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Investigation of the Relationship Between Debt Structure, Credit Rating, and Audit Fees in Companies

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Abstract

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The present study examined the relationships between short-term debt structure, auditor credit ratings, and audit fees in companies listed on the Tehran Stock Exchange (TSE) between 2013 and 2023. An analysis of the relationships among debt maturity, credit quality, and audit pricing was conducted using data from 136 non-financial firms and panel data regression results. Five hypotheses were tested to examine the direct relationship between short-term debt and audit fees, with the moderating effects of auditor rating, firm size, corporate life cycle stage, and financial reporting quality. Audit fees were significantly correlated with short-term debt, indicating that auditors exert greater effort and increase their compensation in response to greater liquidity risk. However, this was moderated by the auditor's credit rating: higher ratings are associated with lower overall audit costs, while high short-term debt increases audit fees, suggesting greater audit caution under complex financial conditions. Moreover, this joint effect is more prominent in larger firms, early-stage companies, declining companies, and companies with delayed financial reporting, highlighting how context influences audit pricing. This research contributed novel insights to the audit literature, especially within the context of emerging capital markets by integrating multi-level interaction effects and applying robust econometric models. The findings emphasized the strategic importance of financial structure management, timely reporting, and auditor selection in controlling audit-related costs for managers, auditors, and regulators. We encourage future studies to replicate this model using more granular governance and audit-quality proxies in other institutional settings.

Keywords:

Audit fees, Credit Rating,
Short-term Debt, financial
Reporting quality, Emerging
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1. Introduction

Financial resource management and other related decision-making are among the absolute priorities of managers of companies in the modern, competitive market. As one of the major aspects of financial decision-making, the debt structure of a company is also very important in terms of determining the financial risk, the capacity of the company to attract financial resources, and even its operational costs. As a result, the credit rating of a company is one of the most important factors used to determine a company's financial health and its economic performance, as it indicates the degree of confidence that investors and creditors have in its ability to repay its debts (Arhinful et al., 2024). In addition, credit rating agencies apply ratings based on the financial credibility of companies by using both quantitative and qualitative data that is retrieved through public and privately available information (Chen & Chen, 2022). As a result of a good credit rating, a company's liquidity risk and agency costs are reduced, which minimizes audit risk and corresponding audit costs (Chen & Chen, 2022).

According to the research done by Gul and Goodwin (2010), the firms with a credit rating and higher short-term debts incur reduced audit fees from the auditors. This discovery, according to the authors, indicates that such firms are less prone to financial misreporting. However, a limitation of their study is that the impact of firm size and corporate life cycle was not fully considered, which is a key focus of this research. Moreover, they found that there was a strong negative correlation between credit ratings and audit fees, and that audit fee charging policies are based on the assumption that credit ratings reflect the client's liquidity risk anxieties and charge lesser fees to companies with good credit ratings. But the advantage of short-term debt is largely witnessed in those firms that have low credit ratings (Gul & Goodwin, 2010). Auditing is an essential part of the financial and economic system because it is a mechanism of increasing financial transparency and giving a guarantee to stakeholders (King & McKennie, 2023). Audit fees, which are a part of financial reporting, are affected by a lot of things. These include the degree of reported risk, the complexity of a company's financial framework, and the regulations that are in place. Accordingly, this paper explicitly examines the effects of firm-specific characteristics, such as size, life cycle stage, and quality of reporting.

Specifically, the current relationship is stronger in firms that are lower rated in terms of credit rating, and this means that auditors have considered the monitoring aspect of lenders when pricing their services (Gul & Goodwin, 2010). Firms with lower quality earnings, small firms, or firms in the growth stage benefit more from short-term debt on owed audit costs (Opare & Bhuiyan, 2023). Additionally, the larger share of public debt and the smaller share of bank debt in the composition of the financing of a company are linked with high audit quality. The outcome is even more significant when the information asymmetry between the firm is high and weak corporate governance, implying that the better the audit quality, the higher the transparency and the lower the possibilities of moral hazard risks between the management and holders of the public debt (Chen et al., 2018).

Based on a study of Tehran Stock Exchange companies, the proposed paper will hopefully shed light on the relationship between debt structure, credit rating, and audit fees. Due to their enormous volume of financial transactions and financial openness, the listed corporations would make suitable research subjects for this topic. Unlike earlier research from other developing countries, this one focuses on how institutional context affects audit pricing. This study will primarily aim at presenting both scientific and practical evidence of the influence of financial structure and credit rating on audit costs. The results of this research can help managers of businesses, investors, auditors, and regulating agencies come up with proper financial policies and better estimate the costs involved. The findings highlight the importance of strategic financial management and the

selection of appropriate auditors in controlling audit-related costs, which is a key contribution of this study.

2. Literature review

Firms' financial governance and strategic decisions are impacted by the relationship between short-term debt and audit fees, making it a crucial subject in financial and auditing studies. A company's financial profile and structure are affected by its short-term debt, which consists of obligations that are repayable within a year and are usually financed by loans or credit lines. The complexity of the financial situation, the size of the company, and the nature of the risk all play a role in determining the audit price. The purpose of this study is to synthesize the existing literature on the topic of audit fees and how various factors, such as short-term debt, credit ratings, company size, business life cycle, and financial reporting quality (FRQ), interact with one another. The review draws attention to both the similarities and differences in the results.

2.1. Short-term debt and audit fees

Audit fees and short-term debt have a complicated and situationally dependent relationship. The negative correlation between short-term debt and audit fees in rated enterprises was discovered by (Gul & Goodwin, 2010). This suggests that improved monitoring leads to a decrease in audit work. Supporting this view is Opare and Bhuiyan's (2023) observation that smaller enterprises, firms in the growth stage, and firms with worse earnings quality experience higher effects (Opare & Bhuiyan, 2023). On the other hand, except privately held companies, audit fees are greater for Chinese companies that use short-term financing to finance long-term projects (Hong & ZHANG, 2020). Reasons for this discord probably have to do with institutional variations, notably China's more stringent regulatory supervision (Hong and Zhang, 2020). In a study conducted by Feito-Ruiz et al. (2023), lower debt maturities were associated with Big 4 auditors and higher ownership concentration in SMEs. In contrast, Gandía and Huguet (2020) found that Spanish SMEs experienced a decrease in debt costs due to higher audit fees in voluntary audits, as lenders place a high value on audit quality (L Gandía & Huguet, 2020). The need to study this link in the Tehran Stock Exchange, where distinct institutional variables may influence financial actions and auditor assessments, is underscored by these contradictory results. Based on this, it can be stated that the initial hypothesis of the present study is the following:

H1: There is a relationship between short-term debt and audit fees.

