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Audit report readability and information efficiency: evidence from the Tehran Stock Exchange

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Abstract

Purpose – This study investigates the impact of audit reports' readability on informational efficiency within the Tehran Stock Exchange (TSE), emphasizing challenges in an emerging market context characterized by voluntary IFRS adoption and the absence of Big 4 audit firms.

Design/methodology/approach – By utilizing hand-collected data from TSE-listed companies, covering 1,097 firm-year observations from 2012 to 2023, readability is assessed using three well-established indexes (Fog, Flesch–Kincaid and Simple Measure of Gobbledygook). Informational efficiency is evaluated by analyzing how stock prices align with a random walk pattern, with additional control variables including governance factors, auditor characteristics and firm-specific indicators to enhance model robustness.

Findings – The findings indicate a positive association between audit report readability and informational efficiency, suggesting that clearer and more readable audit reports help reduce information asymmetry. Control variables such as board independence and auditor tenure showed significant impacts, supporting the conclusion that governance and auditor-specific factors enhanced informational efficiency. Agency and institutional theories are used to contextualize these findings, especially within TSE's unique regulatory environment. The study addresses endogeneity with firm fixed effects and sample selection bias through Heckman's two-stage procedure. The absence of Big 4 auditors in Iran prompted controls for auditor size effects, supporting our findings across different audit market segments.

Research limitations/implications – Limitations include potential omitted variable bias and challenges in generalizing findings beyond the TSE. Despite applying firm fixed effects and Heckman's two-stage procedure to control for endogeneity, some residual biases may remain.

Practical implications – For regulators, auditors and investors, these findings underscore the value of promoting readability in audit reports to improve informational efficiency, particularly in emerging markets with evolving regulatory standards.

Originality/value – By focusing on audit report readability within an emerging market lacking Big 4 presence, this study offers unique insights into how readability can foster transparency and investor confidence in regions with distinct market dynamics.

Keywords Audit report readability, Informational efficiency, Random walk, Tehran Stock Exchange

Paper type Research paper

1. Introduction

Information intermediaries, such as auditors and accounting regulators, play a crucial role in capital markets by bridging the information gap and enhancing trust between firms and investors (Healy and Palepu, 2001). Research has consistently demonstrated how textual characteristics of financial disclosures—such as tone, style, readability, and sentiment—affect investor decision-

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making (Li, 2008, 2010; Loughran and McDonald, 2016). Moreover, the quality of financial reporting significantly impacts information asymmetry, with auditing practices crucial in mitigating this disparity (Gajewski and Quéré, 2013). Audit reports are particularly influential, shaping investor decisions and perceptions (Pound, 1981; Smith, 2016).

Despite the established importance of audit report readability, limited research has examined its influence in emerging markets, where unique challenges such as evolving regulatory frameworks, voluntary adoption of IFRS, and the absence of Big 4 audit firms are prevalent. This gap is especially pronounced in markets like the Tehran Stock Exchange (TSE), where audit report readability may play a vital role in reducing information asymmetry. Our research focuses on understanding how the readability of audit reports might influence the reduction of information asymmetry when a wide range of other potential influential factors are controlled. This aligns with the auditor's role in enhancing the credibility of financial reporting and its impact on investment decisions. The motivation behind our study stems from observing how variations in readability, even within the structured format of Iranian audit reports, might reflect differing levels of transparency and detail that can either clarify or obscure critical financial information. There exists already studies based on Iranian data about readability of financial reporting (Arianpoor and Sahoor, 2023; Moghadam *et al*., 2023; Mohammadi and Naghshbandi, 2019; Seifzadeh *et al*., 2021; E-Vahdati *et al*., 2023) and factors affecting audit report readability (Saeedi *et al*., 2023; Salehi *et al*., 2023a, b). Research by Arianpoor and Sahoor (2023), and Moghadam *et al*. (2023) highlights the significance of readability as it impacts transparency and financial reporting quality in the Iranian context. The readability of financial statement footnotes is also found to be significantly influenced by audit committee characteristics, particularly committee independence and meeting frequency (Mohammadi and Naghshbandi, 2019). Other studies by Seifzadeh *et al*. (2021) and Saeedi *et al*. (2023) further explore the impact of management traits and intellectual capital on financial statement readability, emphasizing the role of managerial characteristics, such as CEO narcissism and overconfidence, in enhancing the clarity of disclosures. Moreover, research by Salehi *et al*. (2023a, b) indicates a positive relationship between intellectual capital and audit report readability, with components like human and structural capital contributing to clearer disclosures. These findings suggest that while readability has steadily improved in the Iranian context, it remains a multifaceted issue shaped by both managerial decisions and the broader organizational environment. However, the impact of varying levels of audit report readability—specifically within the unique framework of Iranian markets—has not been thoroughly examined, presenting a gap that our study seeks to address.

In Iran, the role of audit reports is particularly critical for decision-making, given the constraints of limited media coverage, the general scarcity of information about firms, underdeveloped investor protections, and subpar institutional quality. These reports play a key role in mitigating agency costs within Iran's uniquely competitive audit environment, which operates without the presence of major international firms like the Big 4 (Azizkhani *et al*., 2022). This absence is further magnified by the TSE's distinctive regulatory framework, which shapes how audit reports are prepared and used, emphasizing the need for clear and accessible reporting to enhance market efficiency and regulatory compliance. The challenges associated with these conditions underscore the pivotal role of audit quality delivered by private local firms, which becomes essential for ensuring transparency and accountability across various market stakeholders (MohammadRezaei *et al*., 2016). Additional insights into the nuances of the Iranian audit market are discussed in detail in Section 2.

Our research leverages institutional and agency theories to examine the impact of audit report readability on informational efficiency within the Iranian capital market. Institutional theory emphasizes how external pressures—such as socio-economic and cultural factors—shape corporate behaviors in emerging markets like Iran. These pressures, which stem from evolving regulatory practices and deep-rooted cultural conventions, can either enhance transparency or exacerbate information asymmetry in less regulated environments (Arslan and Alqatan, 2020; Luft Mobus, 2005). In parallel, agency theory explores the internal dynamics within firms, particularly the conflicts of interest between shareholders and managers. While

clearer audit reports could reduce information asymmetry, managers in Iran often exert significant influence over auditors. This bargaining power leads to less readable audit reports, intentionally obscuring critical information rather than enhancing transparency. Such managerial control undermines the potential benefits of improved market efficiency and information validity that clearer reporting could provide (Salehi *et al*., 2020; Briem and Wald, 2018). Together, these theories—detailed in Section 3—provide a framework for understanding the complex relationship between audit report readability and market responses in Iran, highlighting both the potential benefits for market efficiency and the risks of obfuscation in less regulated contexts.

This study delves into analyzing audit report readability by employing the *Fog*, Flesch-Kincaid (*FK*), and Simple Measure of Gobbledygook (*SMOG*) indices (Li, 2008; Lo *et al*., 2017; Hesarzadeh and Rajabalizadeh, 2019). Informational efficiency, a crucial aspect of market quality, is measured using stock return variance ratios (*VR*), consistent with prior literature (Perotti and Windisch, 2017; Hesarzadeh and Rajabalizadeh, 2019). Our study discovers that enhanced readability of audit reports significantly improves information processing efficiency in the TSE. We also addressed potential endogeneity issues by implementing firm fixed-effects and Heckman's two-stage procedure. The results were robust for these modifications. Moreover, considering the absence of Big 4 auditors in the Iranian market, we also controlled for auditor size effects. By re-estimating our models across different audit firm sizes and client sizes, we validated that our conclusions hold true across diverse market segments.

Our study significantly enhances the literature in four key areas. Firstly, it enhances the existing literature on qualitative textual attributes in corporate reporting (Li, 2008, 2010; Lo *et al*., 2017; Loughran and McDonald, 2016) by providing a focused analysis on the impact of audit reports on capital market outcomes. While recent studies such as Gutierrez *et al*. (2018), Lennox *et al*. (2023), Reid *et al*. (2019), Seebeck and Kaya (2023), and Zeng *et al*. (2021) have provided valuable insights about the market perception of auditor report content, our research extends these findings by exploring how readability in audit reports influences market outcomes within an emerging market context, specifically the TSE. This contributes to a deeper understanding of how audit report clarity can affect investor behavior and market efficiency in regimes where corporate governance and reporting standards are distinct from more developed markets.

Secondly, our study contributes to research on audit reports' textual features, addressing Leuz and Wysocki's (2016) call for exploring non-traditional disclosure settings, especially outside the U.S. Our findings align with prior research (Chang and Stone, 2021), indicating the pivotal role of these features in informational efficiency. Thirdly, our study examines the importance of independent auditor assurance in augmenting the credibility of audit reports in terms of readability, integrating insights from both disclosure theory and auditing literature (Mercer, 2004).

