

# Management capabilities, financial distress, and audit fee

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## Abstract

Literature review indicates that there is a positive relationship between risk and audit fees. However, few studies have examined how auditors respond to the risk factors associated with senior management. In this study, we examine the relationship between Management capability and audit fee, taking into account the financial distress of firms. Accordingly, the necessary statistical tests are conducted through linear regression and 10Eviews, and 25SPSS software to test hypotheses and the information related to the firms listed on the stock exchange in 2009 - 2018. The multivariate regression method is used. The results indicate that Management capability negatively affects audit fees in firms with financial distress and has an inverse effect on firms without financial distress.

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## 1 Introduction

Accountability is not just a requirement of the democratic process. One of the main tools of accountability is auditing and accounting in economic activities. Despite the scope of the audit and its application, from the highest governmental level to the smallest business unit, the determinants for the fee are not yet precisely known. Recent research shows that one of the most critical determinants of audit fees is the concept of Management capability. In the accounting literature, Management capability is one of the dimensions of human capital classified as intangible assets. Some researchers define Management capability as the efficiency of managers compared to competitors in turning firm resources into revenue. Many audit researchers and many studies have been done in the field of Audit Pricing. Although the methods are somewhat different, most of them pursue a significant goal: to identify the factors affecting the audit fee. Awareness of these factors is beneficial for both the employer and the auditor. The audit fee is significant for many employers. Although large firms with high sales and liquidity or some state-owned firms may afford this fee, it may be costly for most small businesses or those with poor financial standing. The fee can be significant, and firms must pay for it. As a result, from the employer's point of view, such costs can be reduced and tolerated by recognizing the factors affecting the audit fee, negotiating and bargaining, and controlling these factors within the organization [47]. These factors empower auditors to price their services.

The importance of this issue is especially seen in our country in recent years and after the formation of the Iranian Association of Certified Public Accountants because the audit market monopoly was broken. Intense competition between auditors has formed afterwards in most developed countries. From the early 1970s to the early 2000s, most

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auditing firms focused on their growth rather than professional values [52]. In most research explaining the factors affecting the audit fee, the emphasis has been on the specific characteristics of the employer and the auditing firms. In contrast, recent research has considered managers' personality traits as one of the most critical determinants of audit fee [33]. The results of previous research [33] show that one of the factors influencing audit fee is the concept of Management capability. Today, intangible assets have become a powerful resource for improving the performance of businesses. One of the human resources (intangible assets), which plays a vital role in converting the Firm's resources into revenue and creating wealth for shareholders, is commercial firms' managers. Information related to the management capability, such as their capability to use investment opportunities, provide resources, optimally allocate resources, and their knowledge and experience, is one of the essential and valuable dimensions of intangible assets of commercial firms [1].

It is necessary to identify the root causes of financial distress and bankruptcy. In many cases, multiple causes together lead to bankruptcy, making their identification difficult. However, these factors can be classified into two general groups of intra-organizational and extra-organizational reasons. One of the reasons for business failure stems from managers not reacting in certain situations. Failure is characterized by a lack of a comprehensive and comprehensible business strategy and plan, failure to make timely decisions, high qualified staff turnover, limited knowledge of customers and market conditions, and insufficient authority [23]. Management's lack of training, experience, capability, and initiative makes it difficult for the business unit to survive in the field of competition and technology. The highest number of bankruptcies is due to managers' inefficiency. It includes the lack of cooperation and effective communication between management and professionals [47]. Inability to keep up with market changes and rapid technological advances, inadequate operational control (including budget control, product costing, liability accounting, asset pricing, cash flow forecasting), overdevelopment, inadequate sales, Inadequate pricing of products, overhead and operating costs, and the cost of excessive long-term debt, excessive investment in non-current assets and inventories, insufficient working capital and poor liquidity, unbalanced capital structure, lack of insurance, excessive growth and uncontrolled conditions due to inefficient management, thereby leading to a financial crisis [47].

## 2 Theoretical foundations and review of research background

### 2.1 Management capability

In general, Management capability and its various measures are dimensions of organizational capital and generally a component of intangible assets. Demirjian et al. defined Management capability as the efficiency of managers over competitors in converting firm resources into revenue. These resources in firms include the cost of inventories, sales, administrative and public costs, tangible fixed assets, operating leases, R&D costs, and other intangible assets of the Firm. It is believed that more capable managers have a better understanding of technology and industry trends and can more accurately predict product demand. Also, more appropriate investment in more practical projects and efficient management of employees are the characteristics of capable managers. In the short term, these managers are expected to earn more by using a certain level of resources or using fewer resources to achieve a certain level of income (maximizing the efficiency of the resources). The most famous model for measuring Management capability is the model of Demerjian et al. [13]. For the first time in their study, researchers designed a quantitatively measuring management capability using accounting variables. In this model, the Management capability is calculated by measuring the Firm's efficiency and then entering in multivariate linear regression as a dependent variable and controlling the inherent characteristics of the Firm. Demerjian et al. [13] used a data envelopment analysis model to measure Management capability. Data Envelopment Analysis Model is a statistical model used to measure system performance using input and output data. In this model, sales revenue as output and seven other variables, i.e., the cost of goods sold, general expenses, office and sales, net assets, machinery and equipment, operating rent, research costs and Development, goodwill, and other intangible assets, are considered as input, which primarily covers the management's authority in achieving the desired income. The firm performance model, like the Fama and French [16] model, is designed for the industry so that each Firm's performance can be compared with firms operating in the industry. In this model, a specific coefficient is also considered for each of the input variables because the effect of all input variables on output (sales) is not the same. The value calculated for the Firm's performance also includes a number between zero and one. The maximum efficiency equals one, and the lower the value obtained the lower the Firm's efficiency. In any industry, the Firm that has the highest efficiency is a leader in that industry.

