expansion can significantly reduce clients' indirect costs – such as travel expenses, accommodation and *per diem* allowances for auditors. These benefits can increase client incentives to engage with geographically proximate firms, thus expanding the client base and market share of audit firms.

Moreover, proximity helps reduce information asymmetry between auditors and clients. With easier and more frequent access, audit teams can better understand client operations, optimize the implementation of standard audit procedures and more efficiently perform essential tasks such as physical inspections, inventory observations and staff interviews. These improvements ultimately enhance audit quality and reduce total audit costs.

Despite these advantages, branch expansion introduces new challenges in firm governance. Wang and Chui (2015) emphasize that, particularly in rapidly growing markets like China, aggressive branch proliferation following successive mergers has led to governance disparities across offices. Some branches may lack adequate oversight from the firm's headquarters, raising concerns among regulators and professional bodies. In response, since 2011, the Chinese Institute of Certified Public Accountants has mandated the disclosure of governance information related to branch operations (Wu and Chen, 2012).

As previously noted, professional service firms compete not only in terms of pricing but also in time efficiency. Strategic geographic positioning serves as a competitive tool in determining both service location and market presence. Shapiro (1989) describes how, even in monopolistic settings, geographic proximity among firms heightens price sensitivity. Echoing this, Numan and Willekens (2012) confirm that when spatial distance between competitors decreases, prices tend to converge toward marginal cost.

Accordingly, audit firms can leverage their geographic presence to offer audit fees that better align with client expectations, leading to mutually beneficial agreements, increased client acquisition and larger market share. However, without adequate internal governance structures, this expansion may inadvertently result in market concentration and a decline in true market competition.

Based on the theoretical foundations and empirical insights presented, the first hypothesis is formulated as follows:

H1. The number of audit firm branches positively and significantly affects market competition.

2.6 Mergers and the relationship between branch proliferation and competition

As highlighted in the literature, one of the key motivations for mergers is to increase market share and maintain market position. According to the literature, the 1998 merger

of PricewaterhouseCoopers with Coopers and Lybrand and the 2002 integration of Arthur Andersen into Deloitte contributed to the concentration of the UK audit market over the past decade (Oxera, 2006). Since 1988, the audit market for multinational and large companies has become significantly more concentrated, leaving companies with fewer options for auditor selection. The U.S. Department of Justice and the Federal Trade Commission often reference mergers from 1989 and 1998 when evaluating potential mergers, as these events increased key concentration indices. These metrics indicate that audit markets have become substantially concentrated, empowering the Big Four firms to exert significant market influence. According to monopoly theory, the temptation for collusion among dominant firms also increases under such conditions. Existing research and literature consistently raise concerns about the impact of mergers on market competition and their counterpart, market concentration. Most studies have reached similar conclusions: mergers increase market concentration (Wolk *et al.*, 2001; Thavapalan *et al.*, 2002; Carson *et al.*, 2012). In this context, Wolk *et al.* (2001) observed that large audit firms dominated the European market before the significant merger in 1998. Post-merger, competition was negatively affected. Conversely, Thavapalan *et al.* (2002) challenged the core principles of industrial organization theory in Australia, arguing that the high concentration resulting from the PricewaterhouseCoopers merger increased competition. Their findings suggest that more clients turned to smaller audit service providers, intensifying competition. Using the Herfindahl Index, they found that in nearly one-third of industries, the market share of the Big Four firms was evenly distributed, reflecting a competitive market that emerged after the merger. These studies underscore that the mergers of major audit firms often lead to larger, more dominant entities, resulting in increased market concentration. On the other hand, as outlined in the literature underpinning *H1*, the proliferation of audit firm branches contributes to geographic diversity and the presence of local auditors. This geographic diversity can influence market competition by increasing the market share of audit firms. Given that mergers of large firms often involve combining branch networks, leading to an increased number of branches, it is logical to anticipate that these mergers and branch expansions will further enhance the market share and power of the newly formed entity. Based on this reasoning, *H2* is defined as follows:

H2. Mergers positively and significantly affect the relationship between the number of audit firm branches and market competition.

3. Research methodology

3.1 Temporal and spatial scope

Temporal scope: The study covers the period from 2017 to 2022.

Spatial scope: The research focuses on audit firms that are members of the Audit Organization of Iran. During the study period, 249 eligible audit firms were identified.

3.2 Models

Initially, both models are estimated using the random effects method for panel data. The impact of lagged explanatory variables on market competition in the product market and audit report delays is subsequently assessed. Finally, the study investigates the dynamic effects of variables with serial correlation to capture their influence over time.

$$\mathrm{HHI}_{it} = \beta_0 + \beta_1 NBAI_{it} + \beta_2 MAF + \beta_3 SPEC_{it} + \beta_4 \mathrm{Audswichted}_{it} + \beta_5 Aud - Size_{it} + \beta_6 RET_{it} + \beta_7 CLNASSET_{it} + \beta_8 OPINION_{it} + \beta_9 Salary_{it} + \beta_{10} Rank + \varepsilon_{it} \quad \text{(Model 1)}$$

$$\mathrm{E}_{it} = \beta_0 + \beta_1 NBAI_{it} + \beta_2 MAF + \beta_3 SPEC_{it} + \beta_4 \mathrm{Audswichted}_{it} + \beta_5 Aud - Size_{it} + \beta_6 RET_{it} + \beta_7 CLNASSET_{it} + \beta_8 OPINION_{it} + \beta_9 Salary_{it} + \beta_{10} Rank + \varepsilon_{it} \quad \text{(Model 2)}$$

$$HHI_{it} = \beta_0 + \beta_1 NBAI_{it} + \beta_2 MAF + \beta_3 (NBAI_{it} * MAF_{it}) + \beta_4 SPEC_{it} + \beta_5 \mathrm{Audswichted}_{it} + \beta_6 Aud - Size_{it} + \beta_7 RET_{it} + \beta_8 CLNASSET_{it} + \beta_9 OPINION_{it} + \beta_{10} Salary_{it} + \beta_{11} Rank + \varepsilon_{it} \quad \text{(Model 3)}$$

$$E_{it} = \beta_0 + \beta_1 NBAI_{it} + \beta_2 MAF + \beta_3 (NBAI_{it} * MAF_{it}) + \beta_4 SPEC_{it} + \beta_5 \mathrm{Audswichted}_{it} + \beta_6 Aud - Size_{it} + \beta_7 RET_{it} + \beta_8 CLNASSET_{it} + \beta_9 OPINION_{it} + \beta_{10} Salary_{it} + \beta_{11} Rank + \varepsilon_{it} \quad \text{(Model 4)}$$

3.3 Research variables

3.3.1 Dependent variable. Product market competition:

Consistent with the research purpose and inquiries, product market competition is the independent variable. This study uses two indices, the Herfindahl–Hirschman Index (HHI) and the Entropy Index, to assess competition in the product market. The methodology for calculating each index used to determine the level of competition in the product market is delineated as follows:

Herfindahl-Hirschman Index (HHI):

The HHI quantifies rivalry in product markets, as evidenced in research by Huang *et al.* (2016), Eshleman and Lawson (2017) and Cho (2025). The HHI measures industry concentration. Conversely, elevated HHI signifies increased industrial concentration and diminished sector competitiveness.