Finally, we extend the scope of research to Persian audit reports. Unlike prior studies that often focus on Western settings, our research advocates for "readability guidelines" tailored to the Iranian market. Persian audit reports offer a unique perspective due to the linguistic, cultural, and regulatory idiosyncrasies that influence audit practices in Iran. This extension is significant as it explores how readability can be enhanced in settings where traditional audit reports might not (explicitly) include modern disclosures under headings like KAM. Disclosing KAM can elevate audit quality by detailing critical audit areas and significant risks that received heightened auditor attention, thereby improving transparency and investor understanding (Zeng *et al*., 2021; Chang *et al*., 2024). The actual absence of KAM in Iranian reports, as compared to other contexts, may limit audit effectiveness by obscuring client-specific issues that could otherwise inform investor assessments and contribute to financial reporting quality. This study's focus on readability, therefore, contributes to greater market transparency and investor protection in regions resembling Iran.

The remainder of this paper is organized as follows. Section 2 details the evolution and characteristics of the Iranian capital and audit markets, emphasizing the importance of audit report readability in shaping market behaviors. Section 3 develops the theoretical foundations, discussing both positive and negative implications of audit report readability on informational

efficiency, and formulates the hypotheses for the study. In Section 4, we describe our sample and research design. Section 5 presents our primary findings as well as additional analyses. Section 6 is the discussion, and Section 7 concludes.

2. Audit market dynamics and audit report readability in Iran

Audit report readability is a critical aspect of financial reporting that affects stakeholders' understanding, trust, and decision-making processes (Salehi *et al*., 2022; Marques *et al*., 2021; Rajabalizadeh, 2024a). In Iran, the evolution of audit practices has been influenced significantly by international norms and local market dynamics (Mashayekhi and Mashayekh, 2008).

Parallel to the development of the TSE, Iran's audit market has evolved, aligning its national accounting standards with international norms. The Iranian Association of Certified Public Accountants (IACPA) mandates strict adherence to the International Standards on Auditing (ISA), which is significant for maintaining the integrity and reliability of financial reporting (Hesarzadeh *et al*., 2020). This adherence highlights the crucial role of external regulatory changes and global standardization efforts in shaping audit practices.

The composition of the TSE, encompassing institutional investors like banks and pension funds, individual investors, and analysts, is pivotal in shaping market behavior. The reliance of these stakeholders on audit reports for financial insights underscores the importance of audit quality and practices. Institutional investors, for instance, have been shown to significantly influence market reactions based on the nature of audit reports, highlighting the need for high-quality and reliable auditing standards and their execution in Iran's capital market (Brown and Popova, 2019).

High-quality and reliable auditing standards are essential in Iran's capital market. The exclusion of Big 4 audit firms introduces a distinctive dynamic that initially might seem to limit audit report readability and overall audit quality, due to variations in local auditor expertise and resources compared to more developed markets. While this absence could imply challenges in maintaining consistency and adopting international auditing standards, it also presents a significant opportunity for local audit firms. This unique market condition allows local firms to enhance their competitive edge by developing specialized expertise tailored to the Iranian market's specific needs and regulatory environment. Studies such as Mohammadi and Naghshbandi (2019) have found a significant relationship between audit committee attributes and the readability of financial statement footnotes, highlighting the pivotal role of governance in enhancing transparency. Thus, the absence of Big 4 firms not only fosters a more competitive atmosphere but also encourages local auditors to innovate and adapt in ways that could ultimately lead to greater transparency and audit quality in Iran's capital market.

The internal dynamic, characterized by varying levels of expertise and resource allocation, directly influences the quality and clarity of financial disclosures in the country. This environment, especially with the Iran Audit Organization's (IAO) [1] prominence in state-owned companies, creates a dynamic regime where auditors have greater bargaining power but also face intense competition (MohammadRezaei and Mohd-Saleh, 2018), potentially leading to better audit quality and more readable reports as local audit firms strive to establish credibility and distinguish themselves from their competitors.

The research by Saeedi *et al*. (2023) illustrates how firm's intellectual capital impacts audit report readability and tone, further emphasizing the sophistication required in audits to address the complexities of modern business environments in Iran. Similarly, the influence of auditor characteristics, including narcissism and self-confidence, on report readability (Salehi *et al*., 2023a, b) suggests a nuanced interplay between auditor behavior and report clarity, which can vary significantly across different auditing environments.

Studies like Seifzadeh *et al*. (2021) explore the relationship between management characteristics and financial statement readability, linking managerial behavior such as narcissism and overconfidence to how comprehensible financial reports are. This aligns with findings from Moghadam *et al*. (2023), which indicate that firm's intellectual capital, mediated by management characteristics, can significantly impact the readability of financial statements.

Additionally, Arianpoor and Sahoor (2023) explore the impact of business strategy on the readability of annual reports and its broader implications for financial reporting quality. Their research delves into various dimensions of financial reporting beyond readability, such as accrual quality, earnings management, accounting conservatism, and earnings value relevance. The study provides valuable insights into how strategic business decisions can influence transparency and enhance the overall understanding of financial disclosures. Lastly, the study by E-Vahdati *et al.* (2023) sheds light on how CEO gender and the demographic attributes of female CEOs affect the readability of annual reports, suggesting that different leadership styles and qualities can have significant implications for how information is presented in corporate disclosures.

The specific market characteristics of Iran, such as voluntary IFRS adoption and overall a weaker governance context, pose challenges that may influence auditor behavior differently compared to more regulated markets. High audit market competition in Iran is associated with higher accruals and lower audit fees (Rajabalizadeh, 2024b), suggesting that auditors may compromise report clarity to maintain client relationships in a market with low litigation risk (Safari Gerayli *et al*., 2021; Azizkhani *et al*., 2021).

To address the nuances of audit reporting in Iran, it is essential to consider that while explicit Key Audit Matters (KAM) disclosures are generally absent from Iranian audit reports, auditors include similar information when deemed necessary or beneficial. This traditional format may better align with the local business culture and regulatory environment, reducing potential misinterpretation and confusion among local financial report users. This alignment supports effective dissemination of financial information in a manner that is both accessible and actionable for all market participants within the context of Iran's unique business environment (Segal, 2019).

Iran's traditional audit reports may align well with the local business culture and regulatory environment. In settings like Iran, where business operations and governance structures may differ markedly from those in Western countries, traditional formats can be advantageous. These reports are often more straightforward and less technical, potentially facilitating a clearer understanding among local stakeholders [2] who may not be familiar with the complexities of newer international reporting standards. Additionally, the traditional format may align better with the existing regulatory frameworks and cultural expectations, reducing the potential for misinterpretation and confusion among local investors and other financial report users. This alignment supports the effective dissemination of financial information in a manner that is both accessible and actionable for all market participants within the context of Iran's unique business environment.

3. Theoretical framework and hypothesis development

3.1 Theoretical framework

Our study explores the unique dynamics of the Iranian audit reporting context, which is characterized by its distinct regulatory framework, cultural nuances, weak corporate governance, and audit market dynamics. These elements, as detailed in Section 2, starkly contrast those found in developed markets. Our analysis within the frameworks of institutional and agency theories intricately examines how these distinct factors—evolving regulatory practices, deep-rooted cultural conventions, and competitive audit market conditions—specifically influence auditing practices and governance mechanisms in Iran.

Institutional theory offers valuable insights into how external socio-economic and cultural factors influence organizational behaviors, such as auditing and corporate governance practices (DiMaggio and Powell, 1983). Particularly in emerging economies, where regulatory structures may be evolving, institutional pressures significantly shape corporate governance mechanisms (Arslan and Alqatan, 2020). In the context of Iran, cultural factors—such as traditional views on hierarchy, collectivism, and the role of family-owned businesses—play an important role in shaping organizational behavior and business practices (Yeganeh and Su, 2007). For example, there is a strong emphasis on personal relationships and trust in Iranian business culture, which can influence how firms present financial information. Additionally, in

contexts like Iran, where formal regulatory practices can be inconsistently applied, institutional pressures are critical to understanding how audit firms seek legitimacy and adapt their practices. For Iranian firms, this adaptation is essential not only to maintain legitimacy but also to foster stakeholder trust and facilitate resource access.

In environments with underdeveloped institutional norms, the demand for greater transparency and accountability often promotes the enhancement of audit report readability, a practice vital for building investor confidence and improving informational efficiency. In markets undergoing significant transitions, such as Iran, the expectation for clearer audit reports is positively linked to informational efficiency; higher report readability is expectedreduce information asymmetry by making critical financial insights accessible and understandable to a broader range of investors (Jones and Shoemaker, 1994; Lee, 2012). By aligning with external demands for transparency, firms in Iran can contribute to a more stable investment climate, where accessible audit reports could strengthen market responsiveness to new information and foster an environment conducive to efficient capital allocation.