By improving resource utilization, management can enable the Firm to undertake and perform appropriate tasks and processes and produce innovative products and services, thereby creating value. Managers and the resources under their management have a shared role in the success of firms [29]. In other words, the Firm's success requires effective and efficient resources utilization by the manager. If the manager fails to do so, the Firm will eventually bankrupt.

Now, one of the essential factors that have a significant impact on all aspects of a firm's performance is the Firm's management, identifies profitable projects with high capability and a better understanding of the internal and external conditions of the Firm and high-quality estimates and also improves the operating cash flows and performance of the Firm by investing in these projects.

Management capability directly affects the performance of the Firm and consequently the decisions of users. Also, managers as stakeholders' foremen must pursue activities that lead to the Firm's profitability; on the other hand, choosing the optimal capital structure and different financing methods is the primary concern of firm managers. Improper structure in any firm, especially in small firms, affects different areas of the Firm's activities and can lead to inefficiency in product marketing, inability to employ properly, financial distress, and the like. In recent studies, there is evidence that liquidity problems are one of the influential factors in the financial crisis of firms. More capable managers, because they trust their firms' financial reporting process, try to negotiate to reduce the audit scope and pay less audit fee. Recent research on managers who require fewer audit services also suggests that audit fees are reduced abnormally in the period before restatements of financial statements [9].

## 2.2 Financial Distress

Bankruptcy is when a firm's debts exceed the value of the Firm's assets. Financial distress occurs when the realized rate of return on the capital is consistently and significantly lower than the required rate of return [2]. Given all the definitions of the two concepts, there is a difference between bankruptcy and distress. Bankruptcy is a legal situation that arises for a firm. However, in financial distress, the Firm continues to operate because it has no legal prohibition. Financial distress is before bankruptcy; hence, a firm may be in a state of distress for a long time; But continues its activities because it has no legal prohibition [46]. From an economic point of view, financial distress can be interpreted as firm unprofitability and failure [17]. However, in "a neural network model for predicting financial distress," Odom et al. consider mismanagement as the most important reason for financial distress [43]. One way to help investors is to provide predictive models of the Firm's outlook. The closer the predictions are to reality, the more correct decisions [37]. Bankruptcy is when a Firm's cash flows are less than the sum of interest expenses on long-term debt. From an economic point of view, financial distress can be interpreted as firm unprofitability and failure [17].

## 2.3 Audit fee

The audit fee is determined based on the cost of audit services and an estimate of future losses arising from the auditor's liability for the report issued. This process is performed in three steps. The first step is the auditor's assessment of future losses arising from the auditor's judgment that is incurred in the future for a beneficiary, such as a shareholder. The second step is to utilize human resources in audit operations until the ultimate benefit of reducing the present value of expected future losses from the audit of the financial statements is equal to the final cost of the additional auditing investment. Finally, the auditor sets a price to cover the cost of the audit. The auditor's judgment plays a vital role in determining the price. Agent theory recognizes the auditor as an independent representative of shareholders and other stakeholders in controlling the accuracy, reliability, and relevance of the information provided and presented by business unit managers. However, because auditing requires a close relationship between auditors and business unit managers, this theory assumes that auditors may not be independent in performing their duties and may not do their job correctly in line with their interests and those of managers [51]. Some research has shown that this theory can interpret the effect of audit fees on audit quality.

A literature review showed a positive relationship between some of the concepts of risk and audit fee. Therefore, the auditors consider the risk characteristics of their employer in determining the audit fee and compensate for the relevant risks through higher fees. Also, the results show that auditors should not only focus on the risk associated with financial statements but also have a broader view of the employer's behavior [5]. The audit pricing determinants literature has proven that audit fee relates to risk factors associated with employer characteristics such as size and complexity [48], quality of internal control business risk [6] and corporate governance [34]. Further evidence suggests that audit fees were more sensitive to risk factors in the Post-Sarbanes-Oxley Period. However, few studies have examined auditors' responses to the risk factors associated with their employer's senior management. Chen et al. [23] argue that auditors receive a higher fee from firms with risk-taking managers.

Krishnan and Wang [33] further examined auditors' responses to risk factors associated with business managers. They concluded that the Management capability has a significant effect on the pricing of audit services. The audit fee is determined based on the auditor's estimated risk of the employer, competition in the audit market, and negotiations between the auditor and the employer. In audit planning, The auditor should identify and assess the risk of material misstatement (including the assessment of management competence, the ethical climate of the organization, the

accounts capability, and the disclosure of material misstatement). These factors affect the auditor's ability to detect material misstatement at the financial statements level, a significant risk to the audit firm. Auditors typically gather significant evidence to reduce the non-detection risk of misstatement, thereby increasing the audit fee. This increased cost can be imposed on the owners, which is a bargaining subject between the auditor and the employer [48]. states that when audit risk increases, auditors demand higher fees [33]. Financial reporting risk is one of the most critical risk factors affecting the pricing of audit services. Previous research has shown that as the risk of earnings management increases, scheduled audit efforts and audit invoices increase, and there is a positive relationship between earnings management risk, scheduled hours, and audit fee [5]. Charles et al. [12] also found that selecting an auditor is generally an economic decision. "The employer buys the audit services at the seller (auditor) expected quality from at the lowest cost, and auditor turnover is a response to changes in the fee and type of services required by the employer." In addition, the results of previous research show that managerial remuneration schemes have a significant effect on financial reporting risk, and as the risk of these schemes increases with audit fee [30].

The fee reduction may be due to a reduction in audit efforts or a lower estimate of the employer's risk by the auditor. Therefore, the Management capability can cause management to pay fewer audit fees. Anmol et al. [7] found that audit fee indicates higher audit quality because the audit was performed with more effort by the auditors. Krishnan et al. [33] argued a positive relationship between audit fee and risk factors at the employer level to the extent that audit fee reflected the auditor's efforts and indicated that auditors' efforts increase with risk. Many studies have been conducted on audit fees, Management capability, and financial distress, a summary of which is provided here.