It is worth mentioning that the index, as discussed above, calculates the competitiveness across various industries and is defined using the following formula:

$$HHI = \sum_{i=1}^{n} \left(\frac{S_i}{S} \right)^2$$

where:

S_i = Revenue of firm iii;

S = Total revenue of all firms operating in the industry in which firm iii operates; and

n = Number of firms in the industry.

Entropy Index:

Product market competition, as the independent variable, is measured using the Entropy Index based on studies by Theil (1967), Hart (1982), Nissan (1996), Bikker and Haaf (2002), Nissan (2003), Choi and Russell (2005) and Mayer *et al.* (2014). Theil first introduced the concept of entropy into economic analyses in 1967. In statistics, the Entropy Index refers to a

measure that quantifies the information contained in the frequency distribution of an industry. This index is derived from the weighted sum of firms' market shares, where each market share is assigned a weight equivalent to ln(1/S). The range of the index lies between 0 and logN. When entropy decreases (i.e. when the index approaches zero), the market becomes more concentrated, and competition diminishes. Conversely, when entropy increases (i.e. when the index approaches logN), the market becomes less focused, intensifying competition. The Entropy Index is calculated as follows:

$$E = \sum i = S_i \ln\left(\frac{1}{S_i}\right)$$

where:

S_i = The ratio of the firm's sales to the total industry sales;

E = The Entropy Index; and

N = The number of active firms in the industry.

3.3.2 Independent variable. Number of Branches of Audit Firms (NBAI):

This variable is equal to the number of offices of audit firms.

3.3.3 Moderating variables. The status of merged audit firms was examined based on the first mergers starting in 2015. Merged firms were assigned one value until the year before their separation; otherwise, the value is zero.

This indicator reflects the priority of an industry relative to other auditors. A larger market share for the auditor implies that the auditor has more experience than competitors. Holding a dominant market share means that the auditor has successfully distinguished themselves in audit quality from competitors.

Auditors' market share is calculated as follows: The total assets of all clients of a specific audit firm in a particular industry divided by the total assets of all clients in that industry determines the auditor's market share.

The criterion for determining specialization in an industry is calculated as: [(1/Number of Firms in the Industry)* ½], which means that if an audit firm's market share exceeds the value obtained from this formula, the firm is considered an industry specialist. If the auditor is an industry specialist, the value is set to one; otherwise, it is set to zero (Habib and Bhuiyan, 2011).

Auditor change (Audit Switch):

In line with the study by Nassirzadeh *et al.* (2023), this variable takes a value of one if the previous year's financial statements were audited by a different auditor and zero otherwise.

Auditor size (Audit_Size):

This variable is the ratio of revenue from listed and over-the-counter (OTC) clients accepted by the Securities and Exchange Organization to the total revenue of all firms in the relevant market during the current period.

Client Firm Size – Assets (LNASSET):

The natural logarithm of the client firm's total assets.

Audit Opinion (OPINION):

This variable takes a value of one if the audit opinion is modified (qualified, adverse or disclaimer) and zero otherwise.

Inflation rate (RETINF):

The inflation rate announced by the Central Bank for the current year.

Minimum wage growth rate (Salary):

This variable reflects changes in the minimum base wage set by the government under labor law and social welfare regulations.

Audit firm ranking (Ranke):

Based on the report published by the Securities and Exchange Organization (SEO), the ranking of audit firms ranges from one to five. https://seo.ir/Upload/FileGallery/SeoFiles/133590224888757212_hesabrasi.xlsx. The calculation methods of variables are presented in Appendix 1.

3.4 Methods and tools for data analysis

Initially, to test the hypotheses, the data were thoroughly examined. The tests described the data set's mean (central value), dispersion (degree of data spread) and minimum and maximum values. Before evaluating the hypotheses, the data were tested combined or grouped, and the F-Limer test was applied. Panel data, or combined data, is a data set that combines information on how variables change over time with information on how variables differ from each other at a specific point in time. The panel method is superior to analyzing separate statistical data because it yields more accurate coefficients. After determining the data type, the Hausman test was used to identify the nature of the effects. The data may exhibit fixed effects or random effects.

4. Findings from the analysis

4.1 Results of the pooling test

Based on the results of the pooling test presented in Table 1, the calculated *F*-statistics for the first to fourth regression models are 1.31, 32.64, 11.33 and 2.31, respectively. The null hypothesis assumes that the data are pooled and is significantly rejected for these regressions. Therefore, the panel data model must be used to estimate the coefficients of these models.

4.2 Model estimation

4.2.1 Estimation of the first model. Based on the results of the pooling test, the first regression model should be estimated using the panel data approach. Furthermore, the Hausman test indicated that the random effects method should be employed to achieve the best regression estimates. Additionally, as shown in Table 2, the first regression model

Table 1. Results of the pooling test for regressions

Models	Calculated statistic	*p*-value
First model	1.310	0.018
Second model	32.640	0.000
Third model	11.330	0.000
Fourth model	2.310	0.000

Source(s): Authors' calculations

Table 2. Diagnostic test results for the first regression model

Test name	Chi² or *F* statistic	*p*-value
Breusch–Pagan test	67.60	0.000
Wooldridge test	14.608	0.001
Ramsey RESET test	1.660	0.178

Note(s): The null hypotheses for the three tests are, respectively, homoscedasticity, absence of serial correlation and absence of omitted variables
Source(s): Authors' calculations

exhibits heteroskedasticity in its residuals at the 99% confidence level. The statistic for this test was calculated as 67.60. Moreover, the residuals of this model show serial correlation at the 99% confidence level, with a calculated statistic of 14.608, leading to the rejection of the null hypothesis. Finally, based on the results of the Ramsey RESET test for model specification, this model does not exhibit omitted variables, confirming that the results are free from bias.

Table 3 presents the results of the first model estimation. The robust random effects model and the Generalized Method of Moments (GMM) model addressed heteroskedasticity and serial correlation issues. As the residuals exhibited serial correlation, the GMM model was estimated dynamically.

In the random effects model, the coefficient for the variable "Number of Branches of Audit Firms" was calculated as −0.701 at the 99% confidence level. Similarly, the coefficient for this variable in the dynamic GMM model was estimated at −0.274 with 99% confidence. Thus, as the number of branches increases, the HHI concentration index decreases and product market competition improves. Consequently, the first hypothesis, stating that the number of audit firm branches significantly impacts product market competition using the HHI index, is accepted at the 99% confidence level.

