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Aim and Scope:

The Journal of Emerging Technologies in Accounting (JETA) has started with the aim of expanding the concepts of accounting, auditing and finance in English in order to identify and eliminate gaps in these areas.

The Journal of Emerging Technologies in Accounting (JETA) accepts the articles in the form of Research Article, Review Article, Short Papers, Case-study, Methodologies including these items:

- Emerging technology in the field of Accounting and its future
- Using of new tools in accounting education
- Corporate Governance and the related subjects
- Internal and external auditing and there innovation
- Risk management and its new technologies
- Internal control and new technologies
- Integrated and modern accounting information systems in the organization
- Other research topics related to emerging technologies in accounting

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Investigating the Usage of Shiraz Municipality Managers from the Management Accounting Information System in Budgeting

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Abstract

Objectives: In management accounting literature, the budget is considered the foundation of the management control process in most organizations. Budgeting and management accounting information systems are control tools that rely on each other, acting as two sides of the same coin.

Design/methodology/approach: The research method utilized in this study is an exploratory survey. All managers of the Shiraz municipality are the statistical population for this research. Sampling was not employed in this study. To test the research hypotheses, SPSS software version 24, "one-sample t-test," and "one-way analysis of variance" tests were utilized.

Results: The research findings suggest that the utilization of the management accounting system in the budgeting process by managers at various levels in the Shiraz municipality is above average, but still has room for improvement. Additionally, the results indicate that there is no significant difference in the usage of the management accounting information system and the budgeting system among managers at different levels. Based on these results, enhancing the status of the management accounting system within the budgeting process is necessary in the Shiraz municipality.

Innovation: A review of studies conducted in Iran reveals that no research has yet demonstrated the role of accounting system information in municipal budgeting systems. Therefore, this study is innovative and represents a unique opportunity to be implemented for the first time in one of Iran's metropolitan municipalities.

Keywords: Management Accounting System, Information, Shiraz Municipality, Budgeting

1. Introduction

Although the budget is considered the cornerstone of the management control process in most organizations and is widely used in management accounting literature, it is often incomplete (Damrongsukniwat et al., 2011). Different uses of the budget have been developed in the management accounting literature (Amans et al., 2015), presenting various views, theories, and definitions.

The discussion on accounting changes has gained momentum in recent years (Finodella et al., 2016). Governments are transitioning from traditional budgeting to operational budgeting, and municipalities, as local governments, are following suit. Shiraz municipality has been a pioneer in using operational budgeting, leading to significant changes in the management accounting information system of the municipality.

Given the importance of financial management in Shiraz municipality, it is crucial to formulate efficient budgets. Effective budget development requires information from the organization's accounting system. The success or failure of using management accounting systems in public sector organizations is discussed in the literature, but there is no clear evidence (Jacobs et al., 2004). Therefore, information management and management accounting systems are of special importance.

This study aims to answer the question of how managers in Shiraz municipality utilize information from the management accounting system in their budgeting process. Past research highlights the necessity for organizations to utilize the management accounting information system (Namazi, 2013). However, no research in Iran has proven the role of accounting system information in municipal budgeting. Therefore, this study is innovative and aims to be the first of its kind in a metropolitan municipality like Shiraz Municipality.

Research Literature

As an essential and sensitive tool for planning government operations and activities, the budgeting system has undergone significant stages of development, becoming a complex technical and financial system (Namazi and Kamali, 2013). Budgeting and management accounting information systems are control tools that rely on each other as two sides of a scale (Adebayo and Lotta, 2006). Generally, information from the management accounting system is used to make decisions regarding resource allocation between operating units in budgeting (Chow et al., 1988).

The management accounting information system is a flexible system designed to meet management information needs in alignment with management goals (Hansen and Mowen, 2007). The structure and content of reports prepared by the management accounting information system may vary from one organization to another for this purpose (Wijaya et al., 2015). Choe's (2004) research also supports this claim, as he found differences in the content of management accounting information between Australian and Korean organizations.

In management literature, managers' main duties typically involve planning, organizing, leading, monitoring, and controlling. Decision-making is foundational to all managerial duties, with its importance in management equated to decision-making itself. Access to comprehensive, accurate, and timely information is crucial for successful decision-making (Ghanbari et al., 2012). Namazi (2013) states that management accounting is an information system that collects, records, classifies, and summarizes financial and non-financial information for internal decision-makers, particularly management, for tasks like budgeting, planning, control, and economic decisions.

Changing business conditions have influenced managers' approaches to planning and controlling organizational activities. The accounting information system is part of the management information system, with management accounting responsible for meeting managers' information needs for planning and control (Hilton, 1997). Managers rely on management accounting information for planning and controlling

the organization, requiring abundant and high-quality information (Hilton, 1997). Some researchers believe that the majority of information needed for decision-making in organizations is accounting information (Dastgir et al., 2012). The information provided by the management accounting information system may include financial information, production (product or service), employees, and marketing (Riahi-Belkaoui, 2002). Therefore, the role of management accounting information systems in organizations is crucial (Vijaya et al., 2015). Participation plays a significant role in the functioning of management accounting information systems, as managers' accounting information systems should serve as a control tool with the involvement of people and managers (Tsui, 2001).

To enhance the qualitative aspects of information, accountants must establish a solid accounting system. If the accounting system is not a reliable source of information, the data it produces will not be useful. Management accountants must consider the organization's goals to create an optimal system, which may include maximizing production or service provision, increasing market share, minimizing costs, enhancing services and public welfare, and promoting social responsibility (Namazi, 2013).

According to Busch (2002), new techniques and strategic management accounting information systems can help reduce an organization's budget problems. Information asymmetry among representatives can lead to conflicts of interest and potential budget issues in environments where such asymmetry exists (Libby, 2003). Information asymmetry is identified as one of the internal factors that can impact an organization's budget (Fisher et al., 2002). In public sector organizations like metropolitan municipalities, information asymmetry among managers at different levels is more likely due to their larger size compared to private sector companies. Thus, the strategic accounting information system is a factor that can influence information asymmetry levels within an organization and subsequently affect its budget problems, as supported by Daumoser et al. (2016). One strategic management accounting information system is the organization's budgeting system.

Operational budgeting systems in Shiraz Municipality are likely to undergo changes due to information asymmetry for two reasons. Firstly, the accounting basis is shifting from adjusted cash to an accrual basis. Accrual accounting provides more comprehensive and detailed information compared to cash accounting (Biswas et al., 2015; Sabouri, 2016). Secondly, the use of costing systems helps determine more precise information about the cost of goods and services provided (Namazi, 1987 and 1988). Transitioning from the traditional budgeting system to the operational budgeting system, part of the strategic management accounting information system, is expected to mitigate the organization's budgetary problems by reducing information asymmetry. Therefore, it is anticipated that information from the management accounting information system will be integrated into the budgeting model in Shiraz Municipality.

Organizations typically use budgets as tools for communication, planning, motivation, and performance evaluation (Gallani et al., 2015). The balanced scorecard system, proposed as a powerful strategy tool in recent years, is part of the strategic management accounting information system, aiding in overcoming obstacles to strategy implementation. Balanced scorecards evaluate an organization's performance from four perspectives: financial, customer, inter-organizational processes, learning and growth, creating a balance between them. Municipalities can establish strategic goals in various aspects to enhance revenues, customer satisfaction, productivity, and service quality.

Currently, performance evaluation in Shiraz Municipality focuses on meeting legal requirements and achieving municipal evaluation goals. Internal evaluations are conducted on an ad-hoc basis, scattered across different departments, lacking an integrated system for evaluating the municipality's performance. The implementation of operational budgeting since 2013 in Shiraz Municipality requires fundamental

changes in management information systems, accounting systems, and overall management style. It is expected that the implementation of operational budgeting has led to significant changes in the strategic management accounting information system of Shiraz Municipality and its subgroups in recent years, enabling managers to utilize this information for budget performance evaluation.

Research indicates that information from management accounting systems is crucial for improving hospital performance (Hamid et al., 2010). The structure and content of reports prepared by management accounting information systems vary across organizations. Studies show differences in management accounting information content between Australian and Korean organizations. Management accounting control systems have been shown to reduce budget surpluses in high work uncertainty conditions. The interactive effect of budget participation and management accounting systems on manager performance differs between Western and Chinese managers. Studies in hospital settings reveal a positive relationship between budget motivation, attitude, and performance in public hospitals. Information asymmetry creates an environment conducive to increasing budget slack (Faria and Silva, 2013).

In Italy, research results have shown that participatory budgeting does not affect the use of management accounting information. Commitment to budget goals cannot directly affect budget performance, but commitment to budget goals can influence budget performance through the use of management accounting budget information (Masinati and Rizzo, 2014). Recent research evidence from Wang et al. (2018) has shown that investment in information technology in the health sector improves the financial performance and productivity of hospitals. Additionally, there is evidence of the importance of the qualitative characteristics of accounting information in hospitals regarding the adoption of information systems (Handayani et al., 2017).

Based on the literature presented above, the hypotheses of this research are as follows:

First hypothesis: The information in Shiraz municipality's accounting system possesses the necessary qualitative characteristics for the budgeting system as perceived by managers at various levels.

Second hypothesis: The accounting system and its information have a significant impact on the budgeting model of Shiraz municipality according to managers at different levels.

Third hypothesis: The accounting system and its information play a significant role in assessing the budget performance of Shiraz municipality from the perspective of managers at various levels.