Leverly and Grace [35] showed that resource productivity creates value for firms, and managers of bankrupt firms are less capable than healthy firms. Also, the Management capability is inversely related to the duration of financial distress, the Probability of bankruptcy, and bankruptcy costs. Krishnan and Wang [33] examined the effect of Management capability on audit fees. The results showed that firms with more capable managers pay fewer audit fees. According to Bills et al. [8], the audit firm size has a significant negative effect on the relationship between Management capability and audit fee. Also, the results showed that management uncertainty has a significant positive effect on audit fees. Koester et al. [32] examined the effect of Management capability on tax avoidance. The results showed that capable managers can align\* business decisions with tax strategies due to the high perceived working environment. Andrew et al. concluded that firms with higher Management capability invest more in crisis periods. Also, firms with higher management capabilities are less vulnerable to financial constraints during a crisis and can invest more. They concluded that capable managers increase the value of the Firm by reducing investment problems during a crisis. Nikbakht and Tanani [42] examined the factors affecting audit fees in the Tehran Stock Exchange firms. The results showed that size, the complexity of firm operations, type of audit firm, and inflation have a significant relationship with audit fees. However, the variables of audit risk, education, and experience of financial statement agents do not have a statistically significant relationship with the dependent variable (audit fee).

Salehi et al. [4] investigated the relationship between audit fees and the financial performance of firms. The results showed that audit fees did not have a significant relationship with performance indicators. Farajzadeh and Heidari [25] examined the relationship between Management capability and remuneration and going concern audit opinion and concluded that audit remuneration and the ambiguity in the audit report is reduced with increasing Management capability. In general, the findings showed that Management capability is an influential factor in auditors' decisions. Hassani alghar and Sadidi [26] examined the effect of Management capability on audit fees. The results showed that Management capability has a significant negative effect on audit fees. The audit firm size also undermines the relationship between Management capability and audit fee. The variables of financial leverage, firm size and return on assets significantly correlate with audit fees. Bahar Moghadam et al. [33] examined the relationship between Management capability and audit fee and going concern audit opinion of firms listed on the Tehran Stock Exchange. The findings showed a negative and significant relationship between the management capability and audit fee and between the management capability and the possibility of publishing an auditor's report containing the going concern clause. The findings confirmed that the management capability is related to the decisions of auditors. The results showed that there is a negative relationship between Management capability and bankruptcy risk studied the relationship between financial distress and auditor behavior. The results indicated that there is no relationship between latent financial distress and the audit fee. There is a significant and direct relationship between latent financial distress and auditor stress.

## 2.4 Game Theory

Game theory is a mathematical theory of everyday decision situations. At each stage of the game, some brokers decide, and a series of results are obtained according to their decision. Each player's planning that leads to a decision is called strategy [18]. Accordingly, each person's interests depend not only on his behavior but also on other people's

behavior. One of the most critical issues in any game is finding the equilibrium point, known as Nash equilibrium. If game theory seeks to provide a unique answer to a game, the answer must be Nash equilibrium. This answer is correct, and it is one with the reality that the players behave accordingly. No player is motivated to violate it [39].

## 2.5 Research methodology

The studied variables form a mathematical model. The description of how to study and measure the variables is as follows.

The first model:

$$\begin{aligned} LnAF_{i,t} = & \alpha_0 + \beta_1 MGR - ABILITY_{i,t} + \beta_2 LN SIZE_{i,t} + \beta_3 FOREIGN_{i,t} \\ & + \beta_4 ROA_{i,t} + \beta_5 LOSS_{i,t} + \beta_6 LEV_{i,t} + \beta_7 QUICK_{i,t} + \beta_8 SGROWTH_{i,t} \\ & + \beta_9 EQ_{i,t} + \beta_{10} BING_{i,t} + \beta_{11} SPECIALIST_{i,t} + \beta_{12} LN NAF_{i,t} \end{aligned}$$

The second model:

$$\begin{aligned} LnAF_{i,t} = & \alpha_0 + \beta_1 MGR - ABILITY_{i,t} + \beta_2 DISTR_{i,t} + \beta_3 MGR - ABILITY \times DISTR_{i,t} \\ & + \beta_4 LN Size_{i,t} + \beta_5 FOREIGN_{i,t} + \beta_6 ROA_{i,t} + \beta_7 LOSS_{i,t} + \beta_8 LEV_{i,t} + \beta_9 QUICK_{i,t} \\ & + \beta_{10} SGROWTH_{i,t} + \beta_{11} EQ_{i,t} + \beta_{12} BING_{i,t} + \beta_{13} SPECIALIST_{i,t} + \beta_{14} LN NAF_{i,t}. \end{aligned}$$

In the hypotheses, audit fees are dependent variables, management capabilities are independent variables, and financial distress is independent and moderating variables.

In this study, *lnAF* is the audit fee. The audit fee is extracted from the notes attached to the financial statements of the administrative and general expenses section or other expenses, and the natural logarithm of the audit fee is used.

*MGR - ABILITY* shows the Management capability. To evaluate relative efficiency, Demerjian et al. [14] (DEA) used data envelopment analysis of specific inputs (labor, capital, etc.) towards outputs (revenue, income, etc.) The following inputs are in the revenue generation process: Property, plant, and equipment, operating leases; R&D expenses; purchased Goodwill; Other intangible assets; Cost of inventory and administrative and sales expenses. All of these inputs contribute to revenue generation. Because each input is subject to managerial discretion, they are affected by the Management capability. The remaining is the sale not due to the six features in the model but due to the capability and presence of the manager. The six features include the firm's size, the firm's market share, cash availability, the life cycle, the complexity of operations, and external operations. The remaining term derived from this regression is a component that reflects Management capability.