In contrast, audit firm mergers reduce product market competition and increase the HHI concentration index. The coefficient for the variable "MAF" was calculated as 10.399 in the random effects model and 9.233 in the dynamic model, both at the 99% confidence level. Auditor specialization significantly increases the HHI index among the control variables, reducing product market competition. Conversely, firm size and audit opinion reduce the HHI index, increasing competition.

Considering the annual nature of the data in this study, the lagged value of the HHI variable from the previous year was also included in the dynamic model. The coefficient for this variable was estimated at 0.144 with 99% confidence, indicating that their previous period's values influenced market concentration and competition. The examined model also considered fixed effects for year and industry, but their coefficients were not statistically

Table 3. Results of the first regression estimation

	RE robust model		GMM dynamic model	
Variable	Coefficient	*p*-value	Coefficient	*p*-value
Hhi_{t-1}			0.144	0.007
$Nbai_{t+1}$	−0.701	0.000	−0.274	0.000
Maf_{t+1}	10.399	0.000	9.233	0.000
Spec	15.804	0.000	13.637	0.000
Audsize	13.703	0.237	13.818	0.333
Reti	−0.071	0.571	0.029	0.840
Clnassetln	−2.237	0.010	−1.564	0.031
Opinion	−11.912	0.000	−10.632	0.000
$Salary_{t+1}$	−0.094	0.360	−0.135	0.189
$Rank_{t+1}$	−2.293	0.210	−2.564	0.017
Constant	35.120	0.006	23.133	0.040
Obs	213		164	
Wald test	196.83	0.000	115.85	0.000
R^2 *Adj.*	49.23		50.07	
Norm of resid		0.655		

Source(s): Authors' calculations

significant. Subsequently, the normality of the error term was assessed. According to the results of the Kolmogorov–Smirnov test, the statistic was calculated as 0.655, indicating that the error term follows a normal distribution. Thus, conventional statistical tests such as *Z*, *t* and *F* can be reliably used.

4.2.2 Estimation of the second model. Based on the results of the pooling test for the second regression model, where the dependent variable is the Entropy Index, the model must be estimated using the panel data approach. Additionally, the Hausman test indicated that the random effects method should be used to achieve the best regression estimates. Furthermore, as shown in Table 4, the residuals of the second regression model also exhibit heteroskedasticity at the 99% confidence level. The statistic for this test was calculated as 35.68.

Similarly, the residuals of this model exhibit serial correlation at the 95% confidence level. The statistic for this test was calculated as 5.422, leading to the rejection of the null hypothesis. Moreover, based on the results of the Ramsey RESET test for model specification, this model does not exhibit omitted variables, ensuring that the results are free from bias. Table 5 presents the estimation results for the second model. Robust random

Table 4. Diagnostic test results for the second regression model

Test name	Chi² or *F* statistic	*p*-value
Breusch–Pagan test	35.68	0.000
Wooldridge test	5.422	0.025
Ramsey RESET test	1.810	0.145

Note(s): The null hypotheses for the three tests are, respectively, homoscedasticity, absence of serial correlation and absence of omitted variables
Source(s): Authors' calculations

Table 5. Results of the second regression estimation

	RE robust model		GMM dynamic model	
Variable	Coefficient	*p*-value	Coefficient	*p*-value
E_{t-1}			0.131	0.016
$Nbai_{t+1}$	−0.267	0.000	−0.022	0.002
Maf_{t+1}	0.026	0.000	0.024	0.000
Spec	0.036	0.000	0.032	0.000
Audsize	0.033	0.304	0.039	0.318
Reti	−0.0001	0.813	0.000	0.948
Clnassetln	−0.004	0.142	−0.002	0.436
Opinion	−0.028	0.000	−0.027	0.000
$Salary_{t+1}$	−0.0001	0.610	0.000	0.341
$Rank_{t+1}$	−0.022	0.000	−0.025	0.000
Constant	0.110	0.002	0.078	0.016
Obs	213		164	
Wald test	210.21	0.000	182.147	0.000
R^2 *Adj.*	50.87		52.66	
Norm of resid		0.916		

Source(s): Authors' calculations

effects models and dynamic GMM models were used to address the issues of residual serial correlation and heteroskedasticity of the error terms.

The random effects model's coefficient for the variable "Number of Branches of Audit Firms" was estimated at −0.027 with 99% confidence. Similarly, in the dynamic ABB model, the coefficient for this variable was estimated at −0.022 with 99% confidence. Thus, concentration decreases as the number of branches increases, as measured by the Entropy Index, and product market competition improves. Given that the coefficient for this variable is also significant at the 99% confidence level in the HHI model, the first research hypothesis – stating that the number of branches of audit firms has a significant effect on market competition – is accepted with 99% confidence. Conversely, mergers of audit firms increase concentration as measured by the Entropy Index and, consequently, reduce product market competition. The "MAF" variable coefficient was calculated as 0.026 in the random effects model and 0.024 in the dynamic model, both at the 99% confidence level. Among the control variables, auditor specialization in static and dynamic models contributes to increased concentration and reduced competition in the product market. In contrast, audit opinion and credit rating reduce concentration and enhance competition in the product market based on the E Index.

The coefficient for the lagged value of the Entropy Index variable from the previous year was estimated at 0.131 with 95% confidence, indicating that product market competition, as measured by the Entropy Index, is influenced by its prior period's value. The examined model included fixed effects for year and industry, but their coefficients were not statistically significant. Subsequently, the normality of the error term was assessed. According to the results of the Kolmogorov–Smirnov test, the statistic was calculated as 0.916, confirming that the error term follows a normal distribution. Thus, standard statistical tests such as *Z*, *t* and *F* can be reliably used.

4.2.3 Estimation of the third model. Based on the results of the pooling test, the third regression model should be estimated using the panel data approach. Additionally, the Hausman test indicated that the fixed effects method should be employed to achieve the best regression estimates. Furthermore, as shown in Table 6, the residuals of the third regression model exhibit heteroskedasticity at the 99% confidence level. The statistic for this test was calculated as 90.52.

The residuals of this model exhibit serial correlation at the 99% confidence level. The statistic for this test was calculated as 7.588, leading to the rejection of the null hypothesis. Moreover, based on the results of the Ramsey RESET test for model specification, this model does not exhibit omitted variables, ensuring that the results are free from bias. Table 7 presents the estimation results for the third model. Robust fixed effects models and dynamic GMM models were employed to address the issue of heteroskedasticity.