2.2. Credit ratings and audit fees

Credit ratings are important tools in moderating the short-term debt and audit fee relationship because they are indicators of the financial credibility of a given firm. This part of the research synthesizes the previous works by analyzing the effects of credit ratings on the audit fees in terms of the debt structure, corporate governance, and perceived risk, and how the points differ and converge to support further research on the topic in the Tehran Stock Exchange.

- *Impact of credit ratings on short-term debt and audit fees*

Enhanced lender monitoring reduces the risks of financial misreporting, which is reflected in lower audit fees (Gul & Goodwin, 2010). This is especially true for higher credit ratings and short-term debt. Lenders' increased scrutiny of lower-rated businesses has a greater impact on audit efficiency (Gul & Goodwin, 2010). According to Opare and Bhuiyan (2023), the impact is more noticeable for smaller firms or those with lower earnings quality, as this relationship differs

according to firm size and financial reporting quality (Opore & Bhuiyan, 2023). On the other hand, according to Dhaliwal et al. (2008), audit fees have a positive effect on debt costs for investment-grade issuers (Dhaliwal et al., 2008). This suggests that in some cases, higher fees may indicate that the auditors are putting more effort into inspecting the financial statements. These differing results probably come from differences across institutions, such as how much regulatory monitoring or market openness there is. This shows that we need to look into this dynamic in Iran's rising market.

- *Credit ratings and corporate governance*

Higher credit ratings frequently mean better company governance, which can lead to higher audit fees because of more monitoring. Alali et al. (2012) and Mili and Alaali (2023) show that companies with better credit ratings have better governance procedures, which means they are more open about their short-term debt (Alali et al., 2012; Basu et al., 2022; Mili & Alaali, 2023). Bortolon et al. (2013) and Griffin et al. (2008) say that this increased transparency may require more audit effort. They find that strong governance, like active audit committees, is linked to higher audit fees (Bortolon et al., 2013; Griffin et al., 2008; JANUARTI et al., 2020; Zaman et al., 2011). These studies agree that credit ratings show how well a company is run, which affects the price of audits. However, they disagree on how much the charge should go up, which depends on the governance requirements of the market.

- *Credit ratings and debt structure*

Credit ratings affect the maturity structure of debt, which in turn affects audit fees. According to Diamond (1991), companies with high credit ratings choose short-term debt to show that they are financially flexible, whereas companies with low credit ratings prefer long-term debt to lower their liquidity risk. This decision affects how risky an audit is thought to be. Short-term debt in high-rated enterprises usually means lower fees because the risk is smaller, while low-rated firms have to pay higher fees because they are being looked at more closely (Gul and Goodwin, 2010). Chong et al. (2015) also say that higher credit ratings are linked to more short-term debt disclosures, which lowers information asymmetry but may make audits harder (Chong et al., 2015). These results indicate a complicated relationship between credit ratings, debt maturity, and audit fees, with differences caused by the risk profiles of individual companies. Empirical research is necessary in Iran, where distinct institutional elements, including regulatory frameworks and market dynamics, may influence this relationship in a different way, due to the contradictory results about the direction and size of the effect of credit ratings on audit fees. In high-rated companies, for example, short-term debt could mean good financial management, which would cut audit costs. In lower-rated companies, on the other hand, short-term debt could be seen as riskier, which would draw more attention from auditors. This complexity supports the following hypothesis:

H2: The relationship between short-term debt and audit fees is influenced by the firm's credit rating.

2.3. Firm size and audit fees

Owing to firm size, financing, investment, and risks are managed in varying ways, and this impacts the connection between short-term debt, credit ratings, and audit fees. Using a summary of the existing literature, we examine how the size of a firm affects audit prices and how that effect is influenced by credit ratings and short-term debt, and find overlap and support for extending the research to the Tehran Stock Exchange.

- *Impact of firm size on audit fees*

As a result of greater organizational and financial complexity, larger firms usually incur higher audit fees (Lim & Mali, 2021). This complexity comes from having many different ways to get money and complicated financial systems, which makes audit procedures more complicated. However, they may have less leverage to negotiate with auditors, which might lead to different cost structures depending on how the market changes. Xu et al. (2022) note that audit fees are higher in high-risk firms with weak corporate governance and larger firms, as auditors address enhanced information asymmetry (Xu et al., 2022). This calls for further research into Iran's developing market since the results agree that larger firms pay more in audit fees, but disagree on how much of an impact this link has, which is affected by factors like governance quality and industry specifics.

- *Interaction of firm size with credit ratings and short-term debt*

Credit ratings and short-term debt interact with firm size to shape audit fees. Moalla and Baili (2019) discovered that firms with higher ratings, which are usually bigger, are more likely to get unqualified audit opinions. This could lead to higher audit fees because people want high-quality audits (Moalla & Baili, 2019). Lim and Mali (2021) and Xu et al. (2022) propose that auditors impose elevated fees on larger, higher-rated enterprises to alleviate information asymmetry, especially in markets characterized by rigorous regulatory scrutiny (Lim & Mali, 2021; Xu et al., 2022). On the other hand, Chong et al. (2015) show that there is a non-linear relationship between credit ratings and trade credit use. For example, low-rated companies cut back on trade credit as their ratings go up, but high-rated companies (which are frequently bigger) increase trade credit, which could be a symptom of predatory behavior. This difference shows that short-term debt in bigger companies may be seen as less hazardous, which might cut audit costs. On the other hand, short-term debt in smaller, lower-rated companies may be seen as more risky, which could raise audit costs (Chong et al., 2015). These mixed findings underscore the need to examine how firm size moderates the joint effect of short-term debt and credit ratings on audit fees in Iran, where unique institutional factors, such as regulatory frameworks and market transparency, may lead to distinct outcomes.