Research method

This research is applied research that utilizes a survey method. To gather research texts and literature, library studies were conducted using Persian and Latin books, theses, specialized publications, and electronic databases. The most common methods of data collection in the survey research method are personal interviews and the use of questionnaires. In this research, the questionnaire method was utilized for data collection. Initially, a briefing session was held with each respondent to explain the importance of the research and its concepts before answering the questionnaire. Due to the large sample size, the data distribution follows the normal distribution, and the research hypotheses were tested using the "one-sample t-test and one-way ANOVA at a confidence level of 95%".

The statistical population of this research includes all managers of Shiraz municipality in 2017. The sample size is equal to the entire statistical population, therefore, no sample or sampling method was used. 230 questionnaires were distributed among the members of the statistical community, with 202 collected and 186 deemed appropriate after follow-up by the researcher.

To evaluate the usage of information by Shiraz municipality administrators, a questionnaire designed

by the researcher was employed. This questionnaire consists of three dimensions and 31 questions. The first dimension evaluates the quality features of the system with 11 questions. The second dimension assesses the role of the management accounting system in the budgeting model with 4 questions. The third dimension evaluates the role of the management accounting system in budget performance with 16 questions covering financial aspects, customers, learning and growth, and internal processes, each with 4 questions. A seven-option Likert scale with scores from 7 to 1 was used in the questionnaire, which also includes five general questions about respondents' gender, age, education level, management level, and work history.

The validity and reliability of the measurement tool were also examined. Table 1 displays the results of Cronbach's alpha test for the reliability of the measurement tool, indicating good reliability. Expert professors' opinions were sought to make minor changes in the questionnaires, ensuring content and face validity.

Table 1: result of Cronbach's alpha

Questions related to:…	Cronbach's alpha
Strategic management accounting system	0.971
Qualitative features of the system	0.906
Role of the management accounting system in the budgeting model	0.937
Role of the management accounting system in evaluating budget performance	0.958
Financial aspect	0.958
Customer aspect	0.961
Learning and growth ratio	0.934

Findings

In the first part of the questionnaire, five general questions related to the personal characteristics of the respondents were asked. These questions included gender, age, level of education, organizational level (management level), and work experience. The results obtained from the descriptive analysis of these questions are reflected in Table 2.

Table 2: General Information of Questionnaire

Questions:		frequency
Gender	Female	27.2
	Men	72.8
	Total	100
Age	x<30	11.3
	30<x<40	35.4
	41<x<50	38.7
	x>50	14.6
	100	100
Education	diploma	4.1
	College	9.6
	Bachelor	38.3
	Master	41.6
	Ph.D.	6.4
	100	100
Organization Level	Senior Level	14.3
	Mid-level	29.9
	Operational level	55.8
	Total	100
Work Experience	x<5	10.8
	5<x<10	40.4
	11<x<20	36.4
	x>20	12.4
	Total	100

The results obtained from the descriptive analysis of the general questions of the questionnaire show that out of the 186 respondents, 72.8% are men and the remaining are women. Examining the age of the respondents reveals that 11.3% are under 30 years old, 35.4% are between 30 and 40 years old, 38.7% are between 41 and 50 years old, and only 14.6% are over 50 years old. The analysis of education level shows that 86.3% of respondents have a bachelor's degree or higher. In terms of job roles, 14.3% are senior managers, 29.9% are middle managers, and 55.8% are operational managers. Work experience indicates that 10.8% have less than 5 years, 40.4% have between 5 and 10 years, 36.4% have between 11 and 20 years, and 12.4% have over 20 years of experience.

Table 3 displays the descriptive statistics of the research variables, including minimum and maximum scores, mean and standard deviation, as well as the

results of the "one-sample t-test" to examine the research hypotheses across all management levels. The significance level of the t-statistic in Table 3 indicates the significance of the difference between the average responses of individuals and the test value (number 4) for all research variables at all management levels, except for customer aspects and learning and growth aspects. This suggests that the role of the management accounting system in evaluating budget performance is significant. The average and standard deviation statistics for qualitative characteristics, budgeting model, and budget performance evaluation show that these dimensions in the Shiraz municipal are above average but still below the maximum level (number 7). Financial aspects and intra-organizational processes also show higher than average results but have room for improvement towards the maximum level. Despite the lack of significance in the learning and growth aspect, the average statistics for this indicator suggest that it is below average in the Shiraz municipality.

Table 4 displays the descriptive statistics of the research variables, including the mean and standard deviation, as well as the results of the one-sample t-test to examine the research hypotheses at different management levels. Based on the information in Table 4, the significance level of the t-statistic indicates the importance of the difference between the average responses of respondents and the value of the test item (number 4) in most of the research variables at various management levels. Specifically, the individual results for each level - senior, middle, and operational - for all variables, except the role of the management accounting system in evaluating budget performance, mirror the findings listed in Table 3.

At the senior and operational levels, the role of the management accounting system in evaluating budget performance is not deemed significant. This suggests that at these two management levels, there is no distinguishable variance in the utilization of information from the management accounting system to evaluate budget performance at the average level (number 4).

A one-way ANOVA was conducted to examine differences in research variables among managers with varying levels of management. The results in Table 5 reveal that the only significant difference among senior, middle, and operational managers is in the intra-organizational processes aspect of evaluating budget performance, with a p-value below 0.05. The statistical power for this variable shows acceptable accuracy (maximum power being 1).

Additionally, Table 5 shows no significant differences in the qualitative characteristics of the system, the role of the management accounting system in budgeting, financial aspects, customer aspects, and learning and growth aspects (employees). The management accounting system plays a crucial role in evaluating budget performance and management accounting information systems.

Table 3: The result of one sample t-test at all management levels

Variables		t-statistics				Min
		Test value=4	Standard deviation	Mean	Maximum	
Qualitative features of the system		12.534 (0.0005)	1.25	4.55	6.91	1
Role of the management accounting system in the budgeting model		19.394 (0.005)	1.43	4.97	7	1
Role of the management accounting system in evaluating budget performance	Financial aspect	5.794 (0.0005)	1.37	4.28	6.75	1
	Customer aspect	0.569 (0.570)	1.45	4.03	7	1
	Learning and growth	-0.822 (0.411)	1.39	3.96	7	1
	The internal organization process aspect	7.264 (0.0005)	1.23	4.31	7	1
	Total point	3.847 (0.001)	1.19	4.14	6.69	1
Total		7.165 (0.0005)	1.07	4.27	6.77	1

Table 4: The result of one sample t-test at different management levels

Management Level	Operational			Middle management			Senior management		
Variables	**mean**	**Standard deviation**	**t-statistics**	**mean**	**Standard deviation**	**t-statistics**	**mean**	**Standard deviation**	**t-statistics**
Qualitative features of the system	4.47	1.30	7.723 (0.0005)	4.63	1.21	8.179 (0.0005)	4.68	1.13	6.529 (0.0005)
Role of the management accounting system in the budgeting model	4.87	1.49	12.432 (0.0005)	5.06	1.34	12.407 (0.0005)	5.18	1.36	9.412 (0.0005)
Financial aspect	4.2	1.42	2.952 (0.003)	4.42	1.30	5.086 (0.0005)	4.29	1.29	2.419 (0.017)
Customer aspect	3.98	1.53	-0.230 (0.818)	4.13	1.28	1.655 (0.099)	3.98	1.44	-0.128 (0.898)
Learning and growth	3.92	1.42	-1.149 (0.251)	4.03	1.36	0.413 (0.680)	3.94	1.38	-0.450 (0.653)
The internal organization process aspect	4.21	1.26	3.523 (0.0005)	4.44	1.09	6.280 (0.0005)	4.45	1.33	3.688 (0.0005)
Role of the management accounting system in evaluating budget performance	4.08	1.24	1.347 (0.179)	4.26	1.07	3.766 (0.0005)	4.17	1.2	-1.117 (0.266)
Management accounting information system	4.19	1.10	3.627 (0.0005)	4.38	0.98	6.067 (0.0005)	4.34	1.08	3.435 (0.001)

Table 5: Summary of a One-Way ANOVA for Investigating the Value of Research Variables between Management with Different Management Levels

Variable	source	Sum of squares	Degree of freedom	Mean square	F	P	Statistical power	Effect size
Qualitative features of the system	group	780.13	2	390.06	2.05	0.129	0.423	0.005
Role of management accounting system in budgeting model	group	195.29	2	97.64	2.997	0.051	0.582	0.007
Financial aspect	group	132.92	2	66.46	2.215	0.110	0.453	0.005
Customer aspect	group	63.106	2	31.55	0.942	0.390	0.214	0.002
Learning and growth aspect	group	32.68	2	16.34	0.525	0.592	0.137	0.001
The internal organization process aspect	group	177.38	2	88.69	3.694	0.025	0.679	0.009
Role of the management accounting system in evaluating the budget	group	1339.16	2	669.58	1.862	0.156	0.389	0.005
performance Management accounting information system	group	5656.37	2	2828.18	2.321	0.099	0.471	0.006

Conclusion

In today's complex world, managers require information to effectively oversee their organization's operations. Whether in public or private settings, managers must establish and adhere to a budget for their organization. The Shiraz municipality, as a prominent public sector entity, also needs to establish and operate within a budget. To achieve this, the managers of the municipality rely on information from the management accounting system. The efficiency of this system in budgeting can significantly impact the organization's overall budget efficiency. This study aims to explore the impact of utilizing management accounting system information in the budgeting process by managers at Shiraz municipality.