The random effects model's coefficient for the variable "Number of Branches of Audit Firms" was estimated at −10.920 with 95% confidence. In the dynamic GMM model, the coefficient for this variable was estimated at −7.564 with 90% confidence. These results indicate that an increase in the number of branches leads to enhanced product market

Table 6. Diagnostic test results for the third regression model

Test name	Chi² or *F* statistic	*p*-value
Breusch–Pagan test	90.52	0.000
Wooldridge test	7.588	0.009
Ramsey RESET test	1.440	0.230

Note(s): The null hypotheses for the three tests are, respectively, homoscedasticity, absence of serial correlation and absence of omitted variables
Source(s): Authors' calculations

Table 7. Results of the third regression estimation

Variable	FE robust model Coefficient	*p*-value	GMM dynamic model Coefficient	*p*-value
Hhi_{t-1}			0.133	0.007
$Nbai_{t+1}$	−10.920	0.041	−7.564	0.086
Maf_{t+1}	9.036	0.000	7.333	0.000
*Nbai*Maf*	−0.173	0.004	−0.109	0.000
Spec	16.483	0.000	13.319	0.000
Audsize	9.802	0.414	9.382	0.518
Reti	−0.200	0.097	0.010	0.942
Clnassetln	−1.525	0.115	−1.703	0.013
Opinion	−13.418	0.000	−11.001	0.000
$Salary_{t+1}$	−0.077	0.421	−0.114	0.254
$Rank_{t+1}$	−0.182	0.928	−1.064	0.223
Constant	30.303	0.033	29.465	0.006
Obs	213		164	
F/wald test	18.63	0.000	133.18	0.000
R^2 *Adj.*	54.11		54.38	
Norm of resid		0.501		

Source(s): Authors' calculations

competition and a reduction in the HHI. Conversely, mergers of audit firms reduce product market competition based on this index. The coefficient for the variable "MAF" was calculated as 9.036 in the fixed effects model and 7.333 in the dynamic model, both at the 99% confidence level. The interaction term Nbai×Maf was estimated at −0.173 in the static model and −0.109 in the dynamic model, both at the 99% confidence level, confirming the third hypothesis, which posits that mergers significantly affect the relationship between branch numbers and market competition, based on the HHI index, at the 99% confidence level. Year and industry fixed effects were not statistically significant and did not impact the HHI index. Finally, the Kolmogorov–Smirnov test yielded a statistic of 0.501, indicating that the error term follows a normal distribution.

4.2.4 Estimation of the fourth model. Based on the results of the pooling test for the fourth regression model, where the dependent variable is the Entropy Index, the model must be estimated using the panel data approach. Additionally, the Hausman test indicated that the fixed effects method should be employed to achieve the best regression estimates. As shown in Table 8, the residuals of the fourth regression model exhibit heteroskedasticity at the 99%

Table 8. Diagnostic test results for the fourth regression model

Test name	Chi² or *F* statistic	*p*-value
Breusch–Pagan test	58.55	0.000
Wooldridge test	1.947	0.171
Ramsey RESET test	2.040	0.107

Note(s): The null hypotheses for the three tests are, respectively, homoscedasticity, absence of serial correlation and absence of omitted variables
Source(s): Authors' calculations

confidence level, with a calculated statistic of 58.55. In contrast, the residuals do not exhibit serial correlation, as evidenced by the test statistic 1.947, which fails to reject the null hypothesis. Moreover, based on the results of the Ramsey RESET test, this model does not have omitted variables, ensuring that the results are free from specification bias.Table 9 presents the estimation results for the fourth model. Robust fixed effects models and GMM models were used to address the issue of heteroskedasticity in the residuals.

The number of branches of audit firms significantly reduces concentration and improves product market competition in both models at the 99% confidence level. Conversely, mergers of audit firms significantly increase concentration and reduce competition, as measured by the Entropy Index, in both models at the 99% confidence level. The interaction term Nbai×Maf is also significant in both models at the 99% confidence level. In the fixed effects model, the coefficient for this variable was calculated as −0.012, while in the GMM model, the coefficient was estimated at −0.013. Thus, the third hypothesis, stating that mergers significantly affect the relationship between the number of branches and market competition, is accepted at the 99% confidence level using the Entropy Index.

The examined model included fixed effects for year and industry, but their coefficients were not statistically significant. According to the results of the Kolmogorov–Smirnov test, which yielded a value of 0.955, the error term in this model follows a normal distribution. The explanatory power of the fixed effects model was calculated at 57.99%, while the explanatory power of the GMM model was determined to be 58.78%. The GMM model demonstrates a slight superiority over the fixed effects model due to its higher explanatory power when compared to the two models.

5. Discussion and conclusion

This study investigates the impact of the number of branches and local offices of audit firms on audit market competition in Iran. The primary motivation lies in addressing regulatory concerns about enhancing competition in the audit market and identifying effective strategic levers to achieve this goal. Furthermore, the study is guided by key questions, such as whether the

Table 9. Results of the fourth regression estimation

	FE robust model		GMM model	
Variable	Coefficient	*p*-value	Coefficient	*p*-value
$Nbai_{t+1}$	−0.040	0.007	−0.046	0.000
Maf_{t+1}	0.029	0.000	0.032	0.000
*Nbai*Maf*	−0.012	0.000	−0.013	0.000
Spec	0.036	0.000	0.034	0.000
Audsize	0.015	0.658	0.021	0.559
Reti	0.000	0.236	0.000	0.775
Clnassetln	−0.001	0.665	−0.004	0.077
Opinion	−0.033	0.000	−0.030	0.000
$Salary_{t+1}$	0.000	0.666	0.000	0.726
$Rank_{t+1}$	−0.014	0.012	−0.017	0.000
Constant	0.093	0.018	0.129	0.000
Obs	213		213	
F/wald test	19.59	0.000	251.85	0.000
R^2 *Adj.*	57.99		58.78	
Norm of resid		0.955		

Source(s): Authors' calculations

Table 10. Results of the endogeneity test

Models	Value	Probability
First and third	1.706	0.192
Second and fourth	2.491	0.288

Source(s): Authors' calculations

presence of geographically dispersed offices facilitates access to auditors, attracts clients, increases market share and ultimately strengthens the competitive advantage of audit firms.

To address these issues and respond to policymakers' concerns regarding the promotion of audit market competition – given the importance of audit quality – this study adopts "market competition" as the dependent variable, measured through two widely recognized concentration indicators: the HHI and the entropy index. Both indices reflect market dispersion and diversity. These measures were chosen specifically to capture the degree of market concentration versus competitiveness – an essential factor in prior literature assessing competition, audit quality and market structure, especially in relation to antitrust policy development. In addition, the number of firm branches is considered the independent variable, while firm mergers are treated as a moderating factor, both recognized as influential in shaping market structure and competition. The empirical findings reveal a significant and positive relationship between the number of audit firm branches and market competition. This suggests that geographic expansion of audit offices contributes to a more balanced distribution of audit services, improved client access, reduced service costs and, ultimately, enhanced audit quality.

The results also highlight the role of firm mergers in this context. Mergers can enhance the operational capabilities and resource base of audit firms, facilitating further branch expansion nationwide. Simultaneously, mergers may lead to improvements in service quality and compliance with stricter audit standards. These findings align with previous studies such as Wang and Chui (2015), Numan and Willekens (2012), and Thavapalan *et al.* (2002), which found that local offices and firm mergers can positively influence competition and audit quality across various institutional and geographic settings.