Efficiency represents the performance of the Firm, which is calculated using the data envelopment analysis method.

$$MAX_v \theta = \frac{sales}{v_1 cogs + v_2 SG\&A + v_3 PPE + v_4 OPSLease + v_5 R\&D + v_6 Good\ will + v_7 other\ intan}$$

*Sales* = sale revenue

*Cogs* the cost of goods sold by Firm *t* in year *t*

*SG&A* = General, administrative, and sales expenses of Firm *i* in year *t*

*PPE* = Property, plant, and equipment

*OPSLease* = Firm's operating lease cost in year *t*

*R&D* = R&D costs of Firm *t* in year *t*

*Goodwill* = purchased Goodwill by Firm *t* at the beginning of year *t*

*Otherintan* = other intangible assets of Firm *t* at the beginning of year *t*

$V$  = There is a specific coefficient,  $v$ , for each of the input variables, because the effect of all input variables on sales is not the same.

The calculated value for the Firm's performance is between 0 and 1. Firms with an efficiency score of one are highly efficient, and firms with an efficiency score of less than one are below the efficiency threshold. They must reach the efficiency threshold by reducing costs or increasing revenues.

Distress is also a symbol of financial distress, calculated by Olsen (1989).

$$\hat{P} = \frac{1}{1 + \hat{\gamma}_{i,t}}$$

$$\hat{\gamma}_{(i,t)} = -1.32 - 0.407 \times SIZE + 6.03 \times TLTA - 1.43 \times WCTA + 0.0757 \times CLCA - 2.37 \times NITA - 1.83 \times FUTL + 0.285 \times INTWO - 1.72 \times OENEG - 0.521 \times CHIN$$

where:

$$SIZE = LOG \frac{totalassets}{GNP}$$

$$CLCA = \frac{(currentdebt)}{(currentassets)}$$

$$TLTA = \frac{(totaldebt)}{(totalassets)}$$

$$WCTA = \frac{(totalcapital)}{(totalassets)}$$

$$NITA = \frac{(netincome)}{(totalassets)}$$

$$FUTL = \frac{(operatingbudget)}{(totaldebt)}$$

*INTWO*: 1, if the net income in the previous two years is negative, otherwise zero.

*OENEG*: 1, if the total debt is more than the total assets, otherwise zero.

## 2.6 Control variables

In the present study, according to the proposed model, the research variables are as follows:

*SIZE*= Firm size

*FOREIGN*= External operations of the Firm (export)

*ROA*= Return on Assets

*LOSS*= Firm losses

*LEV*= financial leverage

*QUICK*= quick Ratio

*SGROWTH*= Sales growth

*EQ*= earnings quality

*BIGN*= Audit firm size

*SPECIALIST*= Auditor industry specialization

*NAF*= non-audit fee

*Foreign*= represents the non-oil export index of firms



## 2.7 EQ (Earnings quality)

In the present study, the earnings quality is examined with Penman index (2011) as follows:

$$EQ_{i,t} = \frac{CFO_{i,t}}{OI_{i,t}},$$

where  $CFO_{i,t}$  the operating is cash of Firm  $i$  in year  $t$  and  $OI_{i,t}$  is the operating profit of Firm  $i$  in year  $t$ .

## 2.8 Auditor industry specialization

The auditor specialization is the Ratio of the Firm’s share to the total market share, calculated using the Herfindahl-Hirschman index ( $HHI$ ). One of the most critical and practical indicators for expressing the concept of concentration is the Herfindahl-Hirschman index. This index uses the information of all industry firms. The total square of production, sales, and labor in industry or market is used to obtain this index. This index weighs on each Firm based on its market share. The Herfindahl-Hirschman Index ( $HHI$ ) is defined as follows:

$$\sum_{i=1}^N S_i^2$$

$N$ : The number of firms in the industry or market

$S_i^2$ : Squared Market share of Firm  $i$ .

Accordingly, the research hypotheses are as follows:

1. Management capability has a negative effect on audit fee.
2. The Management capability has a positive effect on audit fee in firms with financial difficulties.
3. Management capability has a negative effect on audit fee in firms without financial distress.

## 3 Research findings

### 3.1 Descriptive Statistics

Descriptive statistics are summarized in Table 1. This Table shows the values of mean, middle, maximum, minimum, standard deviation of data, kurtosis, skewness and statistics, jarque bera and probability.

Table 1: Descriptive statistics of research variables

	Audit fee	Management capability	Financial distress	Firm size	Earnings quality	Export	Sales growth	Financial leverage	Firm loss	Quick Ratio	Return on asset
middle	3.775	0.829	.835	32032.50	0.572	977030.0	-53.178	1.359	0.831	6730823.	723962.3
Mean	3.673	1.000	.805	34122.55	1.000	0.000	0.067	1.026	0.654	393784.0	39662.00
Max	7.072	1.000	8.359	40201.86	1.000	0961796	2757.066	43.811	.598	2.5108	33491156
Min	0.000	0.000	4.018	18886.30	0.000	-2.307	-18494.4	0.000	0.012	-1	-4903144
Standard deviation	1.384	0.376	0.825	6665.048	0.495	126956.	900.020	2.341	0.760	24810345	3174916
skewness	-0.141	-1.755	0.485	-0.737	-0.293	6.663	-17.326	13.352	2.774	.613	7.054
kurtosis	2.803	4.080	2.980	2.366	1.085	60.803	346.716	224.657	12.380	39.658	9.483
jarque bera	2.552	290.536	20.296	5.542	86.325	75801.14	2570820.	1073744.	2558.930	31664.36	73015.01
Probability	0.279	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

According to Table 1, the standard deviation is high compared to export, return on asset, quick Ratio, firm size, and sales growth, respectively, and indicates that these variables have many fluctuations. Also, skewness is observed for export, sales growth, financial leverage, quick Ratio, and return on assets, and kurtosis is observed for all variables except for audit fee and financial distress, firm size, and earnings quality. jarque bera test does not confirm the normality of variables. Since the p-value of the price index is less than 0.05, it indicates that the data is not normal. However, the audit fee variable has a normal distribution.