The results indicate that while there are slight variations in managers' beliefs regarding the qualitative role and importance of management accounting information in budgeting, these differences are significant. Therefore, the first and second

hypotheses of the research are supported. The quality and importance of the management accounting system at Shiraz municipality are rated above average, but there is room for improvement towards optimal levels. Managers should focus on enhancing this system through strategies like training programs to leverage management accounting information for better budget outcomes. Particularly, there is room for improvement in utilizing this information to evaluate customer aspects and employee development.

Further analysis reveal

s no significant differences in the views of senior, middle, and operational managers regarding the role and importance of management accounting information in budgeting. However, the importance of this information in the balanced evaluation of the budget varies across dimensions, with financial aspects and intra-organizational processes being significant. This contradicts expectations, as senior managers were anticipated to utilize this information more extensively. This could be attributed to the technical nature of using management accounting information in budgeting, often delegated to operational and middle managers. Additionally, political influences and lack of necessary infrastructure or training may hinder senior managers from fully leveraging this information.

It is recommended that Shiraz municipality managers emphasize the role of the management accounting system in budgeting, especially in terms of budget performance, through training initiatives. Establishing management accounting units at various organizational levels and hiring experts in the field can also enhance the utilization of management accounting information. The findings of this study contribute to the existing knowledge on

management accounting in the public sector, emphasizing its qualitative role in budgeting and performance evaluation based on the balanced scorecard system.

Overall, the study aligns with previous research both in Iran and internationally, highlighting the importance of investing in information systems for organizational financial performance and productivity.

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Determination of Audit Fees Using Support Vector Machine: Evidence from the Tehran Stock Exchange

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Abstract

Objective: This study explores the determination of audit fees (AF) using Support Vector Regression (SVR) among companies listed on the Iranian stock market from 2017 to 2021. It investigates the relationship between financial variables like financial leverage (DA), current asset ratio (CA), quick ratio (QUICK), ASSETS, current ratio to current liabilities (CR), and long-term debt (DE), with AF as the target.

Design/methodology/approach: Data from 60 listed companies during this period, totaling 279 year-observations, are employed. SVR models are trained on this dataset using Google Colab.

Results: The SVR model achieves a 90.5% R^2 value and a 3.7 Mean Squared Error (MSE) on training data, indicating high explained variance and reasonable error levels. However, on new data, the model's performance diminishes, with an R^2 of 67% and an MSE of 8.1, implying reduced accuracy and intermediate predictive accuracy.

Innovation: This study advances the understanding of AF determination using SVR, highlighting the importance of considering various financial variables.

Keywords: Audit fee, Determination, Iranian Stock Market, SVR

1. Introduction

An audit fee (AF) is a fee charged by a certified public accountant (CPA) or auditing firm for conducting an audit of a company's financial statements. The AF is paid by the company being audited and covers the cost of the auditor's time, expertise, and resources required to thoroughly review the company's financial records, transactions, and internal controls (Kanapathippillai et al., 2024). The fee can vary depending on factors such as the size and complexity of the company, the scope of the audit, and the reputation and experience of the auditing firm (Labri et al., 2024; Subedi, 2024; Ani et al., 2024; Kim et al., 2024).

The determination of AF holds considerable importance within the auditing domain, exerting notable influence on both organizations and auditors (Prabhawa & Harymawan, 2022; Akinola & Olagunju, 2023; Azizkhani et al., 2023). As part of financial auditing procedures, companies engage external auditors are engaged by companies to scrutinize and validate their financial statements, ensuring accuracy and adherence to pertinent accounting standards and regulations. However, the complexity and extent of auditing procedures can vary substantially across companies, leading to disparities in AF (Boynton & Johnson, 2005). Consequently, the determination of AF has garnered considerable scholarly attention over the past four decades (Causholli et al., 2011; Hay, 2017; Xue & O'Sullivan, 2023).

1.1 Literature review

Determining AF involves various methodologies and considerations crucial for defining the financial dynamics between auditors and the entities being audited. These approaches aim to ensure that auditors receive equitable compensation for their services while upholding objectivity and independence in their assessments. For instance, in the investigation conducted by Rusmanto and Waworuntu (2015), which examined the determinants of AF in firms listed on the Indonesia Stock Exchange, findings indicated that factors such as profitability, business intricacy, and the number of subsidiaries did not significantly impact AF. In sum, these diverse elements collectively shape the ultimate cost of auditing services, ensuring a fair and suitable remuneration that reflects the distinctive attributes of each audit engagement.

Determination of AF has traditionally relied on conventional methods, which may now appear insufficient to meet the evolving requirements of contemporary enterprises. With companies encountering escalating complexities and continuously changing financial landscapes, there is a pressing need to explore more efficient and effective approaches to accurately ascertain AF. Within this context, the recent application of Artificial Intelligence (AI), particularly machine learning (ML) techniques, shows considerable potential in reshaping the process of determining various accounting parameters (Ghonji et al., 2020; Moradi et al., 2021; Mohammadi et al., 2021; Alibabae and Khanmohammadi 2022; Duan et al., 2023; Ramzan and Lokanan, 2024; Sun et al., 2024) and especially AF (Hunt et al., 2022; Fedyk et al., 2022; Subedi, 2024; Subedi, 2024; Pham, 2024).

For example, Bao et al. (2020) conducted a study where they discussed the development of an advanced fraud prediction model using a machine learning (ML) approach. The study highlighted the significance of integrating domain knowledge and ML techniques in the construction of the model. In contrast to previous accounting research that relied on financial ratios, Bao et al. (2020) opted for raw accounting numbers as the basis for selecting the model input. Instead of employing the commonly used logistic regression method, they utilized ensemble learning, considered one of the most powerful ML methods. To evaluate the performance of the fraud prediction models, they introduced a novel performance evaluation metric commonly utilized in ranking problems, which proved to be more suitable for the task at hand. By commencing with an identical set of theory-driven raw accounting numbers, Bao et al. (2020) demonstrated a substantial superiority of their new fraud prediction model over two benchmark models.

In this topic, the exploration of incorporating machine learning (ML) methods and novel data

sources in the realm of management accounting (MA) research was undertaken by Ranta et al. (2022). A comprehensive examination of existing accounting and related research demonstrated that ML methods were still at an early stage of development in MA. However, several promising opportunities for leveraging ML in MA research were uncovered through an analysis of recently published ML research in related fields. It was proposed by the authors that the most favorable areas for employing ML methods in MA research included: (1) the harnessing of the abundant potential of diverse textual data sources; (2) the quantification of qualitative and unstructured data to generate novel metrics; (3) the enhancement of estimation and prediction capabilities; and (4) the employment of explainable AI techniques for the detailed interpretation of ML models. By utilizing ML methods, MA research could significantly contribute to the creation, advancement, and refinement of theories through induction and abduction, while also providing interventionist study tools. This highlighted the crucial role ML methods could play in the field of MA research.

Fedyk et al.'s (2022) research conducted an extensive examination of the utilization of AI methodologies in auditing, presenting notable findings regarding the favorable effects of AI on audit quality and efficiency. The study underscored the potential advantages of AI integration in streamlining and optimizing audit procedures, especially in bolstering precision through advanced data analytics for detecting financial irregularities and fraud. Crucially, the research acknowledged AI as a potent tool to supplement and enhance the capabilities of human auditors rather than supplanting them, leading to more robust and dependable audit outcomes.

1.2 Objectives

In this study, we aim to employ machine learning (ML) techniques, specifically support vector regression (SVR), utilizing Python libraries, to determine the audit fees (AF) from the Iranian Stock Market. We will leverage the Google Colab environment for modeling the SVR. To assess the effectiveness of the developed models, we will use new data points from various industries to evaluate the accuracy of the most successful model in predicting AF.

2. Data collection for estimating the AF

This study concentrates on companies listed on the Iranian Stock Market over a span of four years, spanning from 2017 to 2021. A total of 40 companies and 279 company-year observations were analyzed. The research utilized several input variables, including financial leverage (DA), current asset ratio (CA), quick ratio (QUICK), ASSETS, current ratio to current liabilities (CR), and long-term debt (DE), with AF as the target variable. To ensure the precision of the models, certain large companies with notably high audit fees were omitted from the dataset. This precautionary measure was implemented to prevent potential bias in the analysis and to uphold the relevance of the results within the targeted range of audit fees. Statistical parameters for all variables considered in the study are presented in Figs 1(a) through 1(f), with the account number indicating the total observations at 279. Fig. 1(f) specifically illustrates the AF of the companies, which are represented in logarithmic format. By meticulously controlling the data range, the study endeavors to offer a more focused and accurate exploration of the relationships between the chosen variables and the audit fees of companies within the specified range.