From a theoretical standpoint, these results can be interpreted in light of economic models. According to spatial economics theory (Hotelling *et al.*, 1989), competition among service providers is shaped by their geographic location in the "product space," where proximity among competitors increases price sensitivity and narrows the gap between price and marginal cost. Numan and Willekens (2012) emphasize that local offices allow for closer client engagement and more competitive pricing. Additionally, Thavapalan *et al.* (2002), in their study on the Australian audit market, noted that even mergers among large firms could increase competition among smaller firms, as clients may shift their demand toward emerging providers.

From the perspective of game theory, Nemmaoui *et al.* (2023) argue that under conditions of imperfect competition, service providers may prioritize expanding their client base – even by attracting irrational clients – rather than optimizing their cost structure. This behavior can lead to suboptimal geographic expansion and a decline in operational efficiency.

On the other hand, based on the findings of López and Rich (2017), a positive relationship exists between the disclosure of internal control information and geographic proximity. This suggests that closer spatial distance between auditors and clients enhances disclosure quality and monitoring effectiveness. These findings align with the theoretical framework of spatial economics and are supported by studies such as Truong (2023), Chen *et al.* (2016) and Dong and Robinson (2018).

Furthermore, an increase in the number of branches can provide informational advantages to local auditors (Agarwal and Hauswald, 2010; Choi *et al.*, 2012), reducing information asymmetry and improving the quality of auditor-client communication. In line with this, Pan *et al.* (2023) highlight that a significant portion of audit costs is directly linked to the physical distance between audit offices and client headquarters.

However, monopoly theory suggests that greater market power among large firms may increase the risk of collusion and lead to market concentration. Prior research (Wolk *et al.*, 2001; Thavapalan *et al.*, 2002; Carson *et al.*, 2012) has consistently raised concerns regarding the formation of oligopolistic structures and the resulting decline in market competitiveness. Therefore, while the expansion of branches and the horizontal growth of audit firms yield positive outcomes for competition, regulators must carefully monitor structural changes in the market to prevent monopolistic tendencies and maintain an optimal balance between expansion and competitiveness.

In conclusion, this study offers several policy implications for audit regulators and standard-setters. First, the expansion of local offices not only enhances competition but also improves client communication, facilitates information gathering, and supports higher audit quality. Second, regulatory frameworks should aim to prevent excessive market concentration while simultaneously fostering both quality and competition in the audit industry. As such, the strategic development of geographically dispersed offices can serve not only operational objectives but also broader regulatory goals, including promoting transparency and economic integrity.

6. Recommendations

6.1 Recommendations for audit firms regarding branch expansion

Given the research findings indicating a significant positive effect of the number of audit firm branches on market competition, it is recommended that audit firms, alongside geographical expansion, establish a centralized and intelligent management system. This system should include effective mechanisms for continuous performance evaluation of branches, standardization of audit procedures and the use of digital technologies to improve coordination among units. Such measures would not only maintain service quality and enhance efficiency but also prevent uncontrolled dispersion and weakened oversight, ensuring that the expansion of offices genuinely contributes to increased competition and stakeholder satisfaction.

6.2 Recommendations for audit firms regarding post-merger integration

Considering the positive and significant impact of mergers on strengthening the relationship between the number of branches and market competition, it is recommended that audit firms focus on enhancing post-merger integration processes. These processes should include the design and implementation of a comprehensive plan for aligning cultural and operational aspects across offices, adopting unified information systems, standardizing procedures and methodologies and facilitating the exchange of knowledge and experience among branches. Such efforts can improve operational efficiency, organizational cohesion and, ultimately, foster greater competition in the audit market.

6.3 Recommendations for policymakers and regulatory authorities

Based on theoretical foundations and empirical evidence, it can be argued that the simultaneous expansion of branches and successive mergers may increase the likelihood of forming concentrated or even monopolistic market structures. Therefore, policymakers and regulatory bodies are advised to continuously monitor the audit market and adopt smart regulatory approaches to prevent harmful concentration, while establishing a sustainable balance between competition, service quality and a healthy market structure. Revising guidelines and incentives

related to the geographical distribution of offices, as well as assessing the competitive implications of mergers in the audit industry, could play a vital role in shaping market dynamics and preventing adverse consequences of excessive concentration.

7. Limitations and future research directions

Despite its contributions, this study has several limitations. First, access to complete financial statements of audit firms and non-listed clients was not available, and income data for audit firms in 2023 had not been disclosed at the time of analysis. These data limitations prevented the use of more precise market competition indicators such as the Lerner and modified Lerner indices.

Second, certain structural factors that could influence market competition were not included in the model. These include the geographical distances between audit firm offices and clients, the number and growth trends of certified public accountants (CPAs) and the presence of staff with professional qualifications across firms. Although auditor specialization was incorporated as a firm-level control variable, these additional dimensions could enrich future analyses.

Future research may benefit from the inclusion of such structural variables and access to more comprehensive financial data, enabling deeper insights into the dynamics of competition and market structure in the auditing industry.

References

Agarwal, S. and Hauswald, R. (2010), "Distance and private information in lending", *Review of Financial Studies*, Vol. 23 No. 7, pp. 2757-2788, doi: 10.1093/rfs/hhq001.

Asheim, B., Cooke, P., and Martin, R. (2006), "The rise of the cluster concept in regional analysis and policy: a critical assessment", In *Clusters and Regional Development*, 1st Edition Routledge, England, UK, pp. 1-29.

Bae, G., Choi, S.U. and Lee, J.E. (2018), "Auditor industry specialization and audit pricing and effort", *Auditing: A Journal of Practice and Theory*, Vol. 38 No. 1, doi: 10.2308/ajpt-52039.

Bikker, J.A. and Haaf, K. (2002), "Competition, concentration and their relationship: an empirical analysis of the banking industry", *Journal of Banking and Finance*, Vol. 26 No. 11, pp. 2191-2214, doi: 10.1016/S0378-4266(02)00205-4.

Boone, J.P., Khurana, I.K. and Raman, K.K. (2012), "Audit market concentration and auditor tolerance for earnings management", *Contemporary Accounting Research*, Vol. 29 No. 4, pp. 1171-1203, doi: 10.1111/j.1911-3846.2011.01144.x.

Brockbank, B.G., Do, C. and Lawson, B.P. (2023), "Audit market concentration and audit quality: evidence from analysts' forecasts", *Accounting Horizons*, Vol. 37 No. 3, pp. 59-77, doi: 10.2308/HORIZONS-19-192.

Carson, E., Simnett, R., Soo, B.S. and Wright, A.M. (2012), "Changes in audit market competition and the big N premium", *AUDITING: A Journal of Practice and Theory*, Vol. 31 No. 3, pp. 47-73, doi: 10.2308/ajpt-10295.