Applying this theory specifically to the Iranian market, we posit that greater readability of audit reports will contribute positively to informational efficiency, even in the face of evolving institutional norms. In a market where economic and regulatory structures are less mature, clearer communication from audit firms can offset some of the market's inherent informational challenges. This positive influence of readability on informational efficiency is particularly crucial for emerging markets like Iran, where the formal governance landscape is still evolving and institutional pressures drive firms to seek legitimacy.

On the other hand, agency theory, as developed by Jensen and Meckling (1976), focuses on the conflicts of interest that arise between principals (shareholders) and agents (managers), especially in environments where corporate governance is weak. In the Iranian context, where corporate governance mechanisms are still underdeveloped, the principal-agent problem is particularly pronounced. The theory suggests that managers, as agents, may have incentives to obscure information that could reveal the true financial health of a company, especially if such information could affect their compensation or job security (Armstrong *et al*., 2010; Oyer, 2004). In emerging markets like Iran, where regulatory frameworks are still evolving and often lack the enforcement power seen in developed markets, managers often possess significant bargaining power over auditors (MohammadRezaei and Mohd-Saleh, 2017). This bargaining power can manifest in several ways, including the ability to influence the content and readability of audit reports. While audit reports are formally prepared by auditors, managers can pressure auditors to use more complex or technical language that reduces the clarity of the information presented (Cohen *et al*., 2017; Bedard *et al*., 2008). This strategic use of language can obscure negative financial details, thereby decreasing the transparency of the audit report.

Furthermore, in an environment characterized by weak corporate governance, managers may engage in "opinion shopping" (i.e. selectively seeking auditors who will issue favorable opinions) to ensure that the audit report aligns with their personal or organizational goals (MohammadRezaei and Mohd-Saleh, 2017; Salehi *et al*., 2020). In such cases, the readability of the audit report may be compromised as auditors may be incentivized to prioritize the preferences of powerful managers over the clarity of the information. This practice is particularly detrimental in the context of Iran, where regulatory gaps allow managers to exert considerable influence over audit processes (Amoonejad and Geraily, 2018). The result is that less readable audit reports may serve to conceal critical information from investors, thus increasing information asymmetry. This reduction in transparency impedes the informational efficiency of the market, as investors are unable to make well-informed decisions based on easily comprehensible financial data. In markets like Iran, where the lack of transparency can lead to inefficient pricing and higher volatility, the negative impact of poor readability on informational efficiency is especially pronounced. Hence, despite the potential for greater readability to improve informational efficiency, the presence of managerial influence often overrides this positive effect, leading to less transparent disclosures and a corresponding decrease in market efficiency (Kim *et al*., 2019).

3.2 Hypothesis development

Both institutional and agency theories provide insights into how improvements in audit report readability might influence informational efficiency, both positively and negatively. Transitioning from theoretical setting to empirical evidence, our research engages with recent studies that scrutinize the impact of audit report changes on market perceptions and reactions. Studies like those by Gutierrez *et al*. (2018) and Lennox *et al.* (2023) explore the informational contributions of expanded auditor reports in well-regulated markets such as the United Kingdom. These studies find that while such expansions increase disclosure, they do not significantly alter investor reactions or audit fees, suggesting a limited impact on perceived audit quality and market behavior. Reid *et al*. (2019) echo these sentiments, noting that new auditor reporting requirements, while linked to improvements in financial reporting quality, do not significantly affect audit costs or delays. Further building on prior research, Zeng *et al.* (2021) indicate that the introduction of KAMs reporting leads to improved audit quality, evidenced by auditors' increased attention to firm-specific issues and a greater propensity to issue modified opinions when necessary. Seebeck and Kaya (2023) utilize computational linguistics to examine the communicative value of extended auditor reports, specifically the inclusion of KAM. Their findings highlight that specific descriptions within KAMs are positively associated with capital market reactions, suggesting that specificity and clarity in audit reports can substantially enhance their usefulness to investors.

Our study also considers a range of control variables that could influence the primary relationship between audit report readability and informational efficiency. First, a range of governance factors are expected to influence informational efficiency. Larger board sizes often imply more effective governance (Coles *et al*., 2008; John and Senbet, 1998), potentially leading to greater informational efficiency. Similarly, higher board independence might strengthen oversight capabilities, improving informational efficiency (Armstrong *et al*., 2014; Faleye *et al*., 2011). Further, auditor characteristics are expected to play a role. Engagements with high reputation auditors or higher audit fees might reflect better audit quality and effort (Cahan and Sun, 2015; Hoitash *et al*., 2007), which could positively impact informational efficiency. However, frequent auditor changes might disrupt this due to a lack of continuity and familiarity with the firm's operations, including its internal control systems, accounting practices, and business processes (Dodgson *et al*., 2020). Longer auditor tenures may allow auditors to develop a deeper understanding of the firm (Almutairi *et al*., 2009), potentially enhancing informational efficiency.

Financial reporting quality and timeliness also play a crucial role in shaping informational efficiency. Unqualified audit opinions, shorter filing times, and higher financial statement readability are expected to be associated with higher informational efficiency (Kawada and Wang, 2020; Zhang *et al*., 2023). Conversely, higher accruals might indicate earnings management practices, potentially decreasing informational efficiency (Doukakis, 2014). Other firm characteristics and financial indicators are also relevant. Larger firms, firms with higher asset growth, or higher returns on assets might exhibit greater informational efficiency due to robust internal controls, increased market attention, and clearer financial reporting (Chen *et al*., 2011; Feng *et al*., 2015). In contrast, higher leverage, more complex financial and operational structures, or firms experiencing losses might face decreased informational efficiency due to increased financial risk and reporting complexities (Torben Juul Andersen, 2009; Petacchi, 2015).

Drawing on the methodologies and insights from prior research, our research uniquely extends to the Iranian market, where traditional audit report formats lack KAM disclosures. This gap presents a unique opportunity to explore how the absence of such modern disclosures might influence investor perception and market efficiency in a less explored regulatory and cultural context. An essential consideration in this context is the informational efficiency of the TSE. Market efficiency, in terms of how accurately and timely prices reflect available information, plays a critical role in validating the relationship between audit report readability and informational efficiency (Hesarzadeh and Rajabalizadeh, 2019). In this line, Jahan-Parvar and

Mohammadi (2013) found evidence supporting the TSE's efficiency at monthly frequencies and highlighted its integration with international markets, suggesting that it reflects information adequately over longer periods. Additionally, TSE has demonstrated incremental improvements in its regulatory framework and transparency, particularly in response to reforms aimed at aligning its practices with global standards (Rajabalizadeh, 2024a). Such developments suggest that the TSE can reflect financial information in a manner that supports market-based studies (Namazi and Nazemi, 2008). Given this context and in line with prior research on the TSE, we base our study on the view that the TSE possesses a level of efficiency sufficient to investigate the relationship between audit report readability and informational efficiency. Having considered these discussion, we hypothesize that there is a significant association between audit report readability and informational efficiency, while also considering the influence of various governance, auditor, and firm characteristics as control variables.

H. There is a significant association between audit report readability and informational efficiency.

4. Research design

4.1 Sample and data

This study analyzes 1,097 firm-year observations of companies listed on the TSE from 2012 to 2023. The selection of this period is motivated by both regulatory and data availability considerations. The year 2012 marks a significant milestone in the Iranian regulatory landscape, as Iran's national accounting and auditing standards began to more closely align with international practices, particularly with the voluntary adoption of IFRS by listed companies. This alignment was part of a broader effort to modernize the financial reporting framework and improve transparency in the Iranian market. By 2012, the regulatory environment became more consistent, providing a clearer basis for comparative analysis across firms. Meanwhile, 2023 is the most recent year with complete, accessible data across all variables needed for the study, ensuring both relevance and comparability. The qualitative data used in this study were manually extracted from audit reports, financial statements, and notes obtained from the comprehensive official database of the Securities and Exchange Organization of Iran (CODAL). Specifically, the qualitative data include detailed information on audit opinion types, auditor tenure, board characteristics, and institutional ownership. These variables are integral to examining the influences of governance and audit quality on financial reporting practices, aligning with the theoretical framework established earlier. The sample was refined from an initial pool of 3,493 firm-year observations by excluding firms in the financial or utility industries (896 firm-years), those with insufficient information (283 firm-years), those not operational for the entire study period (369 firm-years), and those missing data on audit fees (848 firm-years), resulting in the final sample of 1,097 firm year observations, used for analysis. Table 1 outlines this data refinement process for transparency.

For the textual analysis of audit reports, reports from the specified research period were manually downloaded from CODAL. Using Python packages, the text was extracted and saved in TXT format to simplify further processing. Python was chosen due to its extensive range of tools for natural language processing (NLP) and its flexibility in handling Persian text, which requires specific preprocessing to ensure accurate readability analysis. This approach supports the institutional and agency theories applied in the study, allowing for a systematic and replicable examination of readability across audit reports. This phase involved removing special characters from the Persian text while retaining sentence-ending characters to accurately calculate readability indices. We use standard NLP tools such as the Natural Language Toolkit (NLTK) and the Hazm library, which is specifically designed for Persian, to calculate readability scores from audit reports (Rajabalizadeh, 2023). These tools are essential for handling the linguistic nuances of the Persian language, allowing for a precise measurement of readability that accounts for Iran's unique linguistic and cultural context.