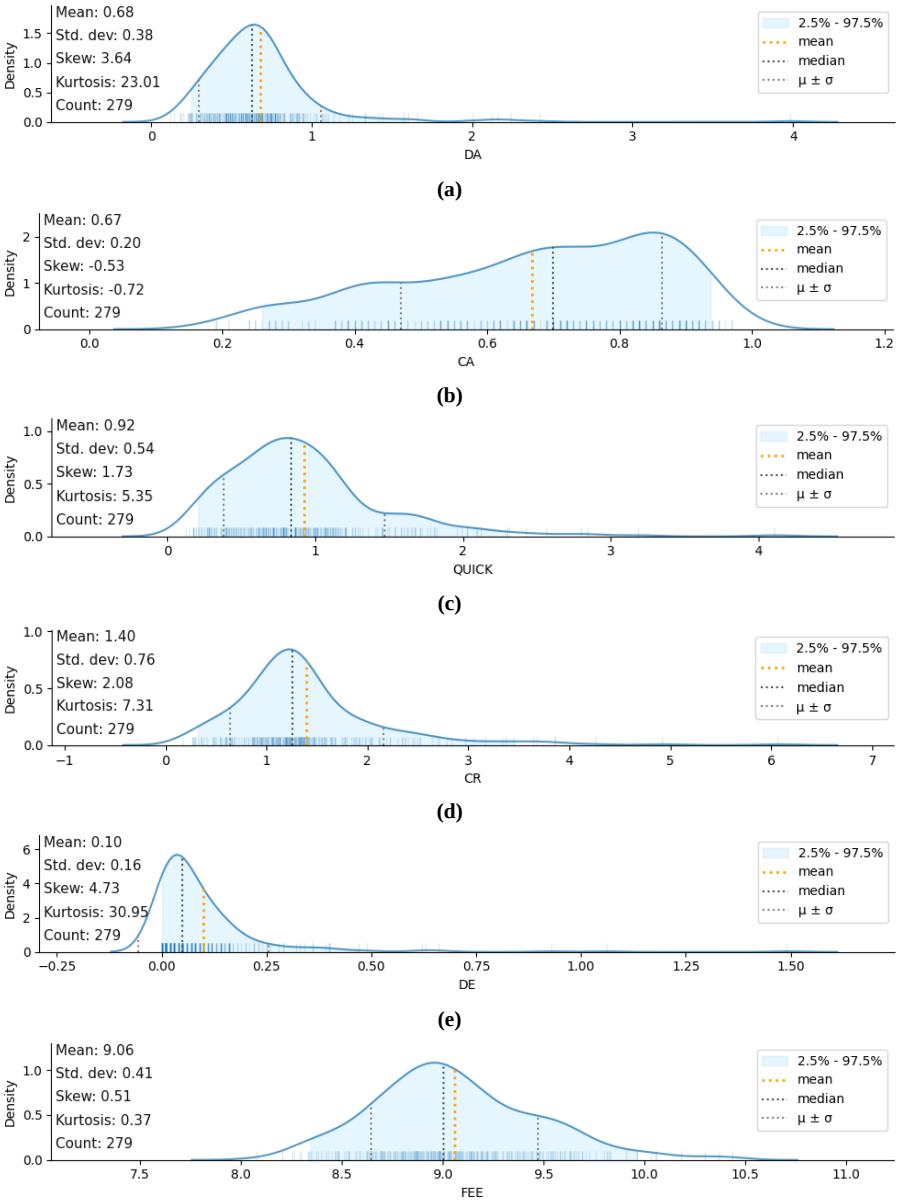

Fig. 1: Statistical summary of the dataset utilized

(f)

3. Development of the SVR model

Support Vector Regression (SVR) is a supervised learning algorithm utilized for regression tasks, functioning akin to Support Vector Machines (SVM) employed in classification but adapted for predicting continuous outcomes. SVR identifies the optimal hyperplane within a high-dimensional space to maximize the margin while minimizing the error between predicted and actual values. Implementation of SVR was conducted using the `SVR` class from the `SVMsvm` module in scikit-learn, specifying hyperparameters including kernel type, regularization parameter (C), and epsilon. The model was trained on the training data using the `fit` method and employed for making predictions on new data via the `predict` method. Notably, the SVR model utilized in this study was developed using the Sklearn Python library. The coding process took place in the Google Colab IDE environment, favored by machine learning and data science professionals for its seamless accessibility and cloud-based execution capabilities. Google Colab offers convenient access to high-performance GPUs and supports parallel code execution, eliminating the need for local development setup management. Fig. 2 depicts the developed code for SVR.

```
# Importing necessary libraries
from sklearn.svm import SVR
import pandas as pd
df = pd.DataFrame(data)
# Separating input features (x) and target values (y)
x = df['inputs']
y = df['target']
# Instantiating SVR model
svr_model = SVR(kernel='rbf', C=1.0, epsilon=0.1)
# Fitting the model to the data
svr_model.fit(x, y)
# Generating sample test data
X_test = df['newdata']# Sample features for testing
# Making predictions on the test data
y_pred = svr_model.predict(X_test)
# Printing the predictions
print("Predictions:", y_pred)
```

Fig 2: Developed code for the SVR

4. Results and discussion

4.1 Correlation matrix

Fig 2 displays the correlation matrix of the parameters. Typically, this matrix illustrates the influence of each parameter on the target variable (AF). However, it does not account for the effects of other parameters. It is evident that the most significant parameter in estimating the audit fee is the company's assets, which is logically consistent.

4.2 SVR results on train data

SVR employs a kernel function to transform the input data into a higher-dimensional space, making it linearly separable. During training, SVR optimizes hyperplane parameters to minimize error and maximize margin from the closest data points, known as support vectors. This optimization involves solving a constrained optimization problem, iteratively adjusting parameters until convergence is reached.

Additionally, hyperparameters like kernel type and regularization parameters are tuned for optimal performance using techniques like cross-validation. The objective of SVR training is to simultaneously minimize prediction error and maximize the margin between the hyperplane and support vectors.

This is achieved through an iterative optimization process, where the model adjusts parameters to fit the training data while maintaining a balance between model complexity and generalization ability. SVR's success relies on its ability to find the optimal trade-off between fitting the training data closely and maintaining flexibility to generalize well to unseen data.

Fig. 4 depicts the results obtained from the trained SVR model, illustrating the comparison between the actual AF and the estimated AF. The plot reveals a close agreement between these parameters, indicating the promising performance of the SVR model in capturing the underlying patterns in the data. However, it's crucial to note that these findings are based solely on the training data, which may not necessarily generalize well to unseen data. It's widely acknowledged in machine learning that model performance metrics, such as the R-squared (R^2) and Mean Squared Error (MSE), tend to be favorable to the training data. In this context, the calculated R^2 value for the SVR model on the training data was approximately 90.5%, suggesting a high degree of explained variance. Additionally, the MSE of the SVR model on the training data was found to be 3.7, indicating a reasonable level of error. While these results are encouraging, it's imperative to evaluate the model's performance on unseen data to assess its true predictive capability and generalization ability. Further validation and testing on independent datasets are essential steps to confirm the reliability and robustness of the SVR model in real-world applications.

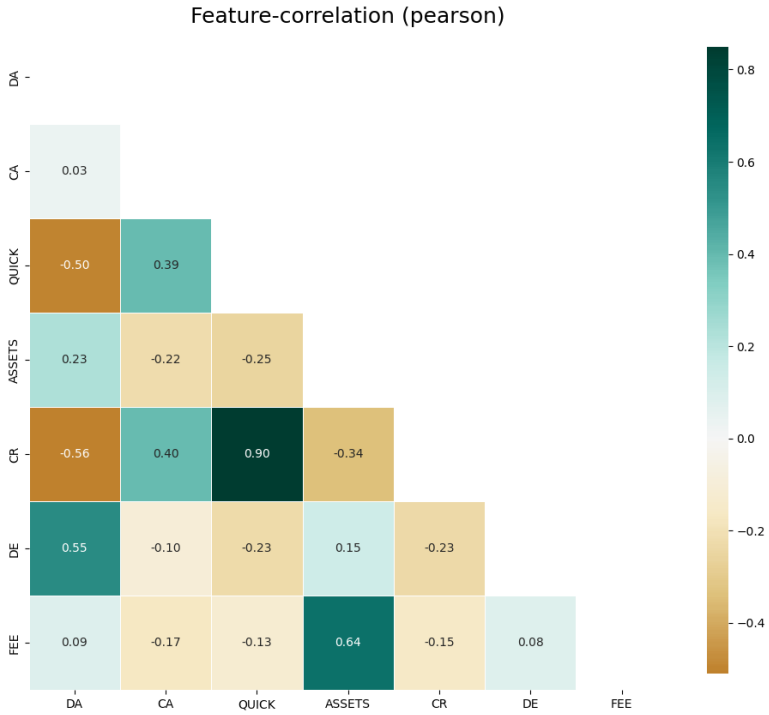

Fig. 3: Correlation matrix of the parameters

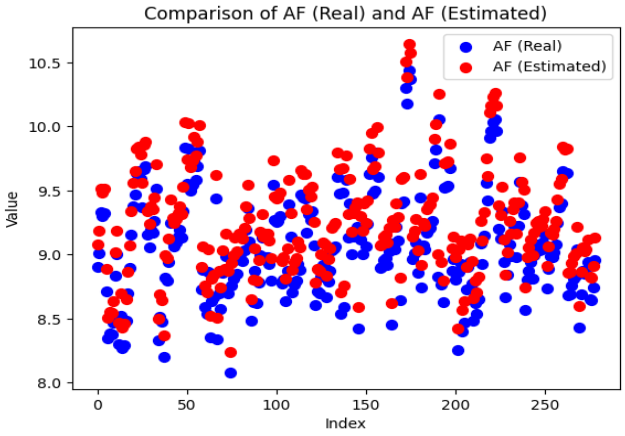

Fig. 4: SVR results

4.2 SVR results on test data

To rigorously validate and ascertain the generalization capabilities of our top-performing model, we opted to scrutinize its efficacy using fresh data. To accomplish this, we sourced data from 10 previously unobserved companies across diverse industries (30 new data), spanning the financial years from 2021 to 2022. Leveraging the Support Vector Regression (SVR) model, we projected the Audit Fees (AF) for these companies and juxtaposed them against the actual fees, as delineated in Fig. 5. Encouragingly, the SVR model showcased notable precision in estimating the new dataset, showcasing a robust alignment with the actual values. The computed R-squared (R^2) value for the SVR model on the training data hovered around 67%, indicating a decrease in the accuracy of the model with new data. Furthermore, the Mean Squared Error (MSE) of the SVR model on the training data was 8.1, signifying an intermediate level of predictive accuracy.