Chang, H., Guo, Y. and Mo, P.L.L. (2019), "Market competition, audit fee stickiness, and audit quality: Evidence from China", *Auditing: A Journal of Practice and Theory*, Vol. 38 No. 2, pp. 79-99, doi: 10.2308/ajpt-52173.

Chen, C.J., Su, X. and Wu, X. (2010), "Auditor changes following a big 4 merger with a local Chinese firm: a case study", *AUDITING: A Journal of Practice and Theory*, Vol. 29 No. 1, pp. 41-72.

Chen, S., Lin, B., Lu, R. and Ma, H. (2016), "Pay for accounting performance and R&D investment: evidence from China", *International Review of Economics and Finance*, Vol. 44 No. 2, pp. 142-153, doi: 10.1016/j.iref.2016.04.004.

Chengai, L., Pan, L. and Chen, M. (2021), "The overseas experience of audit committee and audit fees: empirical evidence from China", *Complexity*, Vol. 2021 No. 1, doi: 10.1155/2021/5454418.

Choi, J. and Russell, J.S. (2005), "Long-term entropy and profitability change of United States public construction firms", *Journal of Management in Engineering*, Vol. 21 No. 1, pp. 17-26, doi: 10.1061/(ASCE)0742-597X(2005)21:1(17).

Choi, J.H., Kim, C., Kim, J.B. and Zang, Y. (2010), "Audit office size, audit quality, and audit pricing", *AUDITING: A Journal of Practice and Theory*, Vol. 29 No. 1, pp. 73-97, doi: 10.2308/aud.2010.29.1.73.

Choi, J.H., Kim, J.B., Qiu, A.A. and Zang, Y. (2012), "Geographic proximity between auditor and client: How does it impact audit quality?", *AUDITING: A Journal of Practice and Theory*, Vol. 31 No. 2, pp. 43-72, doi: 10.2308/ajpt-10241.

Chu, L., Simunic, D.A., Ye, M. and Zhang, P. (2018), "Transaction costs and competition among audit firms in local markets", *Journal of Accounting and Economics*, Vol. 65 No. 1, pp. 129-147, doi: 10.1016/j.jacceco.2017.11.004.

Ciconte, W., Knechel, W.R. and Schelleman, C. (2015), "An examination of the relation between market structure and the profitability of audit engagements", *Accounting and Finance*, Vol. 55 No. 3, pp. 749-781, doi: 10.1111/acfi.12078.

Cho, J.J. (2025), "Audit market concentration and audit quality: evidence from auditors of earliest announcers", SSRN 5169193.

Currid, E. and Williams, S. (2010), "The geography of buzz: art, culture and the social milieu in Los Angeles and New York", *Journal of Economic Geography*, Vol. 10 No. 3, pp. 423-451, doi: 10.1093/jeg/lbp032.

De Villiers, C., Hay, D. and Zhang, Z. (2013), "Audit fee stickiness", *Managerial Auditing Journal*, Vol. 29 No. 1, pp. 2-26, doi: 10.1108/MAJ-08-2013-0915.

DeFond, M. and Zhang, J. (2014), "A review of archival auditing research", *Journal of Accounting and Economics*, Vol. 58 Nos. 2-3, pp. 275-326, doi: 10.1016/j.jacceco.2014.09.002.

Dekeyser, S., Gaeremynck, A., Knechel, W.R. and Willekens, M. (2021), "Multimarket contact and mutual forbearance in audit markets", *Journal of Accounting Research*, Vol. 59 No. 5, pp. 1651-1688, doi: 10.1111/1475-679X.12406.

Dong, B. and Robinson, D. (2018), "Auditor-client geographic proximity and audit report timeliness", *Advances in Accounting*, Vol. 40 No. 1, pp. 11-19, doi: 10.1016/j.adiac.2017.12.001.

Dubaere, C. (2008), "Concentration on the audit market", *Ghent University, Faculty of Economics Business Administration*, Vol. 1 No. 1, pp. 1-73.

Ernstberger, J., Koch, C., Schreiber, E.M. and Trompeter, G. (2020), "Are audit firms' compensation policies associated with audit quality?", *Contemporary Accounting Research*, Vol. 37 No. 1, pp. 218-244, doi: 10.1111/1911-3846.12528.

Eshleman, J.D. and Lawson, B.P. (2017), "Audit market structure and audit pricing", *Accounting Horizons*, Vol. 31 No. 1, pp. 57-81, doi: 10.2308/acch-51603.

European commission (2010), *Green Paper: audit Policy: lessons from the Crisis*, european commission, Brussels.

Feldman, M., and Francis, J.L. (2006), "Entrepreneurs as agents in the formation of industrial clusters", In *Clusters and Regional Development*, 1st Edition, Routledge, England, UK, pp. 115-136.

Florou, A., Morricone, S. and Pope, P.F. (2020), "Proactive financial reporting enforcement: audit fees and financial reporting quality effects", *The Accounting Review*, Vol. 95 No. 2, pp. 167-197, doi: 10.2308/accr-52497.

Government Accountability Office (GAO) (2003), "Public accounting firms: mandated study on consolidation and competition", Report No. GAO-03-864. Washington, DC: GAO, available at: www.gao.gov/products/gao-03-864

Government Accountability Office (GAO) (2008), "Auditors of public companies: continued concentration in audit market for large public companies does not call for immediate action", available at: www.gao.gov/new.items/d08163.pdf

Habib, A. and Bhuiyan, M.B.U. (2011), "Audit firm industry specialization and the audit report lag", *Journal of International Accounting, Auditing and Taxation*, Vol. 20 No. 1, pp. 32-44, doi: 10.1016/j.intaccaudtax.2010.12.004.

Hallman, N.J., Kartapanis, A. and Schmidt, J.J. (2022), "How do auditors respond to competition? Evidence from the bidding process", *Journal of Accounting and Economics*, Vol. 73 Nos 2-3, p. 101475.

Hart, P.E. (1982), "Entropy, moments, and aggregate business concentration in the UK", *Oxford Bulletin of Economics and Statistics*, Vol. 44 No. 2, pp. 1-22, doi: 10.1111/j.1468-0084.1982.mp44002002.x.

Hou, K. and Robinson, D.T. (2006), "Industry concentration and average stock returns", *The Journal of Finance*, Vol. 61 No. 4, pp. 1927-1956, doi: 10.1111/j.1540-6261.2006.00893.x.

Huang, T.C., Chang, H. and Chiou, J.R. (2016), "Audit market concentration, audit fees, and audit quality: evidence from China", *Auditing: A Journal of Practice and Theory*, Vol. 35 No. 2, pp. 121-145, doi: 10.2308/ajpt-51299.

Jensen, K., Kim, J.M. and Yi, H. (2015), "The geography of US auditors: information quality and monitoring costs by local versus non-local auditors", *Review of Quantitative Finance and Accounting*, Vol. 44 No. 3, pp. 513-549, doi: 10.1007/s11156-013-0416-2.