H3: The joint effect of short-term debt and credit rating on audit fees varies across firms of different sizes.

2.4. Corporate life cycle and audit fees

The audit fees are influenced significantly by the stages of the corporate life cycle, according to some studies. Audit fees associated with mature firms are higher than those of growth firms because they have a higher business risk. The negative correlation relationship between short-term debt and credit ratings and audit fees of rated firms shows there is an improved system of monitoring and governance of the firms (Gul & Goodwin, 2010). Credit ratings, small size, growth stage, and weak earnings quality all contribute to the effect (Opore & Bhuiyan, 2023). The effects of the life cycle stages on audit fees have been reported in different markets, such as Egypt, where this association was discovered in a substantial relationship between the audit fees and the introduction, growth, maturity, and decline of life cycle characteristics (Murad, 2018). These findings indicate that the assessment of several firm-related aspects, including life cycle stages, debt structure, and credit rating, is crucial for setting the audit fee and evaluating the quality of financial reporting. It is prudent to consider that the overall impact of short-term debt and credit rating on audit fees will vary at different stages of the firm's corporate life cycle, given their significant influence on audit fees and the established correlation between short-term debt, short-term credit rating, and audit pricing. For instance, the dynamics of audit fees for growth-stage organizations may range significantly from those for mature or falling firms, as growth-stage firms are viewed as having

varying levels of risk, along with more financial complexities and monitoring needs. These results show that different periods of life affect how audit fees work, which means that more research is needed in Iran.

H4: The joint effect of short-term debt and credit rating on audit fees varies across different stages of the corporate life cycle.

- *Financial reporting quality and audit fees*

Optimal auditing has conducted numerous studies about the factors influencing paid audit fees and financial reporting quality (FRQ). A number of studies on the factors that influence audit fees and FRQ have been produced by Optimal Auditing. Audit fees are positively correlated with firm profitability (Elsawah et al., 2024). An analysis by Li and Liu (2024) found that FRQ drops as abnormal audit fees go up (Li & Liu, 2024). For high-risk small firms with poor corporate governance, Xu et al. (2022) found that audit fee premiums are higher when investors pay for rating agencies' coverage. This suggests that these companies offer auditors and rating agencies complementary monitoring services (Xu et al., 2022). A study conducted by Yuan et al. (2025) in the Chinese market found that audit fees are negatively affected by financial report readability. This effect is influenced by factors like the similarity of annual reports and the auditors' experience in specific industries. All these studies are indicative of an intricate relationship between audit fees, FRQ, and other corporate attributes and external utilities (Yuan et al., 2025). These results highlight the multidimensional and multifaceted relationship between audit fees, financial reporting quality (FRQ), and other firm-level attributes and external institutions, including credit rating agencies. Although financial reporting quality is reported to lead to low audit fees because of the low perception of audit risk, its moderating effect on the connection between short-term debt, credit rating, and audit price has not been conclusively determined. Considering that short-term debt can be related to higher transparency because of stronger lender monitoring, and that higher credit ratings are linked with better corporate governance, it can be assumed that the quality of financial reporting contributes eminently to the determination of the effects of these two factors on the audit fees. These studies suggest FRQ moderates the effect of short-term debt and credit ratings on audit fees, a relationship yet to be fully explored in Iran.

H5: The joint effect of short-term debt and credit rating on audit fees is moderated by the firm's financial reporting quality.

3. Research Methodology

This study is practical research that seeks to examine the relationship between short-term debt, credit ratings, and audit fees, utilizing prior theories as a foundation. It uses preexisting archive data to assess variable relationships without control methods; it is descriptive-correlational. This section contains the data collection, a sample selection, variable measurement, regression models, analysis techniques, and a more powerful justification of the Tehran Stock Exchange (TSE) firms and their relevance to the institutions.

3.1. Data collection and sample selection

We used library-based approaches and document analysis to collect data from databases such as Rahavard Novin 3, Codal, TSE, and Iran Fara Bourse (IFB) after the event. The theoretical framework and literature assessment were based on books, academic journals, dissertations, and official reports. Empirical data were sourced from financial statements and related disclosures in the TSE and IFB databases. The statistical population includes all firms listed on the TSE from 2013 to 2023. Several eligibility criteria were applied to ensure data homogeneity and comparability,

including the following criteria:

- Companies with a fiscal year other than March ending are excluded.
- The companies that altered their fiscal year within the framework of the research were not included.
- The exclusion of any investment, holding, and financial intermediary firms was because of the structural variation in their reporting on financial accounts.
- Firms that did not publish or had missing information on their finances were restricted.
- Companies that traded with a suspension of over three months were also deleted.

The final sample, after these filters, consists of 136 companies, which is enough to draw strong statistical conclusions and is reflective of previous study standards. The data structure is panel (longitudinal), integrating cross-sectional and time-series data, which enhances control for unobservable heterogeneity and improves the reliability of the results.

3.2. Justification for using Tehran Stock Exchange firms

Because of Iran's unique institutional framework, which includes economic sanctions, high inflation, concentrated ownership, and strict regulatory requirements, the TSE is a great place to examine audit fees. These variables affect how companies handle their debt, how trustworthy they are, and how risky they think their auditors are, which is very different from how things work in developed markets. Sanctions, for instance, make it harder to get international finance, which makes people rely more on short-term debt. Regulatory mandates in Iran require detailed financial disclosures, increasing audit complexity. With TSE firms, this study provides insights applicable to similar markets and addresses a gap in the literature regarding international audit pricing evidence.

3.3. Variable measurement

The key variables are defined and operationalized as follows to ensure clarity and consistency in Table 1.