Table 1. Sample selection

Description	Firm-year Observations
Main companies listed on the TSE from 2012 to 2023	3,493
Financial or utility industry companies	(896)
Company years with insufficient information	(283)
Firms not in operation for the entire period	(369)
Missing audit fees	(848)
The final sample used for the main analysis	1,097

Note(s): This table outlines the process used for selecting the sample of firms from the Tehran Stock Exchange from 2012 to 2023, including the criteria for exclusions
Source(s): Authors' own work

4.2 Informational efficiency

Informational efficiency (*IE*), or return variance ratio (*VR*), as described by Perotti and Windisch (2017), is gauged by how much stock prices deviate from a random walk pattern, with larger deviations indicating lower informational efficiency. It measures the deviation of the price pattern from a random walk process, and we use the daily compounded *VR* to determine it. *VR* (1, *k*) is calculated as 1/*k* times the ratio of the *k*-day return variance to the 1-day return variance over a 12-month period, beginning three months after the publication date of the audit reports and financial statements. A random walk implies that the ratio of long-term to short-term variances per unit of time equals one. Variance ratios less than one are consistent with negative return autocorrelation, while variance ratios greater than one are consistent with positive return autocorrelation. If return autocorrelations at all lags equal zero, variance ratios are equal to one. To capture any departure from the random walk, we examine the quantity |*VR*-1|, which transforms the ordinary variance ratio into the absolute value of the variance ratio minus one.

This captures both positive and negative autocorrelations, as either a positive or a negative deviation from $VR = 1$ indicates a departure from a random walk. In this regard, a lower |*VR*-1| value represents higher informational efficiency. This paper presents the results concerning *VR* (1, 5) and *VR* (1, 10). For ease of interpretation, this paper denotes $|VR\,(1,5) - 1|$ multiplied by -1 as *IE5* and $|VR\,(1,10) - 1|$ multiplied by -1 as *IE10*, where a higher level of *IE5* and *IE10* indicates higher informational efficiency.

4.3 Readability

In this study, we employ three, commonly applied, measures to calculate readability: the *Fog*, *FK*, and *SMOG* indexes (Loughran and McDonald, 2016; Lo *et al*., 2017; El-Haj *et al*., 2019). Multiple readability measures are employed to validate the results. Additionally, these measures, having been used in prior research, facilitate the comparison of our findings with earlier studies.

Fog: It's particularly relevant for Iranian firms, given the simpler sentence structures in Persian, which aligns with prior Iranian studies (Hesarzadeh and Rajabalizadeh, 2019; Hesarzadeh *et al*., 2020; Rajabalizadeh and Schadewitz, 2025). Scores range from less than 8 (childish) to over 18 (unreadable), with higher scores indicating lower readability. The *Fog* Index formula is:

$$Fog = 0.4 \times [number\ of\ words/number\ of\ sentences + 100 \times (number\ of\ words\ with\ more\ than\ two\ syllables/number\ of\ words)] \quad (1)$$

FK: This measure translates readability into U.S. school grade levels, where higher scores indicate easier readability. Scores range from 0 to 30, suitable for college graduates, to 90 to 100, appropriate for fifth graders and below. To maintain consistency with the other two measures and for brevity, it is multiplied by −1 in the regression analyses.

$$FK = 0.039 \times [number\ of\ words/number\ of\ sentences] + 11.8 \times (number\ of\ syllables/number\ of\ words)] - 15.59 \quad (2)$$

SMOG: Similar to the *Fog*, a higher *SMOG* score indicates lower readability, categorizing texts from elementary (4.9 or lower) to graduate levels (17 or higher) based on complexity:

$$SMOG = 1.043 \times sqrt\,[30 \times number\ of\ words\ with\ more\ than\ two\ syllables/number\ of\ sentences] + 3.1291 \quad (3)$$

4.4 Control variables

In our study, we control for a range of variables to effectively isolate and capture the impact of audit report readability on informational efficiency. All the variables are defined in the Appendix.

We try to eliminate the potential impact of several factors based on prior studies, like board size (*B_SIZE*) and board independence (*B_IND*) (Rajabalizadeh and Oradi, 2022; Hesarzadeh *et al.*, 2020; Hesarzadeh and Rajabalizadeh, 2019). Additionally, we account for institutional ownership (*InstOwn*), auditor attributes including type (*AudType*), fee (*LnFee*), change (*AudChange*), tenure (*AudTenure*), and opinion (*AudOpin*), referencing studies from various jurisdictions (MohammadRezaei and Mohd-Saleh, 2018). We also control for financial statement filing timing (*ARL*) and the influence of accruals (*Accruals*, as per Perotti and Windisch, 2017). Firm size (*Size*), asset growth (*AssetGrowth*), receivables and inventory ratio (*InvRec*), debt ratio (*ΔLev*), return on assets (*ROA*) are included. Other controls, specific to the Iranian context, include net loss indicator (*Loss*), business segments (*Segment*), Altman's Z-score (*ALTZ*), company age (*LnAge*), and asset turnover (*Aturn*) (Hesarzadeh *et al.*, 2020; Hesarzadeh and Rajabalizadeh, 2019). To enhance our model's robustness, we also include key variables addressing financial statement clarity and quality alongside audit report readability. These variables are contemporaneous financial statement readability (*FogFS*), and financial complexity (*FC*). *Industry*, *Year*, and *Audit Firm Fixed Effects* are applied [3], and continuous variables are winsorized at the 1 and 99% levels.

4.5 Regression model

The following model is used to estimate the impact of audit report readability (*Fog*, *FK*, *SMOG*) on informational efficiency (*IE5*, *IE10*):

$$\begin{aligned} IE_{it} = {} & \beta_0 + \beta_1\, Readability_{it} + \beta_2\, B\_SIZE_{it} + \beta_3\, B\_IND_{it} + \beta_4\, InstOwn_{it} + \beta_5\, AudType_{it} \\ & + \beta_6\, LnFee_{it} + \beta_7\, AudChange_{it} + \beta_8\, AudTenure_{it} + \beta_9\, AudOpin_{it} + \beta_{10}\, ARL_{it} \\ & + \beta_{11}\, Accruals_{it} + \beta_{12}\, Size_{it} + \beta_{13}\, AssetGrowth_{it} + \beta_{14}\, InvRec_{it} + \beta_{15}\Delta Lev_{it} \\ & + \beta_{16}\, ROA_{it} + \beta_{17}\, Loss_{it} + \beta_{18}\, Segment_{it} + \beta_{19}\, ALTZ_{it} + \beta_{20}\, LnAge_{it} + \beta_{21}\, Aturn_{it} \\ & + \beta_{22}\, FogFS_{it} + \beta_{23}\, FC_{it} + Industry\ Fixed\ Effect + Year\ Fixed\ Effect \\ & + Audit\ Firm\ Fixed\ Effect + \varepsilon_{it} \end{aligned} \quad (4)$$

5. Empirical results

5.1 Descriptive statistics and correlation matrix

Table 2 displays descriptive statistics for our model's variables, winsorized at the 1 and 99% levels to minimize potential outliers. The mean values of informational efficiency (*IE5* = −0.360, *IE10* = −0.551) continue to resemble those in Hesarzadeh and Rajabalizadeh's (2019) Iran market study. The average *Fog* index is 21.665, indicating lower readability compared to financial statement notes and MD&A sections in Iranian firms (Hesarzadeh *et al*., 2020). Similarly, the *FK* score averages at 22.706 and the *SMOG* index at 18.135, both suggesting a level of complexity that may impact stakeholders' understanding of the content.