Kolodiziev, O.M., Krupka, M., Shulga, N., Kulchytskyy, M. and Lozynska, O. (2021), "The level of digital transformation affecting the competitiveness of banks", *Banks and Bank Systems*, Vol. 16 No. 1, pp. 81-91.

Lennox, C.S. (1998), "Audit quality and auditor switching: some lessons for policymakers, university of Southern California, CA", SSRN 121048.

Liu, C. and Zhang, J. (2008), "Time pressure, accountability and audit judgment performance: an experimental study", *China Account. Rev*, Vol. 4 No. 1, pp. 405-424.

Liu, N. and Zhang, X.J. (2024), "Leader versus lagger: how the timing of financial reports affects audit quality and investment efficiency", *Contemporary Accounting Research*, Vol. 41 No. 4, pp. 2163-2198, doi: 10.1111/1911-3846.12967.

López, D.M. and Rich, K.T. (2017), "Geographic distance and municipal internal control reporting", *Advances in Accounting*, Vol. 36 No. 1, pp. 40-49, doi: 10.1016/j.adiac.2016.08.003.

Makarenko, S., Plastun, A., Makarenko, I., Kozmenko, S. and Kozmenko, O. (2021), "Reforms and competitiveness in the Ukrainian audit market", *Polish Journal of Management Studies*, Vol. 23 No. 2, pp. 305-320, doi: 10.17512/pjms.2021.23.2.18.

Mayer, T., Melitz, M.J. and Ottaviano, G.I. (2014), "Market size, competition, and the product mix of exporters", *American Economic Review*, Vol. 104 No. 2, pp. 495-536, doi: 10.1257/aer.104.2.495.

Nassirzadeh, F., Askarany, D. and Arefi-Asl, S. (2023), "The relationship between changes in corporate governance characteristics and intellectual capital", *Journal of Risk and Financial Management*, Vol. 16 No. 2, p. 133.

Nemmaoui, S., Baslam, M. and Bouikhalene, B. (2023), "Game theory analysis of biometric systems market: users choice vs service providers revenue", *Theoretical Computer Science*, Vol. 943 No. 17, pages, pp. 142-115, doi: 10.2139/ssrn.4230135.

Nisrina, N. (2021), "Product market competition and audit fees: auditor industry specialization as a moderating variable", *Jurnal Dinamika Akuntansi Dan Bisnis*, Vol. 8 No. 1, pp. 91-104.

Nissan, E. (1996), "Concentration in American Property-Casualty companies", *Journal of Actuarial Practice*, Vol. 4 No. 1996, pp. 131-142.

Nissan, E. (2003), "Relative market power versus concentration as measure of market dominance: property and liability insurance", *Journal of Insurance Issues*, Vol. 26 No. 2, pp. 129-141.

Numan, W. and Willekens, M. (2012), "An empirical test of spatial competition in the audit market", *Journal of Accounting and Economics*, Vol. 53 Nos 1-2, pp. 450-465, doi: 10.1016/j.jacceco.2011.10.002.

Oxera (2018), "Four-ever? Competition remedies in the audit market", available at: www.oxera.com/agenda/competition-remedies-audit-market/ (accessed 1 April 2021).

Oxera (2006), "Competition and choice in the uk audit market. A report commissioned by the department of trade and industry and the financial reporting council".

Pan, Y., Shroff, N. and Zhang, P. (2023), "The dark side of audit market competition", *Journal of Accounting and Economics*, Vol. 75 No. 1, p. 101520, doi: 10.2139/ssrn.3721517.

Petersen, M.A. and Rajan, R.G. (2002), "Does distance still matter? The information revolution in small business lending", *The Journal of Finance*, Vol. 57 No. 6, pp. 2533-2570, doi: 10.1111/1540-6261.00505.

Public Company Accounting Oversight Board (PCAOB) (2010), "Auditing standard no. 15: audit evidence", Pcaob release no. 2010-004, Washington, DC.

Public Company Accounting Oversight Board (PCAOB) (2011), "Improving the transparency of release no.2011-007", PCAOB rulemaking docket matter no. 029, Washington, DC.

Public Company Accounting Oversight Board (PCAOB) (2017), "Audit industry concentration and potential implications", available at: https://pcaobus.org/News/Speech/Pages/Harris-Audit-Industry-Concentration-12-07-17.aspx

Rashidi, M. (2021), "Examine market competition, audit fee stickiness, and audit quality", *Financial Accounting Knowledge*, Vol. 8 No. 2, pp. 173-193, doi: 10.30479/jfak.2021.12107.2585.

Reynolds, J.K. and Francis, J.R. (2000), "Does size matter? The influence of large clients on office-level auditor reporting decisions", *Journal of Accounting and Economics*, Vol. 30 No. 3, pp. 375-400, doi: 10.1016/S0165-4101(01)00010-6.

Setyo, T., Nabella, R. and Kartika, S. (2021), " Measuring the competition and banking efficiency level: a study at four commercial banks in Indonesia", *Banks and Bank Systems*, Vol. 16 No. 1, pp. 17-26.

Shapiro, C. (1989), "Theories of oligopoly behavior", *Handbook of Industrial Organization*, Vol. 1 No. 1, pp. 329-414, doi: 10.1016/S1573-448X(89)01009-5.

Shleifer, A. and Vishny, R.W. (1997), "A survey of corporate governance", *The Journal of Finance*, Vol. 52 No. 2, pp. 737-783, doi: 10.1111/j.1540-6261.1997.tb04820.x.

Simmie, J. (2006), "Do clusters or innovation systems drive competitiveness?", *Clusters and Regional Development*, 1st Edition Routledge, England, UK, pp. 164-187.

Simons, D. and Zein, N. (2016), "Audit market segmentation–the impact of mid-tier firms on competition", *European Accounting Review*, Vol. 25 No. 1, pp. 131-154, doi: 10.1080/09638180.2014.990476.

Sirojiddin, S., E'zoza, D. and Abror, E. (2022), "Theories of perfect and imperfect competition", *Web of Scientist: International Scientific Research Journal*, Vol. 3 No. 11, pp. 1414-1434.

Suwarno, A.E., Anggraini, Y.B. and Puspawati, D. (2020), "Audit fee, audit tenure, auditor's reputation, and audit rotation on audit quality", *Riset Akuntansi Dan Keuangan Indonesia*, Vol. 5 No. 1, pp. 61-70.

Thavapalan, S., Moroney, R. and Simnett, R. (2002), "The effect of the PricewaterhouseCoopers merger on auditor concentration in Australia: a note", *Accounting and Finance*, Vol. 42 No. 2, pp. 153-167, doi: 10.1111/1467-629X.00014.

The American Assembly (2005), *The Future of the Accounting Profession: Auditor Concentration*, The American Assembly, New York, NY.