3.4. Research variables

Panel data regression models are employed using EViews 8 and Stata 12 to test the hypotheses, with a consistent format incorporating main effects, interaction terms, and moderating effects. The models are specified as follows:

In line with the study by Gul and Goodwin (2010), the following regression model is developed to test the first hypothesis.

$$\begin{aligned} \text{LN-AF}_{i,t} = & \beta_0 + \beta_1 \text{DM3}_{i,t} + \beta_2 \text{RATING}_{i,t} + \beta_3 \text{LN_NAF}_{i,t} + \beta_4 \text{OPIN}_{i,t} + \beta_5 \text{BIG4}_{i,t} + \\ & \beta_6 \text{LN_TENURE}_{i,t} + \beta_7 \text{ICW_COUNT}_{i,t} + \beta_8 \text{SIZE}_{i,t} + \beta_9 \text{lev}_{i,t} + \beta_{10} \text{MTB}_{i,t} + \beta_{11} \text{ROA}_{i,t} + \\ & \beta_{12} \text{LOSS}_{i,t} + \beta_{13} \text{INVREC}_{i,t} + \beta_{14} \text{QUICK_R}_{i,t} + \beta_{15} \text{TANGIB}_{i,t} + \beta_{16} \text{FORSALE}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

We extend Equation (1) by including the interaction term between DM3 and RATING as an additional independent variable to examine the joint effect of debt maturity and credit rating on audit fees, to test the second hypothesis.

$$\begin{aligned} \text{LN} - \text{AF}_{i,t} = & \beta_0 + \beta_1 \text{DM3}_{i,t} + \beta_2 \text{RATING}_{i,t} + \beta_3 \text{DM3}_{i,t} \times \text{RATING}_{i,t} + \beta_4 \text{SIZE}_{i,t} + \beta_5 \text{lev}_{i,t} \\ & + \beta_6 \text{MTB}_{i,t} + \beta_7 \text{ROA}_{i,t} + \beta_8 \text{LOSS}_{i,t} + \beta_9 \text{INVREC}_{i,t} + \beta_{10} \text{QUICK_R}_{i,t} \\ & + \beta_{11} \text{TANGIB}_{i,t} + \beta_{12} \text{FORSALE}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

Table 1. Definition of variables

Variable	Definition
LN_AF	Natural logarithm of audit fees.
DM3	Total liabilities divided by current liabilities plus debt maturing in the next two or three years.
RATING	Composite score from Iranian credit rating agencies, scaled from 1 (lowest) to 5 (highest), based on financial health, liquidity, and default risk.
LN_NAF	Natural logarithm of non-audit fees paid to the auditor.
OPIN	In the absence of going concern comments in the audit opinion, the dummy variable equals 1.
ARL (delay)	A proxy for financial reporting quality (delay-based) as well as the number of days between the end of the fiscal year and the issuance of the auditor's report.
BIG4	Dummy variable equal to 1 if the firm is audited by a Big 4 audit firm, and 0 otherwise.
IND_SPEC	An industry-specific auditor will have a dummy value of 1; otherwise, a dummy value of 0 will be used.
BUSY	In the case of a fiscal year-end in December, the dummy variable is set to 1, otherwise to 0.
LN_TENU	A natural logarithm is the number of consecutive auditing years for a particular firm by the auditor.
ICW_COUNT	Firms with weaknesses in internal control are assigned a dummy variable of 1, and those without are assigned a dummy variable of 0.
SIZE	Natural logarithm of total assets.
LEV	Ratio of current liabilities to total liabilities.
MTB	Market-to-book ratio of equity.
ROA	Return on assets is measured as net income divided by total assets.
LOSS	Dummy variable equal to 1 if ROA is less than zero, and 0 otherwise.
INVREC	Ratio of inventories and receivables to total assets.
QUICK_R	Divide current assets by current liabilities to get the quick ratio.
TANGIB	Tangibility of assets, measured as fixed assets divided by total assets.
FORSALE	If the firm exports, it has a dummy variable of 1. Otherwise, it has a dummy variable of 0.
FLC_Growth	If the firm is in the growth stage of its life cycle, the dummy variable will be 1; otherwise, it will be 0.
FLC_Decline	A dummy variable of 1 if the firm is in decline, and 0 otherwise.
FLC_Fall	If the firm is in the fall stage of its life cycle, the dummy variable is 1; otherwise, it is 0.
FLC_Maturity	An integer value of 1 indicates that the firm is in the maturity stage of the life cycle, whereas 0 indicates they are not.
FLC_Introduction	Firms in the introduction stage of their life cycle will have a dummy variable of 1; otherwise, they will have a dummy variable of 0.
RESTATE	Restated financial statements are reported as 1, and other financial statements as 0.
DAC	The absolute value of discretionary accruals is calculated using the performance-adjusted modified Jones model. The following equation is estimated for all firms in an industry with at least eight observations in a given year: (A.1) $\frac{ACC_{i,t}}{TA_{i,t-1}} = \gamma_0 \left(\frac{1}{TA_{i,t-1}} \right) + \gamma_1 \left[\frac{\Delta SALES_{i,t} - \Delta RECEIV_{i,t}}{TA_{i,t-1}} \right] + \gamma_2 \left(\frac{PPE_{i,t}}{TA_{i,t-1}} \right) + \gamma_3 (ROA_{i,t-1}) + \varepsilon_{i,t}$ ACC is total accruals calculated as income before extraordinary items and discontinued operations (IB) minus operating cash flow (OANCF). TA is the total assets at year t-1. $\Delta SALES$ is the change in sales from year t-1 to year t. $\Delta RECEIV$ is the change in accounts receivable from year t-1 to year t. PPE is gross property, plant, and equipment. ROA is return on assets, measured as income before extraordinary items and discontinued operations for the previous year divided by total assets of the same year. The estimated coefficients from equation (A.1) are used to compute the non-discretionary component (NDAC) for each firm. Discretionary accruals (DAC) are the residuals from this regression: $DAC = ACC - NDAC$.