### 3.2 Shapiro-Wilk normality test

The Shapiro-Wilk test is similar to the quantile-quantile plot. In this test, a regression relationship is considered between the ordinal statistics of the data and the expected values of the ordinal statistics of the normal distribution. The test statistic is something like a coefficient of determination in regression. The more the statistic, the closer data distribution to normal distribution, and small values of test statistics reject the null hypothesis (normal data distribution).

The Shapiro-Wilk test is based on a regression relationship or correlation analysis between ordinal statistics and their desired values.

Table 2: Shapiro-Wilk normality test

Variables	Statistic	Dof	Sig
Audit fee	2.98	516	.000
Management capability	4.45	516	.000
Financial Distress	9.07	516	.000
Firm size	0.819	516	.000
Export	0.588	516	.000
Return on assets	0.652	516	.000
firm losses	0.562	516	.000
Financial Leverage	0.037	516	.000
Quick ratio	0.762	516	.000
Sales growth	0.882	516	.000
earnings Quality	0.68	516	.000
audit firm size	6.92	516	.000
Auditor industry specialization e	6.83	516	.000
Non-audit fee	2.72	516	.000

Suppose the significance level in the Shapiro-Wilk test (sig.) is more than 0.05. In that case, the data can be assumed to be normal with high confidence. Otherwise, it cannot be said that the data distribution is normal. Therefore, the hypothesis that the distribution of these variables is normal at the 95% confidence level is rejected and indicates that the dependent variables do not have a normal distribution. We must use a non-parametric test to examine the correlation between variables.

### 3.3 Correlation between research variables

In this section, the Spearman correlation coefficient is used to examine the relationship between research variables. The correlation is investigated and analyzed by SPSS 52 software. The matrix of correlation coefficients between the research variables is presented in Figure 3-4.

The results of the Spearman test show that audit fee is positively correlated with Management capability, firm size, and the audit firm size, and negatively correlated with the auditor's industry specialization. Management capability is also positively correlated with firm size, earnings quality, and audit firm size. The firm size is positively correlated with the export, quick Ratio, sales growth, earnings quality, and the audit firm size and negatively correlated with financial leverage. The correlation between export and other variables shows that export is positively correlated with return on assets, Quick Ratio, and sales growth, positively correlated with return on assets, firm losses, sales growth, and non-audit fee, and has a negative correlation with the audit firm size. The firm losses are positively correlated with sales growth and non-audit fee and negatively correlated with the audit firm size. Also, financial leverage has a negative correlation with the quick Ratio and audit firm size. Also, sales growth has a positive correlation with the non-audit fee, and the auditor industry specialization negatively correlates with the audit firm size.

### 3.4 Reliability test

In this section, the reliability of research variables was first investigated. Hadri's test was used to evaluate the reliability. The results of this test are shown in Table 3.

According to Table 3, because  $P < 0.05$ , all variables are stationary at the research period. This means that the mean and variance of the variables have been constant over time, and the variance of the variables has been constant between different years. As a result, these variables in the model do not cause regression fallacy.



		Audit fee	Management capability	Financial distress	Firm size	Export	Return on assets	Firm loss	Financial leverage	Quick Ratio	Sales growth	Earning quality	Audit firm size	Auditor industry specialization	Non-audit fee
Audit fee	statistic	1													
	probability														
Management capability	statistic	.192**	1												
	probability	.000													
Financial Distress	statistic	.001	-.014	1											
	probability	.987	.624												
Firm size	statistic	.141**	.077**	.023	1										
	probability	.001	.008	.433											
Export	statistic	-.001	-.003	.031	.134**	1									
	probability	.982	.912	.291	.000										
Return on assets	statistic	-.070	-.027	-.031	.000	.090**	1								
	probability	.106	.362	.293	.989	.002									
firm losses	statistic	-.093*	-.011	.016	.027	.095**	.687**	1							
	probability	.032	.698	.578	.346	.001	.000								
Financial Leverage	statistic	-.010	.015	.008	-.235*	-.015	-.009	-.014	1						
	probability	.825	.612	.774	.000	.617	.751	.634							
Quick Ratio	statistic	.023	.030	.009	.101**	.063*	-.007	-.020	-.087**	1					
	probability	.594	.308	.768	.000	.030	.798	.485	.003						
Sales growth	statistic	-.043	-.010	.022	.126**	.086**	.572**	.760*	-.016	-.016	1				
	probability	.331	.739	.459	.000	.003	.000	.597	.579						
Earnings Quality	statistic	-.025	.164**	.002	.088**	-.037	.014	.017	-.004	-.010	.012	1			
	probability	.566	.000	.956	.003	.208	.632	.570	.884	.729	.689				
Audit firm size	statistic	.121**	.100**	-.010	.134**	-.026	-.088**	-.083*	-.120**	.055	-.033	-.051	1		
	probability	.005	.001	.723	.000	.372	.002	.004	.000	.056	.258	.080			
Auditor industry specialization	statistic	-.130**	.008	.013	-.007	-.023	.091**	.055	-.029	-.032	.003	.027	-.116*	1	
	probability	.003	.777	.654	.800	.422	.002	.057	.324	.273	.925	.359	.000		
Non-audit fee	statistic	-.065	.012	.007	.006	.048	.343**	.345**	.002	-.015	.447**	.013	-.020	.031	1
	probability	.135	.687	.817	.841	.100	.000	.000	.947	.610	.000	.649	.499	.278	