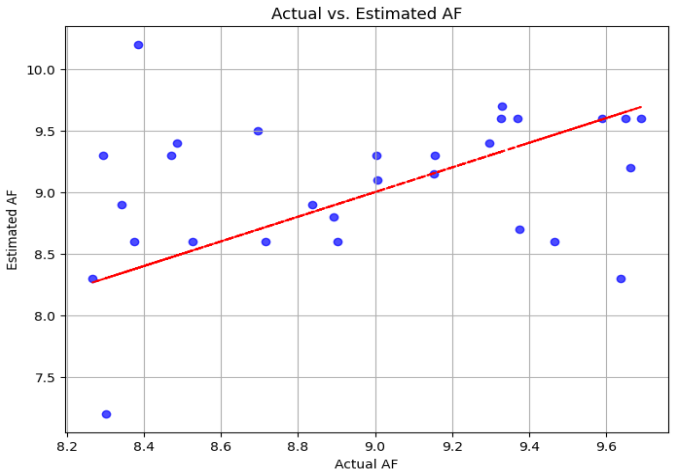

Fig. 5: Validation of the GBR model with new data

5. Conclusions, Limitations, and Future Prospects

In conclusion, our study undertook a comprehensive analysis of audit fee (AF) determination using Support Vector Regression (SVR) on a dataset comprising audit fee data from 60 companies listed on the exchange between 2017 and 2021, resulting in 279 year-observations. Leveraging input variables such as financial leverage (DA), current asset ratio (CA), quick ratio (QUICK), ASSETS, current ratio to current liabilities (CR), and long-term debt (DE), we trained the SVR model on this dataset within the Google Colab environment. Our training results revealed a commendable performance, with an R^2 value of approximately 90.5% and a Mean Squared Error (MSE) of 3.7, indicating a high degree of explained variance and reasonable predictive accuracy, respectively. However, upon testing the model on new data, its performance diminished, as evidenced by a reduced R^2 value of around 67% and an MSE of 8.1. This decline suggests a decrease in accuracy and intermediate predictive performance when confronted with unseen data. Moving forward, addressing the limitations identified, such as data scope and variable selection, presents avenues for future research to enhance the robustness and generalizability of AF determination models.

Although this study has yielded promising outcomes, it is important to acknowledge certain constraints. Notably, the dataset utilized for training and testing the models was limited to firms listed on the Tehran Stock Market from 2017 to 2021. While this dataset offered valuable insights, the ability of the models to generalize to companies beyond this specific timeframe or exchange may be limited. Incorporating data from alternative exchanges or regions could enhance the models' applicability across a wider spectrum of companies. Additionally, the selection of input variables was based on a specific set of parameters, including DA, CA, QUICK, ASSETS, RE, LOSS, CR, and DE. Although these variables were considered relevant and produced satisfactory results, there may exist other factors influencing AF. Future investigations could explore additional variables and employ feature engineering techniques to refine the models and achieve a more comprehensive understanding of the AF determination process.

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The Effect of Corporate Supervisory Mechanisms on the Promotion of Earnings Information Content in the Capital Market of Iran

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Abstract

Objectives: The present study aims to examine the impact of a company's regulatory mechanisms on the enhancement of earnings information content in the Iranian capital market.

Design/methodology/approach: A sample of 142 firms listed on the Tehran Stock Exchange from 2013 to 2022 was chosen using a systematic exclusion model. The research hypothesis was then tested through multiple linear regression tests based on panel data. The profit reaction coefficient and the company's supervisory mechanism, as indicated by the owner's internal control criteria, were used to measure the information content of profits.

Results: The study found a direct and significant correlation between the company's supervisory mechanism and the information content of earnings. Improving the quality of the monitoring mechanism led to an increase in the information content of profits.

Innovation: This study offers valuable insights for company managers and stakeholders in the capital market. By effectively utilizing regulatory mechanisms, the level of information content of profits in the market can be enhanced.

Keywords: Profit Information Content, Regulatory Mechanism, Quality of Internal Control, Capital Market of Iran.

1. Introduction

Every day, members of the capital market receive large amounts of news or signals, such as profit announcements. Processing this information requires judgment on its quality. If investors are uncertain about the future state of firms and the economy, or if they do not know enough about the future cash flows of companies, processing these signals and responding to them will be difficult due to uncertainty. In such a situation, receiving information signals, such as accounting interest announcements, can lead to a revision of investors' earlier beliefs about the future state of companies and the market. Therefore, receiving the information content of financial statements will reduce uncertainty (Arab Salehi et al., 2018).

The final product of accounting operations is to provide accurate information to investors and all users. Net profit is one of these important items in the reports of accountants and auditors, which will contribute to the future decisions of the users. The important question is whether the information content of profits can convey all the facts to the users. What Can Promote Earning Information Content in the Market? One of the factors affecting the information content of corporate profits is corporate regulatory mechanisms. Regulatory mechanisms include direct internal controls within companies. One of the reasons for the establishment of internal control systems within any organization is to improve the quality of accounting information. According to Directive 873 of the Iran Audit Standard, internal controls are a process designed and implemented by management and other employees to achieve the objectives of the entity in the areas of financial reporting, reliability, effectiveness and efficiency of operations, and compliance with relevant laws and regulations, to obtain reasonable confidence in these cases. Internal control can be considered a process established by the board of directors, managers, and other employees of the institute to gain reasonable assurance of objectives such as effectiveness and efficiency of operations, reliability of financial statements, compliance, and compliance with rules (Hajiha et al., 2017). The existence of robust regulatory mechanisms has a significant impact on the quality of financial reports, including the content of earnings information, through controlling the internal weaknesses of the institution. It is also effective in preventing board fraud and management, and it can help investors reduce information asymmetry by making them pay attention to the quality of this information other than just looking at the number of profit figures. To improve the financial image of the company, managers manipulate the figures of the information content of profits to earn the trust of investors. This aspect of investigating whether the supervisory mechanism can prevent important distortions by removing them to improve the information content of reports such as profit has been discussed less in this research. The structure of the research is first to expand the theoretical foundations, hypotheses, and empirical bases of the research, then the methodology and operational definitions of the research variables, and finally the findings and conclusions of the research are presented.

2. Theoretical, empirical, and research hypotheses

In uncertain times, the future of companies, institutions, and capital markets is unclear. However, the entry of signals and information content of earnings can help reduce these uncertainties and influence investor opinions. Pastor and Veronesi (2009) note that there is always uncertainty in financial and investment markets. Positive information can turn potential opportunities into actual income (Arab Salehi et al., 2018). The information content of earnings can predict future stock returns and provide insight into future earnings and changes in stock prices in exchange for profit changes, playing a crucial role in justifying stock returns. Financial statements must be reliable, comprehensive, and timely to provide clear information. Net profit is a key element in accounting reports, and its informational content is high when

unbiased, reflective of reality, and reduces information asymmetry (Khodadadi et al., 2013).

Stock prices reflect the intrinsic value of a stock instantly, increasing market efficiency as abnormal returns decrease. Previous research has shown a direct relationship between published information content and abnormal returns (Salehi et al., 2014). Different accounting methods and individual interests in measuring profits can reduce the quality of accounting information, leading to a reduction in the information content of profits. Internal control mechanisms play a significant role in influencing stock returns and profit information content by helping companies achieve their goals and reduce risks (Nami Basit and Razmi, 2020). Regulatory mechanisms, scrutiny, and laws can impact financial reporting and managerial actions. Since the enactment of the Sarbanes-Oxley Act in 2002, companies must comply with guidelines to ensure appropriate corporate governance (Cao, 2023).

Companies with higher internal control quality exhibit less financial reporting opportunistic behavior, reducing fraud (Zhang, 2011). Internal controls are essential regulatory agents that oversee company affairs and prevent financial statement fraud. Weaknesses in internal controls and reduced regulatory mechanisms can decrease the quality of financial reports, leading to increased fraud and reduced information content of earnings. The Sarbanes-Oxley Act of 2002 was enacted to restore investor confidence in financial statements and improve internal corporate control and the quality of financial reports. In conclusion, internal controls are all measures taken to enhance company affairs and cannot be defined as a specific statement or law. The research hypothesis is as follows:

Research hypothesis: The company's regulatory mechanism increases the information content of profits.

In their research titled "Internal control material weakness disclosure and misstatement duration" Mao and Zhangxia (2023) found that only a small proportion of companies announcing restatements disclose existing internal control material weaknesses (ICMWs) over financial reporting during misstatement periods. Analyzing 1939 restatements related to misstatements between 2003 and 2015, the study revealed that misstatement duration decreases with the disclosure of ICMWs during misstatement periods. The results remained consistent across different samples and measures of the dependent and test variables. The study also identified a negative relationship between the number of ICMWs disclosed and misstatement duration, with both entity-level and process-level ICMWs disclosure associated with shorter misstatement periods. Furthermore, the study found that the frequency of ICMW disclosure was more impactful in intentional restatements. Despite prior studies indicating negative consequences of reporting existing ICMWs, these findings suggest that disclosing ICMWs can lead to more timely improvements in financial reporting, contradicting the notion that companies are penalized for such disclosures.