Hypothesis 3 states that the joint effect of short-term debt and credit rating on audit fees varies across firms of different sizes. The regression model for testing this hypothesis is presented as follows:

$$\begin{aligned} \text{LN} - \text{AF}_{i,t} = & \beta_0 + \beta_1 \text{DM3}_{i,t} + \beta_2 \text{RATING}_{i,t} + \beta_3 (\text{DM3}_{i,t} \times \text{RATING}_{i,t}) \\ & + \beta_4 (\text{DM3}_{i,t} \times \text{RATING}_{i,t} \times \text{SIZE}_{i,t}) + \beta_5 \text{SIZE}_{i,t} + \beta_6 \text{lev}_{i,t} + \beta_7 \text{MTB}_{i,t} \\ & + \beta_8 \text{ROA}_{i,t} + \beta_9 \text{LOSS}_{i,t} + \beta_{10} \text{INVREC}_{i,t} + \beta_{11} \text{QUICK_R}_{i,t} + \beta_{12} \text{TANGIB}_{i,t} \\ & + \beta_{13} \text{FORSALE}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

Hypothesis 4 states that the joint effect of short-term debt and credit rating on audit fees varies across different stages of the corporate life cycle. The regression model for testing this hypothesis is presented as follows:

$$\begin{aligned} \text{LN} - \text{AF}_{i,t} = & \beta_0 + \beta_1 \text{DM3}_{i,t} + \beta_2 \text{RATING}_{i,t} + \beta_3 (\text{DM3}_{i,t} \times \text{RATING}_{i,t}) \\ & + \beta_4 (\text{DM3}_{i,t} \times \text{RATING}_{i,t} \times \text{FLC_Growth}_{i,t}) \\ & + \beta_5 (\text{DM3}_{i,t} \times \text{RATING}_{i,t} \times \text{FLC_Decline}_{i,t}) \\ & + \beta_6 (\text{DM3}_{i,t} \times \text{RATING}_{i,t} \times \text{FLC_Fall}_{i,t}) \\ & + \beta_7 (\text{DM3}_{i,t} \times \text{RATING}_{i,t} \times \text{FLC_Maturity}_{i,t}) \\ & + \beta_8 (\text{DM3}_{i,t} \times \text{RATING}_{i,t} \times \text{FLC_Introduction}_{i,t}) + \beta_9 \text{SIZE}_{i,t} + \beta_{10} \text{lev}_{i,t} \\ & + \beta_{11} \text{MTB}_{i,t} + \beta_{12} \text{ROA}_{i,t} + \beta_{13} \text{LOSS}_{i,t} + \beta_{14} \text{INVREC}_{i,t} + \beta_{15} \text{QUICK_R}_{i,t} \\ & + \beta_{16} \text{TANGIB}_{i,t} + \beta_{17} \text{FORSALE}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (4)$$

Hypothesis 5 states that the joint effect of short-term debt and credit rating on audit fees is influenced by the financial reporting quality of firms. The regression model for testing this hypothesis is presented as follows:

$$\begin{aligned} \text{LN} - \text{AF}_{i,t} = & \beta_0 + \beta_1 \text{DM3}_{i,t} + \beta_2 \text{RATING}_{i,t} + \beta_3 (\text{DM3}_{i,t} \times \text{RATING}_{i,t}) + \beta_4 \text{delay}_{i,t} \\ & + \beta_5 (\text{DM3}_{i,t} \times \text{RATING}_{i,t} \times \text{delay}_{i,t}) + \beta_6 \text{SIZE}_{i,t} + \beta_7 \text{lev}_{i,t} + \beta_8 \text{MTB}_{i,t} \\ & + \beta_9 \text{ROA}_{i,t} + \beta_{10} \text{LOSS}_{i,t} + \beta_{11} \text{INVREC}_{i,t} + \beta_{12} \text{QUICK_R}_{i,t} + \beta_{13} \text{TANGIB}_{i,t} \\ & + \beta_{14} \text{FORSALE}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (5)$$

All research variables must be well specified and operationalized in order to conduct reliable empirical research and test the research hypotheses effectively.

3.5. Analytical methods

Ordinary Least Squares (OLS) is used as the baseline in panel data regression analysis. If heteroscedasticity or autocorrelation is observed, Generalized Least Squares (GLS) is performed. Model specification is determined using:

- F-Limer Test: To choose between pooled OLS and panel models.
- Hausman Test: To select between fixed and random effects models.
- Diagnostic tests ensure model reliability:
- Multicollinearity: Variance Inflation Factor (VIF) to confirm no severe collinearity ($\text{VIF} < 10$).
- Heteroscedasticity: White test or modified Wald test to detect non-constant variance, addressed via GLS if needed.
- Autocorrelation: To check for serial correlation, we use the Durbin-Watson statistic for autocorrelation. If the values are considerably different from 2, we make modifications.

The reliability of the results is improved by these tests, which guarantee fair and consistent estimations. The regressions examine main effects (e.g., DM3, RATING), interaction terms (e.g., $\text{DM3} \times \text{RATING}$), and moderating factors (e.g., SIZE, FLC stages, ARL), in accordance with the assumptions.

4. Research findings

4.1. Descriptive statistics

The descriptive statistics of the research variables are presented in Table 2, offering an overview of the central tendencies and dispersion of the variables under study. The LN_AF, which stands for the logarithm of audit fees, is a good candidate for modeling because it has a normal distribution (skewness = 0.5, kurtosis = 0.01), a standard deviation of 0.90, and an average of 7.35. In contrast, DM3 (short-term debt ratio) is left-skewed with high kurtosis, indicating that short-term debt is a major component for most companies, which could imply liquidity risk. This means that the data may need to be changed. The RATING variable is somewhat biased, which means that companies tend to hire auditors with good reputations, as seen by the auditor ratings. An interesting finding is the FLC_GROWTH variable, which shows a high mean (0.91), suggesting that most firms in the sample are in the growth stage. Subsequent analyses must take careful statistical considerations into account, as the descriptive analysis implies that some variables do not follow a normal distribution.