Key control variables show an average board size (*B_Size*) of approximately five members, and board independence (*B_Ind*) at 69.4%. Institutional ownership (*InstOwn*) averages 59.6%, at 59.6%, aligning with Hesarzadeh *et al*.'s (2020) research on Iranian corporate governance. Private audit firms (*AudType*) account for 78.9% of the sample, with 24.3% experiencing auditor changes (*AudChange*). Audit tenures (*AudTenure*) average 2.7 years, and 42.9% of audits are unqualified, highlighting the ongoing issues and potential of audit reports in Iran. Qualified audit reports, accounting for 57.1% of companies, often cite issues like tax reserves and incorrect cost measurements (MohammadRezaei *et al*., 2016). The average *Fog* index for

Table 2. Descriptive statistics of study variables (n = 1,097)

Variable	Mean	Std.Dev	Min	1%	25%	50%	75%	99%	Max
Dependents									
IE5	−0.360	0.133	−0.736	−0.533	−0.447	−0.410	−0.324	−0.035	−0.035
IE10	−0.551	0.114	−0.933	−0.736	−0.627	−0.586	−0.504	−0.291	−0.124
Independents									
Fog	21.665	3.021	13.731	14.521	19.850	22.066	23.705	26.599	26.599
FK	22.706	5.516	10.369	11.829	18.343	23.259	26.388	31.785	31.785
SMOG	18.135	2.131	12.883	13.361	16.691	18.379	19.593	21.665	21.665
Controls									
B_SIZE	5.006	0.215	4	4	5	5	5	5.510	7
B_IND	0.694	0.196	0	0.200	0.600	0.600	0.800	1	1
InstOwn	0.596	0.311	0	0	0.400	0.689	0.852	0.981	0.995
AudType	0.789	0.408	0	0	1	1	1	1	1
LnFee	6.910	0.783	4.788	5.224	6.397	6.894	7.368	8.829	9.349
AudChange	0.243	0.429	0	0	0	0	0	1	1
AudTenure	2.695	1.782	1	1	1	2	4	8.51	9
AudOpin	0.429	0.495	0	0	0	0	1	1	1
ARL	75.155	26.934	20	28.490	50	74	101	122.510	151
Accruals	0.027	0.134	−0.615	−0.301	−0.051	0.018	0.092	0.528	0.528
Size	6.211	0.568	4.900	5.068	5.841	6.167	6.525	7.844	8.768
AssetGrowth	0.229	0.355	−0.428	−0.236	0.022	0.132	0.304	1.648	1.648
InvRec	0.515	0.192	0.101	0.103	0.380	0.509	0.661	0.926	0.928
ΔLev	0.006	0.151	−0.741	−0.407	−0.064	−0.001	0.059	0.540	0.540
ROA	0.115	0.152	−0.566	−0.264	0.031	0.103	0.180	0.629	0.631
Loss	0.126	0.332	0	0	0	0	0	1	1
Segment	0.400	0.672	0	0	0	0	0.693	2.197	3.663
ALTZ	1.742	1.194	−1.990	−1.657	1.058	1.692	2.449	4.928	4.982
LnAge	3.575	0.403	2.303	2.601	3.332	3.664	3.912	4.143	4.205
Aturn	0.939	0.575	0.102	0.217	0.587	0.811	1.116	3.420	3.816
FogFS	18.430	3.524	10.069	10.312	15.831	18.287	21.031	23.918	23.918
FC	3.169	0.361	2.303	2.303	2.890	3.136	3.401	4.094	4.466

Note(s): This table presents descriptive statistics for all variables used in the study. Refer to the Appendix for variable definitions

Source(s): Authors' own work

financial statements (*FogFS*) is 18.430, indicating they are more readable than audit reports, yet this comparison continues to underscore the relative complexity of audit reports in the Iranian context.

Table 3 displays Pearson correlations for variables in our primary analysis. Notably, there's a significant negative correlation at the 5% level between readability measures (*Fog*, *FK*, and *SMOG*) and both informational efficiency measures (*IE5* and *IE10*). This preliminary supports the conclusion that more readable audit reports are associated with enhanced informational efficiency. Table 3 displays also that all three readability measures — *Fog*, *FK*, and *SMOG* —are positively and significantly correlated with each other, indicating that they similarly capture readability aspects in audit reports. Moreover, the correlations are not indicative of multicollinearity concerns, as evidenced by variance inflation factor (VIF) values below 5, confirming the model's appropriate specification for capturing the relationships between readability, informational efficiency, and control variables.

5.2 Audit report readability and informational efficiency

The main regression results are presented in Table 4. The regressions explaining *IE5* and *IE10* consistently show negative coefficients for the *Fog* (−0.009*** and −0.008***), *FK* (−0.006*** and −0.005***), and *SMOG* (−0.013*** and −0.011***) indices, suggesting that higher readability (lower index scores) correlates with improved informational efficiency [4]. These results are robust across various controls including board size, board independence, institutional ownership, financial statements readability, and other financial variables like accruals, asset growth, and leverage changes, all of which show varied influences on the informational efficiency. Economically, the significant negative relationship between readability indices and informational efficiency suggests substantial market implications. Improved readability not only enhances the immediate understanding of audit reports but also appears to foster a more efficient digestation of this information into market prices, thus contributing favorable to functioning of the market.

The findings of this study offer critical insights for regulators, auditors, and corporate managers in emerging markets such as Iran. By demonstrating the significant positive impact of audit report readability on informational efficiency, our research suggests that regulators should consider implementing stricter guidelines and standards to enhance the readability of audit reports, which could lead to improved market efficiency and reduced information asymmetry. Auditors are encouraged to adopt clear and comprehensive reporting practices. Training programs and continuous professional development should emphasize the importance of readability in audit reports to enhance their effectiveness and the reliability of financial disclosures. Corporate managers, in turn, could benefit from promoting transparency in their financial reporting to improve investor trust and market valuation, thereby potentially lowering capital costs. These findings also underscore the importance of regulatory bodies in fostering a regime that supports clear communication between firms and their stakeholders, enhancing the overall market functioning.

These findings are theoretically grounded in several key perspectives. Firstly, the negative coefficients for readability indices align with agency theory, which posits that clearer, more transparent audit reports reduce information asymmetry between shareholders and management, thus enhancing market efficiency (La Rosa *et al*., 2019). Our contribution extends this understanding specifically to the TSE context, where weak corporate governance and the evolving regulatory environment heighten the impact of readability on market efficiency. This study reveals how TSE's unique market structure amplifies the benefits of transparency, offering a detailed examination of how enhanced readability contributes to reduced information asymmetry in an emerging market.

Secondly, while institutional theory was extensively discussed in our theoretical foundations, its implications are also evident in the empirical results. The variability in readability improvements, as suggested by the theory, can be a response to external pressures

Table 3. Pearson correlations matrix (n = 1,097)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
(1) *IE5*	1	0.889**	−0.205**	−0.187**	−0.204**	−0.136**	0.110**	0.009	0.051	0.017	−0.037	−0.01	0.034	0.043
(2) *IE10*	0.889**	1	−0.198**	−0.189**	−0.197**	−0.123**	0.112**	0.013	0.061	0.022	−0.03	−0.012	0.044	0.04
(3) *Fog*	−0.205**	−0.198**	1	0.830**	0.978**	0.003	0.015	0.160**	−0.072*	0.118**	−0.032	0.019	−0.173**	−0.121**
(4) *FK*	−0.187**	−0.189**	0.830**	1	0.844**	−0.015	−0.003	0.169**	−0.051	0.059	−0.057	0.037	−0.290**	−0.212**
(5) *SMOG*	−0.204**	−0.197**	0.978**	0.844**	1	−0.031	0.008	0.160**	−0.06	0.110**	−0.036	0.019	−0.211**	−0.145**
(6) *B_SIZE*	−0.136**	−0.123**	0.003	−0.015	−0.031	1	0.019	−0.036	−0.055	0.080**	0.051	−0.051	0.033	0.033
(7) *B_IND*	0.110**	0.112**	0.015	−0.003	0.008	0.019	1	−0.083**	0.234**	−0.182**	0.085**	−0.180**	−0.157**	−0.155**
(8) *InstOwn*	0.009	0.013	0.160**	0.169**	0.160**	−0.036	−0.083**	1	−0.109**	0.253**	−0.005	0.041	−0.129**	−0.317**
(9) *AudType*	0.051	0.061	−0.072*	−0.051	−0.06	−0.055	0.234**	−0.109**	1	−0.504**	0.249**	−0.603**	−0.101**	−0.276**
(10) *LnFee*	0.017	0.022	0.118**	0.059	0.110**	0.080**	−0.182**	0.253**	−0.504**	1	−0.159**	0.390**	−0.026	0.068*
(11) *AudChange*	−0.037	−0.03	−0.032	−0.057	−0.036	0.051	0.085**	−0.005	0.249**	−0.159**	1	−0.405**	0.009	−0.037
(12) *AudTenure*	−0.01	−0.012	0.019	0.037	0.019	−0.051	−0.180**	0.041	−0.603**	0.390**	−0.405**	1	−0.001	0.161**
(13) *AudOpin*	0.034	0.044	−0.173**	−0.290**	−0.211**	0.033	−0.157**	−0.129**	−0.101**	−0.026	0.009	−0.001	1	0.305**
(14) *ARL*	0.043	0.04	−0.121**	−0.212**	−0.145**	0.033	−0.155**	−0.317**	−0.276**	0.068*	−0.037	0.161**	0.305**	1
(15) *Accruals*	0.019	−0.015	−0.033	0.095**	−0.017	0.076*	0.029	0.023	−0.015	−0.042	−0.055	0.005	−0.106**	−0.121**
(16) *Size*	0.077**	0.071*	0.079**	0.03	0.067*	0.070*	−0.032	0.123**	−0.229**	0.452**	−0.097**	0.217**	0.031	−0.088**
(17) *AssetGrowth*	0.038	0.027	0.015	0.108**	0.02	0.03	0.041	−0.011	0.005	−0.084**	−0.013	−0.017	0.015	−0.042
(18) *InvRec*	0.117**	0.084**	−0.080**	−0.008	−0.093**	0.048	−0.083**	0.004	−0.049	0.003	−0.024	0.118**	0.018	0.073*
(19) *ΔLev*	−0.179**	−0.132**	0.037	0.048	0.022	−0.004	0.001	0.085**	−0.041	0.002	0.009	0.051	0.039	0.036
(20) *ROA*	0.007	−0.015	0.025	0.107**	0.064	0.023	0.151**	0.058	0.012	−0.073*	−0.061	−0.034	−0.200**	−0.261**
(21) *Loss*	0.025	0.038	0.014	−0.028	−0.002	−0.054	−0.104**	−0.017	−0.042	0.052	0.033	−0.001	0.139**	0.154**
(22) *Segment*	0.008	0.005	0.028	−0.045	−0.001	0.172**	−0.089**	−0.166**	−0.174**	0.263**	−0.064	0.115**	0.242**	0.157**
(23) *ALTZ*	−0.006	−0.027	0.00066	0.094**	0.037	0.070*	0.101**	0.035	0.067*	−0.105**	−0.04	−0.064	−0.202**	−0.267**