Cedric Portetti et al. (2018) examined the independence of audit committees and the information content of profits in Western Europe, concluding that audit committees in institutions with weak internal control could be highly effective and emphasizing the importance of audit committee independence. Almatari et al. (2017) explored the relationship between audit committee activities and internal control systems in commercial banks, finding a significant correlation between audit committee activities and internal control systems. Lisich et al. (2016) investigated the effectiveness of audit committees, CEO power, and internal control quality, revealing that the characteristics of audit committee members have an inverse relationship with internal control weaknesses when CEO power is low. Conversely, when CEO power increases, this negative relationship persists longer. Li (2015) explored the link between managers' ability and internal control quality in China, finding a positive relationship between managers' ability and internal control quality, with the impact diminishing since the mandatory reporting of internal control in China. Othman et al. (2014) stated that audit committee members with financial expertise and

autonomy can significantly impact internal controls and financial reporting effectiveness.

Wilson (2013) studied the impact of earnings management on earnings informational content, finding that institutions with real earnings management have lower information content in earnings. Balsam et al. (2012) examined equity incentives and weaknesses in internal control, suggesting that financial incentives for equity owners motivate managers to maintain internal controls, limiting weaknesses associated with managerial motivations. Chang and Sun (2010) investigated the effect of corporate governance disclosure on market perceptions of information content and earnings management, concluding that a strong corporate governance structure enhances market responsiveness to profit changes. Tipuric et al. (2009) analyzed internal and external regulatory mechanisms in corporate governance, highlighting the importance of balanced relationships between supervisory boards and external audit mechanisms for good corporate governance practices. Their study focused on the relationship between the External Supervisory and Audit Board in the Republic of Croatia, proposing guidelines for improving this relationship and testing it in practice with publicly traded companies in Croatia.

Hajiha and Chenari (2023) emphasized that transparent and reliable financial information, derived from a comprehensive reporting system, is crucial for evaluating a company's status and performance, as well as for making decisions about trading its securities. In modern professional circles, users perceive information reliability as being as important as an independent organization focused on firms' reporting processes, with financial statements being at the core of this monitoring process. Taheri et al. (2022), in their study titled "The Effect of Weakness of Internal Control on the Risk of Fraudulent Financial Reporting by Emphasizing the Moderating Role of Management Feature," highlighted the significant role of internal controls in mitigating the risk of fraudulent financial reporting by reducing opportunities for fraudulent activities. According to the theory of information symmetry, disclosing internal control weaknesses is essential for assessing management accountability. The study's findings indicated that internal control weaknesses have a notable impact on financial reporting and the risk of fraudulent reporting. Furthermore, the persistence of internal control weaknesses intensifies the relationship between these weaknesses and the risk of fraudulent reporting. Fakhari and Peyteh Noei (2017) conducted research on the impact of an audit committee's financial expertise on a company's information environment, revealing a positive and significant correlation between committee members' financial expertise and the information environment. Safari Geraiely et al. (2017) developed a model to explain the effectiveness of an audit committee and the value content of accounting information, demonstrating that an effective audit committee enhances the relevance of profit and balance sheet information. Hajiha and Mohammad Hossein Nezhad (2015) analyzed factors influencing internal control weaknesses and their importance, finding a positive relationship between stock price, inventory ratio, and loss with internal control weaknesses. Vakilifard et al. (2013) explored the link between internal control weaknesses and systematic risk, concluding that weaknesses in the internal control system elevate a company's systematic risk index. Seddighi (2013) investigated the relationship between board structure and accounting earnings' informational content, determining that board structure variables do not significantly impact accounting profit information. Karami (2008) studied the difference between institutional owners and profit information content, suggesting that institutional ownership does not necessarily enhance the information content of a company's profits and may even reduce it. However, institutional ownership levels may either maintain or increase the informational content of profits.

3. Research Methodology

The present study is applied, and from a methodological perspective, correlation is considered causal (post-event). The statistical population of this study includes all firms listed on the Tehran Stock

Exchange, with the study period ranging from 2013 to 2022. Firms listed on the Tehran Stock Exchange that meet specific criteria have been chosen as the sample. To ensure comparability, the financial year for all companies ends in March. This has remained consistent over the 10-year period under review. Information regarding the selected variables in this study is readily available. Excluded from the study are banks, insurance companies, and investment firms. Ultimately, 142 companies were selected as the final sample for the research. Data analysis is conducted using a mixed data method and panel data approach, utilizing Eviews 12 software and the standard error tool to test hypotheses.

3.1. Regression model

$$AR_{it} = \beta_0 + \beta_1 \Delta NI_{it} + \beta_2 SOX_{it} + \beta_3(\Delta NI_{it} \times SOX) + \beta_4 \Delta NI \times LEV_{it} + \beta_5 \Delta NI \times Board\ Ind_{it} + \beta_6 \Delta NI \times SIZE_{it} + \beta_7 \Delta NI \times CASH_{it} + \beta_8 \Delta NI \times GROWTH_{it} + \beta_9 \Delta NI \times Age_{it} + \varepsilon_{it}$$

3.2. Operational Definitions of Research Variables

Dependent Variable: Informational Content of Profits

The dependent variable in this research is the information content of earnings. Building on the research conducted by Setayesh and Ebrahimi (2012), Mehrazin et al. (2012), Firth et al. (2007), and Warfield et al. (1995), the profit reaction coefficient (the relationship between profit and return) will be utilized as a measure. Return is represented by the acquisition of abnormal returns in the market, which is the result of the difference in stock returns from the market return. Additionally, abnormal earnings, derived from the difference in profit period from the previous period, are divided by the reducing factor (total assets of the first period).

Unusual Returns (AR):

$$AR_{i,t} = R_{i,t} - R_{m,t}$$

Real stock return ($R_{i,t}$): The difference in stock price at the beginning of the period from the end of the period by applying the effects of cash dividends and capital gains.

Market Return ($R_{m,t}$): Market Return is equal to the total period index minus the total index of the prior period divided by the total index of the prior period.

Abnormal Earnings (ΔNI): Profit period minus the profit of the previous period divided by total assets.

Independent variable: Supervisory mechanism (weakness of internal control) (SOX)

The supervisory mechanism is a two-valued variable (0 and 1) used to measure the quality of internal controls. Weaknesses in internal control are identified based on research by Hajiha et al. (2017) and Abedini et al. (2019) regarding important weaknesses obtained from independent auditors' reports. Since 2012, internal controls have been approved by the Securities and Exchange Organization, and firms' auditors are required to assess them.

It is essential to examine a company's internal controls and disclose any noncompliance or improper implementation in the audit report. This research focuses on legal responsibilities outlined in audit reports. In this study, the inverse criterion of this definition is used. If a company does not have weaknesses in its internal control system, it is a sign of high-quality controls and is assigned a code of 1; otherwise, it receives a code of 0 (Hajiha et al., 2017).

Control variables

SIZE: Natural logarithm of total assets.

Boardind: The ratio of non-executive members of the board to the total number of members.

Cash: The ratio of operating cash to total assets.

LEV: Total liabilities divided by total assets.

Sales growth: Sales period minus previous period sales, divided by previous period sales.
AGE: Natural logarithm of the year of the firm's establishment.

4. Research Findings

Descriptive statistics of research variables

The findings of the research include descriptive statistics and inferential statistics, which are presented in Table 1 of the descriptive statistics.

Table 1 displays the descriptive statistics of the research variables. It is evident that the average financial leverage of the company is 0.55, indicating that the majority of the data centers around this figure. The size of the company has the highest standard deviation (1.67), while profit changes have the lowest (0.11). The maximum and minimum values also highlight the extremes in the dataset.

The results in Table 2 reveal that the significance level of White's test in the research model is less than 5%, indicating a difference in variance in disruptive sentences. This difference was resolved in the final model estimation using the standard error tool in Eviews software and the command (GLS). Additionally, the significance level of the Brush Godfrey test in the research model was more than 5%, suggesting the absence of serial autocorrelation in the model. The significance level of the Chow test, which was 5%, confirms the model of common data compilation.

The results from Table 3 indicate that the supervisory mechanism, with a positive coefficient of 4.07 and a significance level below 5% (0.0000), has a direct relationship with the information content of profit. This suggests that a high-quality monitoring mechanism increases the information content of profit. Therefore, the research hypothesis is not rejected at a 5% error level. Additionally, liquidity, company size, and sales growth have an impact on the dependent variable.

The coefficient of determination for the model is 0.18 percent, suggesting that the independent and control variables in the model explain 0.18% of the variation in the dependent variable. Watson's camera value is 2.45, falling between 1.50 and 2.50, indicating no strong correlation between the error terms. Collinearity statistics are below 5, showing no strong correlation among the research variables.
The test statistics (F) with a significance level below 5% suggest that the research model fits well.