Table 2. Descriptive statistics

Variable Name	Mean	Median	Min	Max	Std Dev	Skewness	Kurtosis	Jarque-Bera
LN-AF	7.350	7.290	4.370	10.230	0.900	0.090	3.220	4.340
DM3	0.900	0.930	0.150	1.000	0.120	-2.340	10.450	4075
RATING	1.780	1.000	1.000	4.000	1.260	1.120	2.360	287.550
LN*NAF	10.290	11.110	0.000	18.360	3.960	-1.390	4.750	569.960
OPIN	1.100	1.000	1.000	2.000	0.290	2.750	8.560	3223.550
BIG4	0.300	0.000	0.000	1.000	0.460	0.890	1.790	243.500
BUSY	0.850	1.000	0.000	1.000	0.360	-1.980	4.940	1028.300
LN*TENURE	1.210	1.100	0.000	3.090	0.980	0.330	1.840	93.480
ICW*COUNT	0.710	1.000	0.000	1.000	0.460	-0.910	1.830	247.350
SIZE	15.280	15.050	11.160	21.900	1.750	0.650	3.560	104.700
LEV	0.530	0.520	0.010	1.960	0.230	0.540	4.820	236.450
MTB	5.350	3.100	-48.250	262.110	12.850	12.430	214.700	2394818
ROA	0.160	0.140	-0.620	0.890	0.160	0.370	4.480	144.460
LOSS	0.080	0.000	0.000	1.000	0.280	3.020	10.140	4612.270
INVREC	0.290	0.260	0.000	0.920	0.190	0.710	2.940	107.240
QUICK*R	1.450	0.950	0.110	47.070	2.940	9.700	116.700	701237.700
TANGIB	0.230	0.180	0.000	4.120	0.210	5.880	99.260	495704.400
FORSALE	0.550	1.000	0.000	1.000	0.500	-0.210	1.040	210.930
FLC*MATURITY	0.300	0.000	0.000	1.000	0.460	0.880	1.770	242.310
FLC*INTRODUCTION	0.010	0.000	0.000	1.000	0.070	13.330	178.720	1664969
FLC*GROWTH	0.910	1.000	0.000	1.000	0.290	-2.850	9.100	3669.030
FLC*FALL	0.170	0.000	0.000	1.000	0.370	1.780	4.170	739.930
FLC*DECLINE	0.100	0.000	0.000	1.000	0.300	2.690	8.230	2965.780

4.2. Hypothesis testing

To test Hypothesis 1, Regression Model (1) was used. The hypothesis assumes that firms with higher short-term debt face greater financial risk, influencing auditors' risk assessments and leading to higher audit fees. Table 3 presents the regression results.

DM3 (short-term debt ratio) shows a significant positive coefficient of 0.7847 ($t = 5.83$, $p = 0.0005$), confirming that higher short-term debt correlates with higher audit fees. This finding supports the hypothesis that auditors perceive higher risk in firms with more short-term debt, requiring more effort and compensation. RATING (auditor rating) shows no significant effect ($p = 0.807$), indicating that auditor rating alone does not substantially influence audit fees in this context. Firm size (SIZE) and internal control weaknesses (ICW_COUNT) have significant positive effects, indicating more audit costs for larger firms or those with reporting weaknesses. Opare and Bhuiyan (2023) discovered that short-term debt correlates with reduced audit expenses, particularly for

companies with subpar credit ratings and smaller dimensions. In contrast, the lack of significance in RATING here differs from Hong and Zhang (2020), where auditor ratings significantly impacted audit fees, particularly for firms using short-term debt for long-term investments.

Table 3. Results of the first Model test

Variables	Coefficients	t-Statistic	p-Value
DM3	0.784	5.836	0.0005
RATING	0.0014	0.250	0.807
LN_NAF	-0.006	-2.903	0.015
OPIN	-0.026	-1.279	0.229
BIG4	-0.048	-1.812	0.111
LN_TENURE	-0.011	-1.262	0.235
ICW_COUNT	0.079	4.836	0.0007
SIZE	0.294	15.503	0.000
LEV	0.161	4.048	0.002
MTB	0.0008	2.836	0.017
ROA	0.135	2.644	0.024
LOSS	0.071	4.139	0.002
INVREC	0.149	2.822	0.018
QUICK_R	-0.005	-2.391	0.037
TANGIB	0.032	0.812	0.435
FORSALE	-0.043	-2.896	0.015
C	2.774	10.501	0.000
R-squared	0.961	Adjusted R-squared	0.957
F-Statistic	218.177	Significance Level	0.000
Durbin-Watson Statistic		1.520	

To test Hypothesis 2, an interaction regression model was used, incorporating DM3, RATING, and their interaction term ($DM3 \times RATING$). The results are shown in Table 4

Table 4. Results of the second Model test

Variables	Coefficients	t-Statistic	p-Value
DM3	-0.234	-2.806	0.018
RATING	-0.094	-2.767	0.019
DM3×RATING	0.112	2.872	0.016
SIZE	0.300	14.553	0.000
LEV	0.123	2.990	0.013
MTB	0.001	2.456	0.033
ROA	0.099	1.296	0.223
LOSS	0.071	4.892	0.000
INVREC	0.264	3.201	0.009
QUICK_R	-0.004	-2.282	0.045
TANGIB	0.037	1.091	0.300
FORSALE	-0.036	-2.116	0.060
C	2.806	8.261	0.000
DM3	-0.234	-2.8067	0.018
R-squared	0.956	Adjusted R-squared	0.952
F-Statistic	199.916	Significance Level	0.000
Durbin-Watson Statistic		2.148	

DM3 and RATING show significant negative coefficients, indicating that both higher short-term debt and higher auditor ratings are associated with lower audit fees. The interaction term $DM3 \times$

RATING is positive and significant (0.1129, $p = 0.016$), suggesting that the combination of high short-term debt and strong auditor ratings increases audit fees due to the added complexity of auditing such firms. Gul and Goodwin (2010) found that short-term debt negatively correlated with audit fees. This study's interaction between short-term debt and auditor rating provides a more nuanced perspective, especially in firms with complex financial conditions.

Hypothesis 3 examines whether the joint effect of short-term debt and auditor credit rating on audit fees varies across firms of different sizes. The results in Table 5 confirm that the interaction term $DM3 \times RATING \times SIZE$ is statistically significant.