Table 3: Hadri's test

Variable	t	P-value	Variable	t	P-value
Audit fee	8.581	0.000	Financial Leverage	17.114	0.000
Management capability	8.168	0.000	firm losses	10.566	0.000
Financial Distress	14.101	0.000	quick ratio	12.265	0.000
Firm size	9.014	0.000	Return on assets	12.399	0.000
Earnings quality	12.380	0.000	Auditor industry specialization	16.203	0.000
Export	7.567	0.000	Non-audit fee	16.203	0.000
Sales growth	14.239	0.000	The audit firm size	7.952	0.000

### 3.5 Chow test

To properly determine the estimation of the regression model, one would answer whether there are heterogeneities or individual differences. If there is heterogeneity, the panel data method is used; otherwise, the pooled method is used. Therefore, the Chow test is used to determine the application of the fixed effects model compared to the pooled data. The hypotheses are as follows:

Table 4: Chow test results

Hypothesis	Results	Prob.	D.F.	Statistic	Effects test
The first hypothesis	Panel data	0.000	(85,410)	22.274302	F
		0.000	85	457.393	Chi-squared
The second hypothesis	Panel data	0.000	(117.999)	11.595661	F
		0.000	117	975.358599	Chi-squared
The third hypothesis	Panel data	0.000	(117.1006)	8.271286	F
		0.000	117	765.605342	Chi-squared

$H_0$ : Pooled Model

$H_1$ : panel Model

The results of the Chow test show that the  $p < 0.05$ , so  $H_0$  is rejected and  $H_1$  is confirmed, so it can be concluded that There is individual heterogeneity, and a panel data method should be used to estimate the model.

Next, the Hausman test determines the fixed effect model compared to the random effect model.

**3.6 Hausman test**

The Hausmann test is based on the presence or absence of a relationship between regression error and the model’s independent variables. The hypotheses are as follows:

$H_0$ : Random Effect

$H_1$ : Fixed Effect

Table 5: Hausman test result

Hypothesis	result	P-value	Dof	Chi-squared
The first hypothesis	Random effects model	0.0987	12	18.598
The second hypothesis	Fixed effects model	0.0211	12	23.880
The third hypothesis	Fixed effects model	0.0211	12	23.880

Table 3-6 shows that  $P < 0.05$ , so there is a relationship between the regression estimate error and the independent variables, so  $H_0$  is rejected and  $H_1$  is confirmed. The Chow test and Hausman test results indicate that the fixed effects model is the most appropriate method for estimating the hypothesis test.

**3.7 Results of the first research hypothesis testing**

The first hypothesis is the negative effect of Management capability on audit fee. This hypothesis is estimated using model (1) in the form of panel data as follows:

$$LnAF_{i,t} = \alpha_0 + \beta_1 MGR - ABILITY_{i,t} + \beta_2 DISTRS_{i,t} + \beta_3 MGR - ABILITY \times DISTRS_{i,t} + \beta_4 LNSize_{i,t} + \beta_4 FOREIGN_{i,t} + \beta_5 ROA_{i,t} + \beta_6 LOSS_{i,t} + \beta_7 LEV_{i,t} + \beta_8 QUICK_{i,t} + \beta_9 SGROWTH_{i,t} + \beta_{10} EQ_{i,t} + \beta_{11} BING_{i,t} + \beta_{12} SPECIALIST_{i,t} + \beta_{13} LNNAF_{i,t}$$

Table 6: Results of the first research model estimation

	Variables	Coefficient	Standard error	T	P	Result
Intercept	C	5.182	0.506	10.237	0.000	
Management capability	TAVANAI	-0.274	0.131	-2.088	0.037	confirmed
Financial Distress	P	-0.231	0.086	-2.697	0.007	confirmed
Firm size	SIZE	0.000	0.000	-0.013	0.990	rejected
Return on assets	ROA	0.000	0.000	0.015	0.988	rejected
Financial Leverage	LEV	0.012	0.016	0.714	0.476	rejected
firm losses	LOSS	-0.067	0.053	-1.270	0.205	rejected
Sales growth	GROWTH	0.000	0.000	-1.075	0.283	rejected
Earnings Quality	EQ	0.346	0.143	2.410	0.016	confirmed
Export	FOREGHN	0.000	0.000	-0.104	0.917	rejected
Quick ratio	QUICK	0.000	0.000	0.465	0.642	rejected
Audit firm size	SPCIALIST	0.000	0.000	-1.433	0.153	rejected
Industry specialization	BIGN	0.095	0.370	0.256	0.798	rejected
Non-audit fee	NAF	0.000	0.000	-1.592	0.112	rejected
F: 20.936	p: 0.000	Coefficient of determination: 0.844				
Durbin Watson test: 1.721		The adjusted coefficient of determination: 0.803				

According to the results of Table 6, the F statistic and its significance level are less than 0.05, so the null hypothesis is significant with 95% confidence and can explain the dependent variable based on the available data. Also, according to the coefficient of determination, about 84% of the dependent variable changes are expressed by independent and control variables. Durbin Watson’s statistic of 1.72 shows that the residuals in the regression are not autocorrelated. According to the  $t - statistic$  of Management capability of -2.088 and the significance level of 0.037, which is less than 0.05, there is a significant inverse relationship between Management capability and audit fee. The first hypothesis is confirmed. Also, considering the  $t - statistic$  of financial distress of -2.697 and the significance level of 0.007, which

is less than 0.05, an inverse and significant relationship between financial distress and audit fee is confirmed. In the first model, only the earnings quality with a  $t$  value of 2.410 and a significance level of 0.016 less than 5% has a direct and significant relationship with audit fees. However, other control variables in this model do not have a significant relationship with the audit fee because  $p > 0.05$ .