Table 1: Descriptive statistics

Variable	Mean	Max	Min	Std. v
AR	0.27	4.97	-0.97	1.18
ΔNI	0.041	0.48	-0.33	0.11
SOX	0.67	1.00	0.0000	0.10
CASH	0.12	0.55	-0.18	0.13
LEV	0.55	0.99	0.10	0.20
SIZE	14.76	20.46	11.30	1.67
Boardind	0.66	1.00	0.20	0.18
AGE	3.60	4.24	2.30	0.37
Sale growth	0.34	1.56	-0.34	0.42

Table 2: Results of classical regression preparation tests

Test Model	Test Statistics	Sig
White	153.13	0.0008
Breusch-Godfrey	1.53	0.46
F-Limer	0.39	0.978
Remaining normal model	244.25	0.0000

Table 3: Testing Research Hypotheses

Variables	Coef	Std. v	Statistic t	Sig	VIF
ΔNI	3.28	2.41	1.35	0.17	1.71
SOX	0.24	0.078	3.07	0.002	1.25
SOX ×ΔNI	4.07	0.87	4.65	0.0000	2.19
LEV×ΔNI	-1.03	0.91	-1.13	0.25	1.11
Board ind×ΔNI	1.18	0.95	1.24	0.21	1.12
CASH×ΔNI	-6.87	1.099	-6.25	0.0000	1.26
SIZE×ΔNI	-0.19	0.097	-2.05	0.040	1.46
Age×ΔNI	0.19	0.45	0.43	0.66	1.20
growth×ΔNI	0.82	0.42	1.92	0.054	1.16
C	0.048	0.036	1.34	0.17	-
Coef determination	0.18				
Watson Durbin	2.45				
F	22.146				
Sig	0.0000				

5. Discussion and conclusion

The foundation of investors' decision-making in the capital market relies on information published by companies in the form of financial statements and their attachments, as well as occasional oral news shared by corporate representatives. This information carries various details for users upon entering the market, prompting reactions based on the data presented. Among all the information disclosed in financial statements, the figure of net profit or profit per share stands out as a clear indicator of a company's performance during a specific period. It reflects the company's standing, sometimes comparing it to competitors in both favorable and challenging market conditions. Stakeholders and users of these financial statements respond to these profit figures by generating abnormal returns, either positively or negatively, in the market. This reaction highlights the impact of the information presented in these financial statements post-release. The information's content can vary based on market efficiency, data quality, and timeliness. Information validated by reputable auditors is deemed more reliable, instilling trust among investors. To achieve short-term and long-term goals, meet missions and visions, sustain financial stability and profitability, handle unforeseen events, and address stakeholder demands, economic entities must establish a robust internal control system devoid of weaknesses. Internal control encompasses a series of comprehensive actions integrated into all organizational activities, ensuring operational continuity. This system permeates the organization's operations, guiding and directing its functions. Managers prioritize internal controls as they understand that any weaknesses can hinder goal attainment and veer the company off course. A strong internal control system enhances confidence in financial figures and statement information, facilitating sound decision-making to reach organizational objectives. Following the 2008 scandal and the enactment of the Sarbanes-Oxley Act, internal controls have gained significant prominence. Auditors must meticulously identify and address any internal control weaknesses, which could be specific to certain units or prevalent across the organization. Implementing an effective internal control system within economic entities is crucial for operational efficiency, financial transparency, regulatory compliance, fraud prevention, and overall organizational management. Failure to adhere to these controls can impede goal achievement and lead to weaknesses in internal control. Research indicates that regulatory mechanisms positively influence profit information content, aligning with previous studies. To enhance profit information content and investor reactions, managers should focus on strengthening internal controls.

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The Impact of Debt, Taxation, and Financial Crisis on Earnings Management

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Abstract

Objectives: The present study investigates the impact of debt, taxation, and the financial crisis on earnings management.

Design/methodology/approach: This research is applied, and the methodological dimension is causal correlation. The statistical population of this study was all firms listed on the Tehran Stock Exchange, and using the systematic deletion sampling method, 138 firms were selected as the sample and studied during the 8 years between 2015 and 2022.

Results: Four hypotheses were proposed for the present study. The results of testing the research hypotheses showed that the financial crisis and corporate tax had a direct impact on the company's earnings management, but debt did not affect the company's earnings management.

Innovation: The current research provides evidence that dealing with the financial crisis and paying taxes are the main factors in increasing earnings management in companies.

Keywords: Debt, Financial Crisis, Profit Management, Taxation, Financial Statement Fraud.

1. Introduction

In accounting literature, defining earnings management is challenging due to the unclear boundary between earnings management and financial fraud. However, there are distinct conceptual differences between fraudulent accounting activities and judgments and estimates that align with accepted accounting principles and can be used to manage earnings effectively (Ebrahimi et al., 2021). Earnings management occurs when managers utilize judgments in financial reporting and transaction structures to alter financial reports, either to mislead shareholders or due to contractual impacts reliant on accounting figures (Almarayeh et al., 2022). Some define earnings management as targeted involvement in the external financial reporting process to generate profits (Al-Zoubi, 2018). Others suggest that earnings management practices aim to assist managers in fulfilling their duties to shareholders or deceiving investors (Mamatzakis et al., 2023). Various definitions of earnings management have been proposed in the accounting literature by researchers. Crafting a precise definition of earnings management necessitates an understanding of the methods of applying earnings management and its outcomes. Earnings management occurs when managers use their judgments in financial reporting and manipulate transaction structures to alter financial reports (Roni, 2022). This objective may mislead some shareholders about the company's economic performance or influence the results of contracts contingent on specific profits (Ahmadpour and Shahsavari, 2014). The bottom line of financial statements (i.e., profit) is a crucial basis for decision-making for various users, such as investors, analysts, creditors, and financiers, and is considered one of the best indicators for assessing managerial performance (Izedinia et al., 2015). Given the significance of earnings management and its influence on investors' decisions, it is crucial to explore the factors impacting earnings management. Therefore, this study investigates the effects of debt, taxes, and financial crises on earnings management. With the escalating levels of fraud and earnings management in financial statements and the pivotal role of financial reports in decision-making for investors and corporate stakeholders, it is imperative to address the issue. In the capital market, conservative managers often refrain from disclosing negative news about the company, only presenting positive news to avoid tarnishing their managerial reputation and the company's history. This behavior could lead to future losses for investors and shareholders of companies. Hence, it is essential to address the necessity for companies facing financial crises to avoid tax evasion and refrain from manipulating critical financial statements. Examining earnings management and its influencing factors like financial crises, taxes, and debt is crucial for identifying uncertainties, addressing research gaps, and enhancing understanding. The research structure entails expanding on theoretical foundations, hypotheses, and empirical bases, followed by outlining the methodology and operational definitions of research variables and concluding with presenting the research findings and conclusions.

2. Theoretical foundations and the development of research hypotheses

Earnings management is a crucial contemporary issue in accounting research. It involves managers manipulating earnings to deceive shareholders about the company's true economic performance or to meet contractual obligations based on reported revenues (Mamatzakis et al., 2023). Previous studies have shown that corporate managers who violate accounting laws can manipulate financial statements (Ebrahimi et al., 2021). Companies engage in reporting inflated profits by creating reserves for questionable debts or manipulating earnings early, known as accrual profit management. However, there is a shift towards real earnings management. Auditors need to carefully examine deviations from the natural direction of businesses in earnings management, which can involve changes in revenue, sales, cost of goods sold, or non-operating costs (Bansal, 2021). Earnings management occurs when managers use their judgment in financial reporting to alter the structure of transactions. This can

be intentional or unintentional, with some shareholders concerned about the company's economic performance or the outcome of contracts dependent on profit (Huang, Hu, 2020). Various factors influence managers' decisions to manage profits. During financial crises, companies may reduce profit management to show higher losses and avoid taxes (Pereira and Alves, 2017). Some argue that in times of crisis, companies may use earnings management to accurately reflect their value. The impact of financial crises is more pronounced in countries with weak investor protections. However, some studies suggest that companies are less inclined to engage in earnings management during crises (Mechelli and Cimini, 2017). Increased oversight from creditors, auditors, and stakeholders during crises may deter companies from manipulating earnings. Governments may also support struggling companies during crises, discouraging tax evasion and promoting high-quality financial reporting, to attract investors (Mamatzakis et al., 2023). Based on the above, the first hypothesis of the research is as follows:

H1: There is a significant relationship between financial crises and profit management.

A variety of factors can influence managers' actions in managing profits. One key factor related to earnings management is a company's debt, which can reduce the value of shareholders' shares as debt increases and the company's cash flow decreases (Mamatzakis et al., 2023). Debt serves as an alternative mechanism for shareholders and debt holders to influence the financial value of the company. Companies with higher debt ratios and overall leverage face a greater risk of bankruptcy, potentially leading to increased debt costs (Costa et al., 2016). In highly leveraged companies, managers often engage in profit management to attract stakeholders and investors and meet the expectations of creditors (Kim et al., 2012; Zang 2012). Furthermore, managers in high-leverage risk companies tend to employ more earnings management practices to avoid debt (Al-Zoubi, 2018). Studies have shown that high-leverage companies prefer real profit management methods over accruals, as they are less scrutinized by auditors, analysts, and stakeholders (Kou et al., 2014). Companies with high levels of debt may use earnings management practices to avoid scrutiny from shareholders and creditors. However, some research suggests that increasing corporate debt can lead to a reduction in earnings management practices as managers become more disciplined and less opportunistic (Mamatzakis et al., 2023). Based on the aforementioned points, the second hypothesis of the research can be stated as follows:

H2: There is a significant relationship between the company's debt ratio and earnings management.