Table 5. Results of Model 3 estimation

Variables	Coefficients	t-Statistic	p-Value
DM3	-0.225	-2.606	0.009
RATING	-0.088	-2.328	0.020
DM3×RATING	0.189	2.028	0.042
DM3×RATING×SIZE	0.253	2.049	0.040
SIZE	0.295	45.514	0.000
LEV	0.124	2.961	0.003
MTB	0.0009	2.805	0.005
ROA	0.097	1.806	0.071
LOSS	0.073	2.912	0.003
INVREC	0.264	6.547	0.000
QUICK_R	-0.004	-1.841	0.065
FORSALE	-0.037	-1.801	0.071
TANGIB	0.036	0.981	0.326
C	2.880	22.136	0.000
R-squared	0.800	Adjusted R-squared	0.777
F-Statistic	199.895	Significance Level	0.000
Durbin-Watson Statistic		1.549	

The results of Model 3 indicate that the combined effect of short-term debt and auditor credit rating on audit fees varies according to firm size. The coefficient of the three-way interaction term ($DM3 \times RATING \times SIZE$) is 0.253, which is significant ($t = 2.049$, $p = 0.040$) and highlights the moderating role of firm size. In other words, for larger firms, the joint effect of short-term debt and auditor quality on increasing audit fees is stronger. Short-term debt alone reduces audit fees ($\beta = -0.225$, $p = 0.009$), while greater auditor credit rating also has a negative effect ($\beta = -0.088$, $p = 0.020$). However, the interaction term $DM3 \times RATING$ is positive and significant ($\beta = 0.189$, $p = 0.042$), indicating that when short-term debt is high and the auditor has a high credit rating, their combined effect leads to an increase in audit fees. Results support prior theory: audit fees are positively correlated with firm size ($\beta = 0.295$, $p < 0.001$), leverage ($\beta = 0.124$, $p = 0.003$), and inventory and receivables ($\beta = 0.264$, $p < 0.001$). Overall, these results suggest that auditors charge higher fees when dealing with large, high-risk firms, even in the presence of auditors with high credit ratings. The model exhibits a strong fit ($R^2 = 0.800$, Adjusted $R^2 = 0.777$), and the F-test confirms the overall significance of the model, reinforcing the robustness of the findings.

Hypothesis 4 tests whether the joint effect of short-term debt and auditor rating on audit fees varies across different stages of the firm life cycle (FLC). There is a significant moderating effect of life cycle stages in this relationship, as shown in Table 6.

Table 6. Results of Model 4 Test

Variables	Coefficient	t-statistic	p-value
DM3	-0.233	-3.231	0.001
RATING	-0.097	-2.975	0.003
DM3×RATING	0.123	3.106	0.001
SIZE	0.300	56.838	0.000
LEV	0.126	2.786	0.005
MTB	0.001	2.384	0.017
ROA	0.089	1.528	0.126
LOSS	0.067	2.869	0.004
INVREC	0.259	6.337	0.000
QUICK_R	-0.003	-1.872	0.061
TANGIB	0.035	0.778	0.436
FORSALE	-0.040	-1.909	0.056
DM3×RATING×FLC_FALL	-0.001	-0.189	0.849
DM3×RATING×FLC_MATURITY	0.007	1.133	0.257
DM3×RATING×FLC_INTRODUCTION	0.146	3.396	0.000
DM3×RATING×FLC_GROWTH	-0.012	-0.890	0.371
DM3×RATING×FLC_DECLINE	0.017	1.874	0.0611
C	2.805	25.133	0.000
R-squared	0.957	Adjusted R-squared	0.952
F-Statistic	194.462	Significance Level	0.000
Durbin-Watson Statistic		1.556	

The interaction term $DM3 \times RATING \times FLC_Introduction$ is highly significant ($\beta = 0.1464$, $p = 0.0007$), indicating that in newly established firms, high short-term debt combined with a high auditor rating significantly increases audit fees due to the high operational and financial uncertainty in these firms. This suggests that auditors may still need to focus on liquidity risk at declining firms, despite what experts believe. The results for growth, maturity, and fall stages are statistically insignificant, implying that in these phases, other factors such as stability and process maturity may reduce the impact of short-term debt and auditor rating on audit fees. These findings align with the research by Murad Ali Ahmed (2018), who found that the life cycle stage has a significant effect on audit fees, particularly in the introduction stage. The results suggest that startups and declining firms face higher audit costs due to their higher risk and audit complexity. Feito-Ruiz et al. (2023) also highlighted that growth-stage firms tend to have more dynamic financial structures, which might mitigate the impact of short-term debt and auditor rating on audit fees.

4.3. Triple interactions with firm life cycle stages

- *Introduction Stage ($DM3 \times RATING \times FLC_Introduction$)*: The interaction effect is positive and highly significant ($\beta = 0.1464$, $p = 0.0007$). This indicates that audit fees are substantially increased in newly formed enterprises due to the combination of short-term debt and a high auditor's reputation, which is especially problematic in these situations due to the high levels of operational and financial uncertainty. A startup's finances are generally new and fragile, and its capital structure is fragile, making it more challenging for auditors to conduct an audit of it, especially high-profile ones looking to maintain their credibility.
- *Decline Stage ($DM3 \times RATING \times FLC_Decline$)*: The interaction is positive but only marginally significant ($\beta = 0.0177$, $p = 0.0611$). In declining firms, reduced operations may lower audit scope, yet high short-term debt may still raise concerns about liquidity risk, leading auditors to devote more effort to going-concern assessments.
- *Growth Stage ($p = 0.3716$), Maturity Stage ($p = 0.2571$), and Fall Stage ($p = 0.8498$)*: These

interactions are statistically insignificant, implying no meaningful moderation effect of the firm life cycle stage in these phases. In growth-stage firms, diverse financing sources and a more dynamic structure may diminish the relative importance of short-term debt and auditor rating in determining audit fees. Mature firms have well-established processes, reducing audit risks. The audit considerations of short-term debt become less important in the fall phase as operations taper off, transactions become simpler, and operations become simpler.

- Specifically:
- *Maturity Stage* ($DM3 \times RATING \times FLC_Maturity$): Although the coefficient is positive ($\beta = 0.0076$), it is not significant ($p = 0.2571$), suggesting that the audit environment is stable and standard procedures apply, regardless of debt structure or auditor reputation.
- *Fall Stage* ($DM3 \times RATING \times FLC_Fall$): The coefficient is negative and insignificant ($\beta = -0.0015$, $p = 0.8498$), showing no observable effect. At this stage, reduced activity and audit scope likely make the interaction between short-term debt and auditor rating irrelevant.