According to the findings of the Table, the estimated regression model of the first hypothesis is as follows:

$$LNFA = 5.182 - 0.274 * MGR - ABILITY_{i,t} - 0.230 * DISTRS_{i,t} - 0.000 * SIZE + 0.000 * ROA + 0.012 * LEV - 0.067 * LOSS 0.000 * GROWTH 0.346 * EQ - 0.000 * FOREGHN + 0.000 * QUICK 0.000 * SPCIALIST + 0.094 * BIGN - 0.000 * NAF + \epsilon_i.$$

### 3.8 Results of the second research hypothesis testing

The second hypothesis is that Management capability positively affects audit fee in firms with financial distress. This hypothesis is estimated using model (2) as panel data as follows:

$$LnAF_{i,t} = \alpha_0 + \beta_1 MGR - ABILITY_{i,t} + \beta_2 DISTRS_{i,t} + \beta_3 MGR - ABILITY * DISTRS_{i,t} + \beta_4 LNSize_{i,t} + \beta_4 FOREIGN_{i,t} + \beta_5 ROA_{i,t} + \beta_6 LOSS_{i,t} + \beta_7 LEV_{i,t} + \beta_8 QUICK_{i,t} + \beta_9 SGROWTH_{i,t} + \beta_{10} EQ_{i,t} + \beta_{11} BING_{i,t} + \beta_{12} SPECIALIST_{i,t} + \beta_{13} LNNAF_{i,t}.$$

Table 7: Results of the second research model estimation

Variables	Symbol	Coefficient	Standard error	T	P	Result
intercept	C	3.312	0.810	4.087	0.000	
Management capability	MGR-ABILITY	-0.734	0.151	-4.861	0.000	confirmed
Firms with financial distress	DISTRS	0.986	0.281	3.506	0.001	confirmed
Management capability Firms with financial distress	$MGR - ABILITY_{i,t} * DISTRS_{i,t}$	0.977	0.821	1.189	0.235	rejected
Firm size	SIZE	-0.198	0.120	-1.643	0.101	rejected
Export index	FOREGHN	0.000	0.000	0.710	0.478	rejected
Return on assets	ROA	0.000	0.000	1.411	0.159	rejected
firm losses	LOSS	-0.000	0.000	-1.678	0.094	rejected
Financial Leverage	LEV	-0.037	0.063	-0.597	0.551	rejected
quick ratio	QUICK	0.057	0.028	2.065	0.039	confirmed
Sales growth	GROWTH	0.000	0.000	-0.365	0.715	rejected
Earnings Quality	EQ	0.000	0.000	-1.101	0.271	rejected
Audit firm size	BIGN	-0.062	0.150	-0.416	0.677	rejected
Industry specialization	SPCIALIST	0.295	0.231	1.279	0.201	rejected
Non-audit fee	NAF	-0.000	0.000	-2.285	0.023	confirmed
F: 7.859      p: 0.000			Coefficient of determination: 0.504			
Durbin Watson test: 1.637			The adjusted coefficient of determination: 0.439			

The results indicate that the F statistic and significance level are less than 0.05, so the null hypothesis is significant with 95% confidence and can explain the dependent variable based on the available data. Also, according to the coefficient of determination, about 50% of the dependent variable changes are expressed by independent and control variables. Durbin Watson’s statistic of 1.63 shows that the residuals in the regression are not autocorrelated. According to the  $t - statistic$  of Management capability of -4.861 and the significance level of 0.000, which is less than 0.05, there is a significant inverse relationship between Management capability and audit fee. The second hypothesis is not confirmed. Also, considering the  $t - statistic$  of firms with financial distress of 3.506 and the significance level of 0.001, which is less than 0.05, a direct and significant relationship between firms with financial distress and audit fee is confirmed. Therefore, firms with financial distress should pay more for audit services. In the second model, only the quick Ratio with a  $t$  value of 2.065 and a significance level of 0.039, which is less than 5% has a direct and significant relationship with audit fee and non-audit fee with negative  $t - value < 5\%$ , have an inverse and significant

relationship with audit fee. However, other control variables in this model do not have a significant relationship with the audit fee because  $p > 0.05$ .

According to the findings of the Table, the estimated regression model of the second hypothesis is as follows:

$$LNFA = 3.311 - 0.733 * MGR - ABILITY_{i,t} + 0.986 * DISTR_{i,t} + 0.9766MGR - ABILITY_{i,t} * DISTR_{i,t} - 0.197 * SIZE + 0.000 * FOREGHN + 0.000 * ROA - 0.000 * LOSS - 0.037 * LEV + 0.057 * QUICK - 0.000 * GROWTH - 0.000 * EQ - 0.062 * BIGN + 0.295 * SPCIALIST - 0.000 * NAF + \epsilon_i$$

### 3.9 Results of the third research hypothesis testing

The third hypothesis is that Management capability negatively affects audit fee in firms without financial distress. This hypothesis is estimated using model (3) in the form of panel data as follows:

$$LnAF_{i,t} = \alpha_0 + \beta_1 MGR - ABILITY_{i,t} + \beta_2 NonDISTR_{i,t} + \beta_3 MGR - ABILITY * DISTR_{i,t} + \beta_4 LNSize_{i,t} + \beta_4 FOREIGN_{i,t} + \beta_5 ROA_{i,t} + \beta_6 LOSS_{i,t} + \beta_7 LEV_{i,t} + \beta_8 QUICK_{i,t} + \beta_9 SGROWTH_{i,t} + \beta_{10} EQ_{i,t} + \beta_{11} BING_{i,t} + \beta_{12} SPECIALIST_{i,t} + \beta_{13} LNNAF_{i,t}$$

Table 8:

Variables	Symbol	Coefficient	Standard error	T	P	Result
intercept	C	4.520	0.974	4.640	0.000	
Management capability	MGR-ABILITY	-0.682	0.167	-4.072	0.000	confirmed
Firms with financial distress	DISTR	-1.295	0.297	-4.365	0.000	confirmed
Management capability Firms with financial distress	$MGR - ABILITY_{i,t} * NonDISTR_{i,t}$	-1.237	0.277	-4.472	0.000	confirmed
Firm size	SIZE	-0.153	0.120	-1.276	0.202	rejected
Export index	FOREGHN	0.000	0.000	-0.094	0.925	rejected
Return on assets	ROA	0.000	0.000	1.615	0.107	rejected
firm losses	LOSS	0.000	0.000	-1.776	0.076	rejected
Financial Leverage	LEV	-0.027	0.064	-0.421	0.674	rejected
quick ratio	QUICK	0.057	0.028	2.046	0.041	confirmed
Sales growth	GROWTH	0.000	0.000	-0.210	0.834	rejected
Earnings Quality	EQ	0.000	0.000	-0.867	0.386	rejected
Audit firm size	BIGN	-0.107	0.160	-0.670	0.503	rejected
Industry specialization	SPCIALIST	0.116	0.260	0.448	0.655	rejected
Non-audit fee	NAF	0.000	0.000	-2.695	0.007	confirmed
F: 7.535      p: 0.000			Coefficient of determination: 0.512			
Durbin Watson test: 1.655			The adjusted coefficient of determination: 0.444			

The results indicate that the F statistic and significance level are less than 0.05, so the null hypothesis is significant with 95% confidence and can explain the dependent variable based on the available data. Also, according to the coefficient of determination, about 51% of the dependent variable changes are expressed by independent and control variables. Durbin Watson’s statistic of 1.65 shows that the residuals in the regression are not autocorrelated. According to the  $t - statistic$  of Management capability of -4.072 and the significance level of 0.000, which is less than 0.05, there is a significant inverse relationship between Management capability and audit fee in firms without financial distress, and the third hypothesis is confirmed. Also, considering the  $t - statistic$  of firms without financial distress of -4.365 and the significance level of 0.000, which is less than 0.05, an inverse and significant relationship between firms without financial distress and audit fee is confirmed. Therefore, firms without financial distress should pay less for audit services. In the third model, only the quick Ratio with a  $t$  value of 2.046 and a significance level of 0.041, which is less than 5% has a direct and significant relationship with audit fee and non-audit fee with negative  $t - value < 5\%$ ,

have an inverse and significant relationship with audit fee. However, other control variables in this model do not have a significant relationship with the audit fee because  $p > 0.05$ .

According to the findings, the estimated regression model of the first hypothesis is as follows:

$$\begin{aligned} LNFA = & 4.520 - 0.681 * MGR - ABILITY_{i,t} - 1.295 * NonDISTRS_{i,t} - 1.237 MGR \\ & - ABILITY_{i,t} * NondISTRS_{i,t} 0.152 * SIZE - 0.000 * FOREGHN 0.000 * ROA \\ & - 0.000 * LOSS - 0.026 * LEV + 0.057 * QUICK - 0.000 * GROWTH - 0.000 * EQ \\ & - 0.107 * BIGN + 0.116 * SPCIALIST - 0.000 * NAF + \varepsilon_i. \end{aligned}$$

## 4 Discussion and conclusion

The first hypothesis is about the negative effect of Management capability on audit fees. The results showed an inverse effect of Management capability on the audit fee is confirmed, and the first hypothesis is confirmed. Therefore, audit fee is reduced with increasing management capabilities. In other words, the more capable the manager is, the less the audit fee. Findings are consistent with Blanki et al. (2012), Lorty and Grace and Anmol et al. [7], Farajzadeh and Heidari [25], Hassani and Sadidi [26], Bahar Moghadam et al. and inconsistent with Krishnan and Wang [33]. The second hypothesis is about the positive effect of Management capability on audit fees in financial distress firms. The findings indicated a significant inverse effect between Management capability and audit fee in firms with financial difficulties, and the second hypothesis is not confirmed. No research has been done in this regard so far. Also, the t-statistic of 3.506 for firms with financial distress and the significance level of 0.001 is less than 0.05. The direct and significant impact between firms with financial distress and audit fee is confirmed. Therefore, firms with financial distress should pay more for audit fees. In this regard, the results are consistent with Golbakhsh (2018). In the second model, only the quick Ratio with a  $t$  value of 2.065 and a significance level of 0.039, which is less than 5% has a direct and significant relationship with audit fee and non-audit fee with negative  $t - value < 5\%$  have an inverse and significant relationship with audit fee. However, firm size, export, return on assets, firm losses, financial leverage, sales growth, the audit firm size, and industry specialization have no significant relationship with audit fee because  $p > 0.05$ . In this regard, the findings are inconstant with Tanani and Nikbakht [42] in terms of the relationship between firm size and audit firm type and consistent with Salehi et al. [4] in terms of the relationship between performance indicators and audit fees. Also, the third hypothesis is about the negative and significant effect of Management capability on audit fees in firms without financial distress. The findings indicated a significant inverse relationship between Management capability and audit fee in firms without financial distress, and the third hypothesis is confirmed. No research has been done in this regard so far. Also, considering the  $t$  of 4.365 for firms without financial distress and the significance level of 0.000, which is less than 0.05, there is a significant inverse effect between firms without financial distress and audit fee. Therefore, firms without financial distress should pay less for audit fees. In the third model, only the quick Ratio has a direct and significant relationship with the audit fee with a  $t$  of 2.046  $t$  and a significance level of 0.041, which is less than 5%. Moreover, non-audit fee with negative  $t - value$  and p-value less than 5% has an inverse and significant relationship with audit fee but firm size, exports, return on assets, firm losses, financial leverage, sales growth, audit firm size, and industry specialization have no significant relationship with the audit fee in this model because  $p > 0.05$ . In this regard, the findings are inconstant with Tanani and Nikbakht [42] in terms of the relationship between firm size and audit firm type and consistent with Salehi et al. [4] in terms of the relationship between performance indicators and audit fees.

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