(*continued*)

Table 3. Continued

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
(24) *LnAge*	0.007	0.006	−0.029	0.008	−0.032	0.049	−0.044	−0.177**	−0.080**	0.114**	−0.045	0.027	−0.033	0.173**
(25) *Aturn*	−0.088**	−0.088**	0.032	0.076*	0.057	−0.010	−0.031	0.106**	0.079**	−0.093**	0.014	−0.096**	−0.06	−0.173**
(26) *FogFS*	0.014	0.008	0.094**	0.122**	0.096**	0.092**	−0.006	−0.125**	−0.001	−0.091**	−0.012	−0.019	−0.067*	−0.045
(27) *FC*	−0.009	−0.010	0.083**	0.076*	0.081**	0.107**	−0.068*	0.178**	−0.123**	0.211**	−0.048	0.034	−0.074*	−0.147**

Variables	15	16	17	18	19	20	21	22	23	24	25	26	27
(15) *Accruals*	1	0.190**	0.342**	0.278**	−0.059	0.544**	−0.369**	−0.01	0.486**	−0.019	0.175**	0.075*	0.002
(16) *Size*	0.190**	1	0.192**	0.025	0.035	0.310**	−0.098**	0.323**	0.181**	0.032	−0.011	−0.099**	0.265**
(17) *AssetGrowth*	0.342**	0.192**	1	0.003	0.203**	0.278**	−0.083**	−0.055	0.202**	−0.033	0.150**	0.05	−0.069*
(18) *InvRec*	0.278**	0.025	0.003	1	0.122**	0.022	−0.033	−0.165**	0.164**	0.065*	0.196**	−0.023	−0.069*
(19) *ΔLev*	−0.059	0.035	0.203**	0.122**	1	−0.195**	0.241**	0.03	−0.187**	−0.039	0.103**	−0.018	0.026
(20) *ROA*	0.544**	0.310**	0.278**	0.022	−0.195**	1	−0.574**	−0.056	0.864**	−0.046	0.262**	0.045	−0.034
(21) *Loss*	−0.369**	−0.098**	−0.083**	−0.033	0.241**	−0.574**	1	0.084**	−0.537**	0.022	−0.089**	−0.100**	0.042
(22) *Segment*	−0.01	0.323**	−0.055	−0.165**	0.03	−0.056	0.084**	1	−0.118**	0.227**	−0.245**	−0.099**	0.283**
(23) *ALTZ*	0.486**	0.181**	0.202**	0.164**	−0.187**	0.864**	−0.537**	−0.118**	1	−0.012	0.579**	0.090**	−0.082**
(24) *LnAge*	−0.019	0.032	−0.033	0.065*	−0.039	−0.046	0.022	0.227**	−0.012	1	−0.090**	−0.029	−0.063
(25) *Aturn*	0.175**	−0.011	0.150**	0.196**	0.103**	0.262**	−0.089**	−0.245**	0.579**	−0.090**	1	0.114**	−0.081**
(26) *FogFS*	0.075*	−0.099**	0.05	−0.023	−0.018	0.045	−0.100**	−0.099**	0.090**	−0.029	0.114**	1	−0.015
(27) *FC*	0.002	0.265**	−0.069*	−0.069*	0.026	−0.034	0.042	0.283**	−0.082**	−0.063	−0.081**	−0.015	1

Note(s): The table summarizes the Pearson correlation coefficients between all pairs of variables involved in the study, offering insights into the relationships and potential multicollinearity among them. Correlation significance is indicated with asterisks (***$p < 0.01$, **$p < 0.05$, *$p < 0.1$). See the Appendix for variable definitions

Source(s): Authors' own work

Table 4. Regression analysis of informational efficiency on readability indices

Variable	(1) IE5	(2) IE10	(3) IE5	(4) IE10	(5) IE5	(6) IE10
Fog	−0.009***	−0.008***				
	(0.002)	(0.002)				
FK			−0.006***	−0.005***		
			(0.001)	(0.001)		
SMOG					−0.013***	−0.011***
					(0.003)	(0.003)
B_SIZE	−0.100***	−0.081***	−0.103***	−0.084***	−0.103***	−0.083***
	(0.032)	(0.028)	(0.032)	(0.028)	(0.032)	(0.028)
B_IND	0.113***	0.105***	0.111***	0.103***	0.112***	0.105***
	(0.031)	(0.028)	(0.031)	(0.028)	(0.031)	(0.028)
InstOwn	0.052**	0.026	0.043*	0.018	0.050**	0.024
	(0.023)	(0.021)	(0.023)	(0.020)	(0.023)	(0.021)
AudType	−0.074	−0.050	−0.076	−0.052	−0.073	−0.049
	(0.089)	(0.080)	(0.089)	(0.079)	(0.089)	(0.080)
LnFee	−0.001	0.009	−0.003	0.007	−0.000	0.009
	(0.011)	(0.010)	(0.011)	(0.010)	(0.011)	(0.010)
AudChange	−0.015	−0.012	−0.016	−0.013	−0.015	−0.012
	(0.013)	(0.011)	(0.013)	(0.011)	(0.013)	(0.011)
AudTenure	−0.004	−0.001	−0.004	−0.001	−0.004	−0.001
	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
AudOpin	0.002	0.010	−0.004	0.005	0.001	0.009
	(0.013)	(0.012)	(0.013)	(0.012)	(0.013)	(0.012)
ARL	0.001*	0.000	0.000	0.000	0.001*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Accruals	−0.071	−0.061	−0.059	−0.050	−0.072	−0.061
	(0.050)	(0.044)	(0.049)	(0.044)	(0.050)	(0.044)
Size	0.021	0.023*	0.018	0.020	0.020	0.021*
	(0.014)	(0.013)	(0.014)	(0.013)	(0.014)	(0.013)
AssetGrowth	0.045***	0.029**	0.052***	0.034**	0.045***	0.029*
	(0.016)	(0.015)	(0.016)	(0.015)	(0.016)	(0.015)
InvRec	0.103***	0.063*	0.098**	0.058*	0.101***	0.061*
	(0.039)	(0.035)	(0.039)	(0.034)	(0.039)	(0.035)
ΔLev	−0.217***	−0.130***	−0.213***	−0.126***	−0.217***	−0.130***
	(0.039)	(0.035)	(0.039)	(0.034)	(0.039)	(0.035)
ROA	−0.210*	−0.148	−0.227**	−0.163*	−0.203*	−0.143
	(0.109)	(0.097)	(0.108)	(0.096)	(0.109)	(0.097)
Loss	0.009	0.004	0.008	0.003	0.011	0.005
	(0.020)	(0.018)	(0.020)	(0.018)	(0.020)	(0.018)
Segment	0.012	0.002	0.012	0.002	0.012	0.003
	(0.011)	(0.010)	(0.011)	(0.010)	(0.011)	(0.010)
ALTZ	0.020	0.015	0.021	0.016	0.020	0.015
	(0.016)	(0.014)	(0.016)	(0.014)	(0.016)	(0.014)
LnAge	−0.010	−0.007	−0.005	−0.002	−0.010	−0.006
	(0.016)	(0.014)	(0.016)	(0.014)	(0.016)	(0.014)
Aturn	−0.034*	−0.035**	−0.030*	−0.032**	−0.033*	−0.034**
	(0.017)	(0.016)	(0.017)	(0.015)	(0.017)	(0.016)
FogFS	0.003**	0.003**	0.003**	0.003*	0.003**	0.003**
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
FC	−0.013	−0.013	−0.011	−0.011	−0.013	−0.013
	(0.018)	(0.016)	(0.018)	(0.016)	(0.018)	(0.016)
Intercept	0.154	−0.271	0.114	−0.308	0.214	−0.222
	(0.267)	(0.238)	(0.264)	(0.235)	(0.270)	(0.240)
Industry Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES

(*continued*)

Table 4. Continued

Variable	(1) IE5	(2) IE10	(3) IE5	(4) IE10	(5) IE5	(6) IE10
Audit Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	1,097	1,097	1,097	1,097	1,097	1,097
R-squared	0.401	0.350	0.407	0.356	0.401	0.350
Adj *R*-squared	0.266	0.204	0.274	0.211	0.267	0.204
F value	2.975***	2.399***	3.059***	2.461***	2.984***	2.400***

Note(s): Standard errors are in parentheses. *p*-values: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Each continuous independent variable is winsorized at the 1st and 99th percentile to reduce the influence of outliers. Variable definitions are provided in the Appendix
Source(s): Authors' own work

for transparency in the Iranian market. To better reflect the coercive, mimetic, and normative processes described by institutional theory, this study delves deeper into the specific mechanisms at play. We find that coercive pressures from regulatory authorities, mimetic behavior following market leaders, and normative influences from professional standards collectively drive improvements in audit report readability. This expanded analysis demonstrates how these processes not only encourage uniformity in reporting practices but also support legitimacy in the unique regulatory landscape of TSE.

5.3 Additional analysis

5.3.1 Controlling for endogeneity. To address the potential omitted variable problem, we conducted an additional test using Firm Fixed Effects. The use of Firm Fixed Effects allows for the control of unobserved heterogeneity, where the individual characteristics of each firm are taken into account. In Panel A of Table 5, the regression models demonstrate a consistent negative association between readability measures (*Fog*, *FK*, *SMOG*) and informational efficiency indicators (*IE5*, *IE10*). These results confirm that higher readability, indicated by lower values of readability indices, correlates with higher informational efficiency, even after controlling for firm-specific characteristics and other controls like board size, institutional ownership, and audit type.

Additionally, to address potential sample selection bias — a concern particularly relevant given the dynamics of the Iranian audit market where negotiation between client and auditor might affect the report's content (MohammadRezaei and Faraji, 2019) — we applied Heckman's (1979) two-stage correction procedure. This adjustment is crucial in contexts like Iran, where less isomorphism is observed due to varied compliance with institutional norms among different auditors. The unique negotiation behaviors between clients and auditors in Iran reflect a deviation from the homogeneous practices predicted by institutional theory, necessitating robust statistical methods to ensure the reliability of our findings. The Heckman method allows us to correct for possible sample selection bias in the analysis of audit report readability and its impact on informational efficiency. This approach ensures that our findings are robust and unbiased against non-random selection in our sample.

In the first untabulated stage of our Heckman approach, we predict the likelihood of an audit report exhibiting higher than median readability based on a set of control factors, such as audit firm size, industry type, and financial performance metrics. This stage is essential for identifying the potential selection mechanism into higher readability categories, laying the groundwork for addressing potential selection bias in our analysis. By including variables that influence readability but do not directly affect informational efficiency, such as the length of the audit report or the complexity of the financial transactions being audited, we ensure proper model specification in this probit estimation phase.

Table 5. Controlling for endogeneity

Panel A: Firm Fixed Effects Analysis Variables	(1) IE5	(2) IE10	(3) IE5	(4) IE10	(5) IE5	(6) IE10
Fog	−0.004* (0.003)	−0.004* (0.002)				
FK			−0.003 (0.002)	−0.003** (0.002)		
SMOG					−0.007* (0.004)	−0.006* (0.004)
Intercept & Controls	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	NO	NO	NO	NO	NO	NO
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Audit Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	1,097	1,097	1,097	1,097	1,097	1,097
R-squared	0.575	0.502	0.574	0.503	0.575	0.502
Adj *R*-squared	0.464	0.373	0.464	0.374	0.464	0.373
F value	4.044***	2.826***	4.020***	2.853***	4.034***	2.820***

Panel B: Heckman two-stage Correction for sample selection bias Variables	(1) IE5	(2) IE10	(3) IE5	(4) IE10	(5) IE5	(6) IE10
Fog	−0.008*** (0.002)	−0.007*** (0.002)				
IMR	0.030 (0.026)	0.031 (0.023)				
FK			−0.006*** (0.001)	−0.005*** (0.001)		
IMR			−0.006 (0.017)	−0.014 (0.015)		
SMOG					−0.012*** (0.003)	−0.011*** (0.003)
IMR					0.033 (0.027)	0.027 (0.024)
Industry Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Audit Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	1,030	1,030	981	981	1,029	1,029
R-squared	0.378	0.320	0.388	0.330	0.335	0.292
Adj *R*-squared	0.262	0.194	0.274	0.206	0.210	0.159
F value	3.264***	2.538***	3.407***	2.652***	2.683***	2.197***

Note(s): Standard errors are in parentheses. *p*-values: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Each continuous independent variable is winsorized at the 1st and 99th percentile to reduce the influence of outliers. Variable definitions are provided in the Appendix

Source(s): Authors' own work

The second stage utilizes the Inverse Mills Ratio (*IMR*) derived from the first stage to adjust our main regression models. These models explore how different readability indices (*Fog*, *FK*, *SMOG*) influence informational efficiency measures (*IE5*, *IE10*). By incorporating the *IMR*, we account for the potential bias that could arise from non-random distribution of readability levels across the sample. This step is crucial for understanding the true impact of audit report readability on market efficiency while controlling for any underlying selection bias. In Panel B of Table 5, the negative relationships between readability indices and informational efficiency

remain significant. The *IMR* coefficients suggest some impact of selection bias on the estimates, though they are not consistently significant across all models.

5.3.2 Controlling of auditor size effects. Given that Big 4 auditors are prohibited from operating in the Iranian audit market, there is a concern that audit firm size could affect our results. We followed Azizkhani *et al*. (2022) to address this concern and employed the following methods. Firstly, we excluded audit firms with fewer than two or three clients per year and re-calculated our main hypothesis, then re-estimated our models to examine the impact of audit report readability on informational efficiency. The results (not tabulated) for the readability indexes were consistent with our main results. Secondly, we divided the sample based on client size (using median market value of equity and total assets) and reanalyzed the models. These subsample results also supported our main findings. Lastly, considering that audit fees and market size might influence our results, we categorized the sample by audit market size, defined by clients' total assets. In smaller audit markets, a significant negative relationship persisted between the readability indexes and informational efficiency, mirroring the findings observed in larger markets. The analysis of audit fees revealed a nuanced impact on informational efficiency, where higher fees generally corresponded with better readability, suggesting that more substantial investment in audit services may enhance the quality of audit reports.

These analyses confirm that our main conclusions about the link between audit report readability and informational efficiency are robust to the size of the audit market. From the perspective of institutional theory, the consistent results across different market sizes demonstrate a high degree of isomorphism in audit reporting practices, indicating that auditors, regardless of size, converge towards similar standards and behaviors in audit report readability. This convergence could be driven by normative pressures, such as professionalization within the industry, and coercive influences from regulatory bodies, reflecting a uniform response to regulatory expectations and market demands. By showing that similar audit reporting practices are upheld across varying market sizes, our findings contribute to institutional theory by highlighting the pervasive influence of institutional norms on audit practices within the Iranian context.

6. Discussion

This study set out to examine the association between audit report readability and informational efficiency in Iran's unique audit market context. In light of the market's regulatory, cultural, and structural characteristics, we hypothesized a significant association between audit report readability and informational efficiency. This hypothesis draws on the dual theoretical lenses of institutional theory and agency theory, each offering insights into the external and internal dynamics influencing audit report quality in an emerging market context. Specifically, the study aimed to determine whether, in Iran's market environment, enhanced readability could effectively reduce information asymmetry and facilitate better decision-making for stakeholders reliant on these reports.

Our findings align with and extend previous studies on audit report readability and market efficiency. The negative relationship between readability indices and informational efficiency suggests that more readable audit reports indeed foster a more efficient absorption of information by the market. These results are consistent with previous research, particularly in well-regulated markets, where readability has been shown to reduce information asymmetry and support transparency (Salehi *et al*., 2022; Marques *et al*., 2021). Studies like Gutierrez *et al*. (2018) and Lennox *et al*. (2023), which analyze expanded auditor reports in developed markets, generally indicate that while report expansions provide additional information, they do not drastically alter investor reactions or affect audit fees. In contrast, our findings in the Iranian context demonstrate a more pronounced impact of readability on market efficiency. This discrepancy likely stems from Iran's evolving regulatory environment, where readability improvements are more critical

due to the market's lower baseline of informational transparency. Consequently, these results underscore the significance of readability in emerging markets, suggesting that readability enhancements can play a transformative role in markets characterized by information asymmetry and limited regulatory oversight (Rajabalizadeh, 2024b; Mashayekhi and Mashayekh, 2008).