The results show that the stage of the firm's life cycle affects the relationship between short-term debt, auditor rating, and audit fees. The interaction is most pronounced and significant in the introduction stage, marginal in decline, and negligible in other phases. Modeling and interpreting audit fees must take lifecycle dynamics into account. Overall, these results confirm that the joint effect of short-term debt and auditor credit rating on audit fees is more pronounced during the introduction and decline stages of the firm life cycle, while no significant differences are observed in other stages. Audit fee analysis should take a firm's life cycle into account, as shown by these results. A more thorough investigation of the stages (growth, maturity, and fall) that did not show statistical significance, as well as sensitivity analyses on control variables (such as ROA and TANGIB) that did not show statistical significance, should be considered for future research. Startup firms are known to have high levels of risk and uncertainty. Furthermore, leveraging larger datasets or more advanced statistical methods could provide a more comprehensive understanding of the determinants of audit fees.

The fifth hypothesis of this study posits that the joint effect of short-term debt and credit rating on audit fees is moderated by the quality of financial reporting. To test this hypothesis, the Regression Model (5) has been employed. A summary of the results from this analysis is presented in Table 7.

Financial reporting quality, as assessed by audit report delay (DELAY), moderates the joint effect of short-term debt (DM3) and auditor credit rating (RATING) on audit fees (LN-AF), according to the results of Table 7, which corresponds to the test of the fifth hypothesis. This supports the hypothesis. In regression model (5), the main variables DM3 (coefficient = -0.240, p -value = 0.001) and RATING (coefficient = -0.090, p -value = 0.006) have significant negative effects on audit fees. This means that higher short-term debt ratios and better auditor credit ratings are linked to lower audit fees. This could be because lower financial risk and more trust in high-quality auditors lead to lower audit fees. The interaction term $DM3 \times RATING$ (coefficient = 0.105, p -value = 0.004) shows a significant positive effect. This means that having a lot of short-term debt and a good reputation as an auditor makes audits more expensive, probably because they are more complicated. The audit delay variable (DELAY, coefficient = -0.001, p -value = 0.000) has a strong negative relationship with audit fees. This means that longer reporting delays may be linked to lower fees, which could be because of limited scope or efforts to cut costs. The three-way interaction term $DM3 \times RATING \times DELAY$ (coefficient = 0.015, p -value = 0.000) is significant at the 1% level. This shows that the quality of financial reporting, as shown by the delay in the audit report, moderates the relationship between short-term debt and auditor rating with audit fees. The interaction between DM3 and RATING has a positive coefficient, which shows that when firms

take longer to report, the combined effect on audit fees is stronger. This could be because of higher audit risk, which needs more thorough scrutiny by qualified auditors. The lower R-squared (0.6500) and Adjusted R-squared (0.6200) numbers show that the model fits pretty well. This means that even though the key variables are important, audit fees may also be affected by other things.

Table 7. Results of Model 5 estimation

Variables	Coefficient	t-statistic	p-value
DM3	-0.240	-3.200	0.001
RATING	-0.090	-2.700	0.006
DM3×RATING	0.105	2.800	0.004
SIZE	0.295	16.600	0.000
LEV	0.115	2.150	0.032
MTB	0.002	1.400	0.162
ROA	0.095	0.950	0.343
LOSS	0.090	3.350	0.001
INVREC	0.280	3.500	0.000
QUICK_R	-0.005	-1.800	0.072
TANGIB	0.035	0.980	0.328
FORSALE	-0.025	-1.150	0.251
DM3 × RATING × DELAY	0.015	4.500	0.000
DELAY	-0.001	-3.600	0.000
C	3.020	9.998	0.000
DM3	-0.234	-3.125	0.001
RATING	-0.086	-2.685	0.007
DM3 RATING	0.101	2.775	0.005
R-squared	0.650	Adjusted R-squared	0.620
F-Statistic	195.000	Significance Level	0.000
Durbin-Watson Statistic		1.850	

5. Conclusion and suggestions

This study looks at how short-term debt, auditor credit rating, and audit fees are related in companies listed on the Tehran Stock Exchange. It does this by taking into account firm size, the life cycle of the company, and the quality of its financial reporting. Short-term debt correlates positively with elevated audit fees, as liquidity and financial concerns inherent in short-term liabilities require more comprehensive audits. The auditor's credit rating affects this relationship. Auditors with good credit ratings tend to be more cautious, especially when short-term debt levels are high, which raises the cost of the audit. Larger firms, due to operational and reporting complexities, experience greater audit fee increases when high short-term debt and auditor reputation interact. The firm life cycle stage significantly impacts the joint effect of short-term debt and auditor rating on audit fees. This effect is most pronounced during the introduction and decline stages, where financial uncertainty and operational instability increase audit risks. Financial reporting quality—as measured by audit report delay—moderates the relationship, with delayed reporting signaling weak internal controls and increasing audit efforts and costs.

This study contributes to the audit literature by moving beyond linear models, providing a nuanced understanding of how short-term debt, auditor reputation, and firm-specific characteristics interact to shape audit pricing in emerging markets. It highlights the conditional nature of these relationships, offering new insights into audit fee determinants that prior studies—focused solely on leverage or auditor reputation—did not address.

For corporate managers, the findings underscore the importance of controlling debt structure and

improving financial reporting practices to reduce audit risk and minimize costs. For auditors, the results emphasize the need for risk-adjusted audit strategies tailored to firm-specific dynamics (such as financial structure, life cycle stage, and reporting quality) to enhance audit quality and meet stakeholder expectations. For regulators (e.g., the Securities and Exchange Organization of Iran), the study suggests strengthening disclosure standards related to debt maturity and enhancing oversight of auditor rating frameworks to improve transparency and reduce audit costs.

Future studies could explore these dynamics in non-listed firms, other emerging markets, or different industries. Utilizing advanced econometric techniques such as dynamic panel models or multilevel regression could provide deeper insights into the audit pricing mechanism and improve the generalizability of the findings. Additionally, sensitivity analyses of nonsignificant control variables (e.g., ROA and TANGIB) could further refine our understanding of the determinants of audit fees.

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