Theil, H. (1967), *Economics and Information Theory*, Nort-Holland, Holland, Amsterdam.

Truong, P. (2023), "Peer effects and disclosure timing: evidence from earnings announcements", *The Accounting Review*, Vol. 98 No. 3, pp. 427-458, doi: 10.2308/TAR-2020-0311.

Vargas, G., Jacanamejoy, J., Cordoba, M. and Lopez, J., (2019), Factors that influence the competitiveness of SMEs in the commerce and services sector in the municipality of Palmira, Colombia. *Problems and perspectives in management*, Vol. 17 No. 4, pp. 480-492.

Vnukova, N.M., Opeshko, N.S. and Mamedova, E. (2020), "Identifying changes in insurance companies' competitiveness on the travel services market", *Insurance Markets and Companies*, Vol. 11 No. 1, pp. 53-60.

Wang, Y. and Chui, A.C. (2015), "Product market competition and audit fees", *Auditing: A Journal of Practice and Theory*, Vol. 34 No. 4, pp. 139-156, doi: 10.2308/ajpt-51014.

Wang, Z., Tan, J., Lin, Z. and Dong, C. (2016), "Auditor quality and IFRS information comparability", *Academy of Accounting and Financial Studies Journal*, Vol. 20 No. 1, pp. 114.

Wen, F., Chen, M., Zhang, Y. and Miao, X. (2023), "Oil price uncertainty and audit fees: evidence from the energy industry", *Energy Economics*, Vol. 125, p. 106852, doi: 10.1016/j.eneco.2023.106852.

Wolk, C.M., Michelson, S.E. and Wootton, C.W. (2001), "Auditor concentration and market shares in the US: 1988–1999 a descriptive note", *The British Accounting Review*, Vol. 33 No. 2, pp. 157-174, doi: 10.1006/bare.2001.0159.

Wu, X. and Chen, M. (2012), "Internal governance of public accounting firms: theory, principles, and implications for organizational strategies", *Auditing Research*, Vol. 3 No. 1, pp. 76-82.

Further reading

DeFond, M.L. and Francis, J.R. (2005), "Audit research after Sarbanes-Oxley", *AUDITING: A Journal of Practice and Theory*, Vol. 24 No. s-1, pp. 5-30, doi: 10.2308/aud.2005.24.s-1.5.

Organization for Economic Co-operation and Development (OECD) (2010), "Policy roundtables competition and regulation in auditing and related professions", available at: www.oecd.org

Organization for Economic Co-operation and Development (OECD) (2012), "Market definition, background note, policy roundtables", available at: www.oecd.org/daf/competition/marketdefinition2012.pdf

Organization for Economic Co-operation and Development (OECD) (2021), "Workshop on methodologies to measure market competition", available at: www.oecd.org/daf/competition/workshop-on-methodologies-to-measure-market competition.htm

U.S. Treasury (2006), "Remarks by treasury secretary Henry M. Paulson on the competitiveness of U.S. capital markets", New York, NY: Economic Club of New York, available at: https://home.treasury.gov/news/press-releases/hp174

Van Raak, J., Peek, E., Meuwissen, R. and Schelleman, C. (2020), "The effect of audit market structure on audit quality and audit pricing in the private-client market", *Journal of Business Finance and Accounting*, Vol. 47 Nos 3-4, pp. 456-488, doi: 10.1111/jbfa.12414.

Appendix

Table A1. Variables, model specification and explanation

Model(s)	Variable (type)	Variable name	Explanation
Model (4–1) and Model (4–2)	Dependent	HHI (herfindahl–hirschman index)	Considering the purpose and question of the research, competition in the product market is considered as the independent variable. In this study, the Herfindahl–Hirschman index and the entropy index are used as measures to assess product market competition
	Dependent	E (entropy index)	Refers to the number of audit firm offices
	Independent	NBAI (number of branches)	Based on the initial mergers from 2015, merged firms were identified and assigned a value of one until the year prior to separation; otherwise, a value of zero was assigned
Model (4–3) and Model (4–4)	Moderator	MAF (audit firm merger) and NBAI*MAF (interaction term)	Numerous studies have shown that auditor industry specialization is associated with audit fees and audit firm income (Nisrina, 2021; Bae *et al.*, 2018; Chengai *et al.*, 2021). Since market competition indices such as Herfindahl and Entropy are income-based, specialization can indirectly affect market competition. Also, companies tend to choose specialized auditors due to their reputation and service quality, which increases the market share of these firms. Therefore, auditor specialization is included as a control variable.
All models	Control	SPEC (auditor industry specialization)	Auditor change can result from various factors such as mandatory rotation or dissatisfaction with the audit report. Studies like Chen *et al.* (2010) show that companies may change auditors to obtain a favorable report. In competitive markets with price pressure, auditors may comply with management requests to retain clients. As such changes can affect firm income and competition indices are income-based, auditor change is considered a control variable
	Control	Audswitched (auditor change)	Larger audit firms usually have bigger clients with higher market share. Users such as creditors show more trust in reports issued by such firms. Therefore, firm size can be related to market share and income. Given this relationship and the income-based nature of competition indices, auditor size is considered a control variable
	Control	Aud-Size (auditor size)	Inflation, as a macroeconomic variable, can affect audit firm income through cost increases and fee adjustments. In the studied society, the effects of inflation are tangible, and firms may implicitly adjust their service rates accordingly. Thus, inflation rate is considered a control variable

(*continued*)

Table A1. Continued

Model(s)	Variable (type)	Variable name	Explanation
	Control	RET (inflation rate)	Larger clients require more time and resources from audit firms, usually leading to higher audit fees. These fees constitute firm income and influence the Herfindahl index. Hence, client size can directly affect firm market share. To control for this, client size is included as a control variable
	Control	CLNASSET (client size)	In competitive markets, managers may change auditors to obtain favorable reports (Chen *et al.*, 2010). According to Lennox (1988), in such markets, client pressure may lead to auditor compromise or client loss. This situation may result in greater market concentration or changes in firm revenue share. Thus, auditor opinion is considered impactful in analyzing market share and included as a control variable
	Control	OPINION (audit opinion)	Wages and salaries, as the major component of audit service costs, directly affect firm profits and income. These costs influence fee determination and may increase contract value or hinder contract finalization. This could reduce firm income share or intensify price competition. Therefore, wage rate is considered a control variable
	Control	Salary (minimum wage growth rate)	Based on auditor size theory and the rating guidelines of licensed firms by the stock exchange, firm ranking is determined by staff count, experience and defined thresholds. This ranking directly affects the type and number of acceptable clients, influencing market structure. Thus, audit firm rank is treated as a control variable
	Control	Rank (audit firm rating)	Based on capital market regulations, firm ranking (A, B, etc.) determines the range of eligible clients and thus affects competitive positioning in the market

Source: Created by the authors

Corresponding author
Mahdi Salehi can be contacted at: mehdi.salehi@um.ac.i