Our study also parallels the findings of Seebeck and Kaya (2023) and Zeng *et al*. (2021), who show that specific, comprehensible information within audit reports enhances their communicative value and aligns investor expectations with firm realities. In Iran, where KAM disclosures are generally absent, traditional audit report formats that emphasize clarity can still serve as functional equivalents, supporting transparency without the complexities often associated with expanded reports. This insight contrasts with studies in more standardized regulatory environments, underscoring the adaptability of audit report readability as a tool for enhancing informational efficiency within diverse market contexts.

Our analysis also included several control variables to capture additional factors that could influence informational efficiency beyond readability alone. Governance variables such as board size, board independence, and institutional ownership were found to exert meaningful impacts. Larger board sizes, consistent with Coles *et al*. (2008), are often associated with more robust oversight, which can enhance informational efficiency by supporting transparency initiatives and ensuring accurate reporting. Board independence also exhibited a significant positive association with informational efficiency, in line with Armstrong *et al*. (2014) and Faleye *et al*. (2011), likely due to the increased monitoring power of independent boards in promoting clear and accurate reporting. Institutional ownership, another significant control, aligns with findings from Salehi *et al*. (2023a, b), suggesting that stakeholders with substantial market influence demand higher levels of transparency, which can enhance readability and informational efficiency. These findings collectively emphasize the importance of governance structures in reinforcing transparency within Iran's capital market.

Audit-related controls, such as auditor type, audit fees, audit tenure, and auditor change frequency, also influenced informational efficiency, though their effects were mixed. High-reputation auditors and higher audit fees generally indicate better audit quality, supporting informational efficiency by reinforcing confidence in report readability and accuracy (Cahan and Sun, 2015; Hoitash *et al*., 2007). Conversely, frequent auditor changes were negatively associated with informational efficiency, aligning with Dodgson *et al*. (2020), as these changes may disrupt audit continuity, thereby impairing auditors' familiarity with the firm's financial dynamics. Additionally, extended audit tenures may foster deeper firm knowledge, further contributing to informational efficiency (Almutairi *et al*., 2009).

Lastly, firm-specific controls such as financial statement timeliness, accruals, firm size, asset growth, and leverage yielded insights into how financial health and stability impact informational efficiency. Our results support prior findings that timelier filings and higher-quality financial reporting correlate with greater informational efficiency (Kawada and Wang, 2020; Zhang *et al*., 2023). While high accruals can indicate earnings management behaviors that obscure transparency, decreasing informational efficiency (Doukakis, 2014), stronger firm performance metrics such as higher asset growth and returns on assets were positively associated with informational efficiency, reflecting greater operational efficiency and clear financial reporting (Chen *et al*., 2011; Feng *et al*., 2015).

7. Conclusions

Our study contributes to the literature by empirically demonstrating that lower readability scores (i.e. higher Fog, Flesch-Kincaid, and SMOG indexes) are associated with decreased informational efficiency in the Iranian capital market. The negative and significant relationship between readability indexes and informational efficiency suggests that audit reports with higher readability positively impact market functioning, supporting institutional theory's perspective on the importance of transparent reporting practices in enhancing market

efficiency. This finding extends the existing literature by offering new insights within the specific regulatory of an emerging market.

The study's primary findings align with institutional theory, illustrating that in environments with evolving regulatory standards, as in Iran, external pressures for transparency encourage organizations to produce clearer audit reports. Enhanced readability fosters greater informational efficiency by providing investors with accessible and comprehensible disclosures, thereby reducing information asymmetry. Although agency theory also provides relevant context, our empirical results strongly support the institutional perspective on how readability improvements contribute to market stability and investor confidence in such a unique market setting.

Practically, these findings underline the importance of regulatory and professional practices aimed at improving financial disclosure clarity. To enhance informational efficiency, regulators should consider implementing standards that promote clear and accessible language in audit reports, potentially introducing guidelines or readability benchmarks for key sections. Firms can take actionable steps by investing in training for management and reporting teams to enhance report clarity and ensure that disclosures meet readability standards while preserving the depth of financial information. Auditors play a crucial role in this process by prioritizing readability as part of their audit quality assessments and actively advising firms on best practices for clear reporting. By collaborating, these stakeholders can work toward a more transparent financial reporting environment that better serves investors and supports market efficiency and overall stability.

However, the study also cautions against the potential risks of over-relying on readable audit reports, which might oversimplify financial data or compromise the specificity of financial disclosures. This underscores the need for a balanced approach to enhancing readability that maintains detailed and accurate financial reporting. Additionally, further research could delve more deeply into identifying which theoretical framework — agency and institutional theories— is most robustly supported by the empirical data. Such analysis would refine our understanding of the dynamics at play and guide more targeted policy interventions.

Notes

1. The Iran Audit Organization (IAO) is a government-affiliated entity responsible for auditing state-owned companies and public sector organizations in Iran (MohammadRezaei *et al*., 2016). Established in 1979, the IAO operates under the direct supervision of the Iranian Supreme Audit Court. Its primary role is to ensure transparency, accountability, and compliance with financial regulations in the public sector. Given its significant involvement in state-owned enterprises, the IAO plays a crucial role in shaping the audit landscape in Iran, especially in terms of establishing audit standards and overseeing financial reporting practices in the public sector.

2. While foreign investors are technically allowed to participate in Iran's stock markets, various sanctions and geopolitical factors often complicate such investments. The U.S. and EU sanctions, for instance, restrict many foreign financial institutions from engaging in direct investment in Iran, limiting the scope for foreign participation in the Iranian capital market.

3. The decision to not include Firm Fixed Effects in the main model stems from our initial focus on industry-wide and temporal variations that might influence audit report readability and informational efficiency more significantly. However, recognizing the potential influence of individual firm characteristics, Firm Fixed Effects are controlled for in a supplementary analysis presented in Section 5.3.1. This approach allows us to assess the robustness of our findings and specifically investigate the firm-level dynamics without conflating these effects with broader industry or temporal trends.

4. Following Kohlbeck and Luo (2022), we considered illiquidity as another measure of informational efficiency, calculated as the daily ratio of absolute stock return to its dollar volume over a year from the annual report's release. However, due to its low statistical significance (sig = 0.836), these results were excluded from our main analysis. Attempts to measure uncertainty using bid-ask spread and trading volume also lacked statistical significance.

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(The Appendix follows overleaf)

Appendix

Table A1. Variable definitions

Variable	Description
IE5 and IE10	$=\lvert VR(1,k)-1\rvert \times (-1)$; where VR (1, *k*) is the return variance ratio, i.e. 1/*k* times the ratio of the *k*-day return variance to the 1-day return variance. IE5 is computed using VR (1, 5) and IE10 using VR (1, 10)
Fog	$=0.4 \times$ [number of words/number of sentences $+ 100 \times$ (number of words with more than three syllables/number of words)] computed exactly as in Li (2008)
FK	$=0.39 \times$ [number of words/number of sentences] $+ 11.8 \times$ [number of syllables/number of words] – 15.59
SMOG	$=1.043 \times$ sqrt [$30 \times$ number of words with more than two syllables/number of sentences] $+ 3.1291$
B_SIZE	=The number of directors on the board of directors
B_IND	=The percentage of independent directors on the board of directors
InstOwn	=The percentage of the company's shares owned by institutional owners
AudType	=1 if the auditor is a private audit firm, 0 otherwise
LnFee	=The natural log of statutory audit fees
AudChange	=1 if the auditor switched, 0 otherwise
AudTenure	=Auditor tenure in years
AudOpin	=1 if the audit opinion is unqualified, 0 for the qualified audit opinion
ARL	=Audit report lag, days between a firm's fiscal year-end and the audit report date.
Accruals	=Total accruals, measured as income before extraordinary items less operating cash flows, all divided by total assets
Size	=Log of the market value of equity
AssetGrowth	=The annual percentage change in total assets
InvRec	=Some of the firm's receivables and inventory divided by its total assets
ΔLev	=LEV (total debt divided by total assets) in year *t* minus LEV in year t-1
ROA	=Operating earnings deflated by total assets
Loss	=1 if net income is negative, and 0 otherwise
Segment	=Natural logarithm of the number of business segments
ALTZ	=Altman's Z-score is computed as: [(1.4 × retained earnings + sales + 3.3 × pre-tax income +1.2 × (current assets−current liabilities)) ÷ total assets]
LnAge	=Natural log of the number of years from the establishment of a client firm
Aturn	=Asset turnover, measured as sales divided by total assets
FogFS	=Readability score of financial statements contemporaneous with the audit report, calculated using the Fog index
FC	=Natural logarithm of the number of footnotes in the financial statements
Year, Industry, Audit Firm, and Firm Fixed Effects	=Year, industry, audit firm, and firm fixed effects are included

Source(s): Authors' own work

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