Taxation may create incentives for managers to manipulate profits to maximize financial profit and minimize taxable profits. Some literature suggests that taxation increases the likelihood of corporate earnings management practices, particularly for companies with positive net profits, as they aim to maximize financial profit while reducing taxable profits (Pereira & Alves, 2017). These studies indicate that managers are motivated to engage in earnings management to pay less tax, as reflected in financial statements. Other research shows that companies use taxes to manipulate profits to meet investors' expectations (Gupta et al., 2016). However, some studies have found a negative association between taxation and earnings management or no effect at all (Mamatzakis et al., 2023). Based on the information presented, the third hypothesis of the research can be stated as follows:

H3: There is a significant relationship between the corporate tax rate and earnings management.

3. Research Background

Mamatzakis et al. (2023) conducted a study titled "The Impact of Debt, Taxation, and Financial Crisis on Earnings Management," which found that Greek firms are more likely to manipulate profits in the presence of debt. They also noted that taxes and financial crises have a negative and positive effect on earnings management, respectively. Aqabna et al. (2023), in their study titled "Corporate Performance, Corporate Social Responsibility, and its Impact on Earnings

Management," found that while social responsibility has a limited positive impact on financial performance, it significantly reduces earnings management. The study offers recommendations for policymakers, board directors, and managers to enhance their understanding of how managers respond to disclosure, ultimately minimizing profit manipulation. Almariah et al. (2022) investigated "The Impact of the Audit Committee on Reducing Earnings Management" and concluded that audit committee independence is crucial for improving audit effectiveness by reducing accrual earnings management. Other audit committee characteristics tested, such as committee size and financial expertise, did not show significant statistical relationships. Norfadilla and Muslim (2022) studied "The Relationship between Tax Planning and Deferred Tax Costs in Earnings Management" using a sample of 20 manufacturing companies from 2015 to 2017. Their findings indicated a positive correlation between tax planning, deferred tax expenses, and earnings management. Roni (2022) explored "The Impact of Tax Planning on Earnings Management" and found that tax planning and deferred tax costs positively influence the probability of corporate earnings management. The study focused on firms listed in the Jakarta Islamic Index from 2016 to 2018. Li et al. (2020) investigated "The Relationship between Financial Crisis, Earnings Management, and Internal Controls" and found that companies resort to various methods of earnings management during financial crises. Effective internal controls and oversight can help minimize profit manipulation. Dhole et al. (2016) examined the CEO's impact on the relationship between internal debt and earnings management. Their results suggested that internal debt was negatively associated with earnings management, indicating that CEOs with higher internal assets adopt less risky corporate policies. Xu et al. (2015) studied the impact of relationship-based transactions and internal control on earnings management and found that high-quality internal control can limit earnings management resulting from supplier relationships. Franz et al. (2014) analyzed the impact of debt covenant violations on earnings management and found that companies with loans close to breaching their covenants were more likely to engage in profit manipulation. Companies with strong incentives to avoid covenant breaches shifted from accounting to real-profit management. Fan et al. (2013) discovered that high-quality internal controls did not effectively limit earnings management in Chinese listed companies, noting a shift from accrual to real profit management. Gunny (2010) found that companies in financial crises tend to manipulate profits through accruals and various accounting methods. Cohen et al. (2008) observed a shift from accrual to real earnings management following the implementation of the Sarbanes-Oxley Laws.

4. Research Methodology

The present study is applied and methodologically based on causal correlation. The statistical population studied in this research includes all firms listed on the Tehran Stock Exchange during the period from 2015 to 2022. Companies listed on the Tehran Stock Exchange that meet specific criteria have been selected as a sample. These criteria include having financial year-ends that are comparable to each other. The financial period has remained consistent over the 8-year review period. The selected companies are not banks, insurance companies, or investment firms. Ultimately, 138 companies were chosen as the final sample for the research. Data analysis was conducted using a mixed-data method and panel data approach, utilizing Eviews 12 software and standard robust tools to test hypotheses.

Table 1. The screening of the statistical population

The statistical population in 2022		577
Deductible: inactive companies	-193	
Deductible: Companies that have stock trading suspension	-37	
Deductible: Companies that have changed the financial period	-61	
Deductible: Companies that entered the stock market during the research period	-99	
Deductible: investment companies, banks, and holdings	-49	
The final sample of the research		138

4.1. Research model

Following the research of Mamatzakis et al. (2023), a comprehensive model consisting of introduced variables has been designed and introduced to test the research hypotheses as follows:

$$AM_{it} = \beta_0 + \beta_1 Distress_{it} + \beta_2 Debt_{it} + \beta_3 TAX + \beta_4 Qtobin_{it} + \beta_5 SIZE_{it} + \beta_6 ROA_{it} + \beta_7 IND_{it} + \beta_8 growth_{it} + \beta_9 Cash_{it} + \varepsilon_{it}$$

4.2. Operational Definitions of Research Variables

Following Mamatzakis et al.'s (2023) research, three variables—tax, debt, and financial crisis—are used as independent variables in the research as follows.

First Independent Variable of Research: Financial Crisis (Distress)

In this study, to adapt financial crisis models to the native environment of Iran, the modified model of Kordestani et al. (2014) and the research of Aflatooni et al. (2022) and Memarian and Mostafa Alavi (2020) have been used. The final model is as follows:

$$T - score_{it} = 0.291(X1) + 2.458(X2) - 0.301(X3) - 0.079(X4) - 0.05(X5)$$

In this model, the T-Score represents the financial ability score as follows:

x_1: Ratio of working capital to total assets

x_2: Ratio of accumulated profit and loss to total assets

x_3: Ratio of operating profit (loss) to total assets

x_4: Ratio of book value to total value of liabilities

x_5: Ratio of income to total assets.

About the above indicators, the same relationship indices are high، and the lower the obtained index for a company, the more unfavorable the financial situation is, so companies with T<-0.14 are very likely to have a financial crisis.

The second independent variable of the research is the structure of debt(Debt):

Following Mamatzakis et al. (2023) research, the long-term debt-to-total-debt ratio is used to calculate the maturity of the company's debts.

The third independent variable of research is tax (TAX)

To measure the corporate tax rate in compliance with the research of Mamatzakis et al. (2023), the effective tax rate is used as follows:

The effective rate of cash tax is calculated by dividing the cash tax paid on earnings before tax deduction by (minus one) (Arab Salehi and Hashemi, 2015).

The dependent variable of research: Managing accrual profit (AM)

In this study, the Kothari model (2005) is used to measure accrual earnings management in compliance with the research of Mamatzakis et al. (2023). Kothari et al. developed a model that resembled Jones's adjusted model but also used the rate of return on assets. In their studies, they found that the model had

stronger results than Jones's model and that the remainder of the model was used for accrual earnings management (Kothari et al., 2005).

$$\frac{TA_{it}}{A_{it-1}} = \alpha_1\left(\frac{1}{A_{it-1}}\right) + \alpha_2\left(\frac{\Delta REV_{it}}{A_{it-1}}\right) + \alpha_3\left(\frac{PPE_{it}}{A_{it-1}}\right) + \alpha_4 ROA_{it-1} + \varepsilon_{it}$$

In this model:

TA_{it}: The total accruals of Company I in year t are derived from net profit minus operating cash.

A_{it-1}: Total Assets of Company I in Year T-1

ΔREV_{it}: Corporate income change I between years T-1 and T

PPE_{it}: The amount of property, machinery, and equipment of the company in the year t

ROA_{it-1}: The Return Rate of Assets in the Year T-1

ε_{it}: The remainder of the error in the model.

Control variables

Following the study of Mamatzakis et al. (2023), the following variables have been used as control variables:

(QTobin): The ratio of stock market value plus book value of debt divided by total expenditure of assets.

(SIZE): Natural logarithm of total assets.

(ROA): The ratio of net profit to total assets.

(IND): The ratio of non-executive directors of the board of directors to the total members.

(Sales growth): Sales revenue minus previous sales divided by previous period sales.

(Cash): The ratio of operating cash to total assets.

5. Research Findings

5.1. Descriptive findings

The main central indicator is the average, which represents the equilibrium point and center of gravity of the distribution and is a good indicator of the centrality of the data. For example, the average value for the return on assets variable is 0.151 hundredths, indicating that most data is centered around this point. In general, the dispersion parameters are a measure for determining the amount of dispersion from each other or their dispersion relative to the average. One of the most important parameters of dispersion is the standard deviation. The value of this parameter is equal to 2.742 for the value of the company and for the liquidity of the company (0.12), which indicates that these two variables have the highest and lowest standard deviations, respectively. The lowest and highest values are in each variable.

As can be seen in Table 3, the total number of the firm-years surveyed is equal to 1104, of which 175 firm-years, or 15.85% of the firm-years, have been in financial crisis, and 929 firm-years, equal to 84.15% of the firm-years, have not been in financial crisis.

Table 2, Descriptive statistics

Variable	Mean	Max.	Min.	Stde. V
A.M	0.017	0.604	-0.366	0.18
Debt	0.113	0.587	0.002	0.111
TAX	-0.103	0.0000	-0.263	0.0811
Q-Tobin	3.059	15.30	1.034	2.742
SIZE	15.20	19.77	11.65	1.643
ROA	0.151	0.520	-0.125	0.150
IND	0.645	1.00	0.20	0203
Growth	0.390	1.342	-0.254	0.422
CASH	0.110	0.479	-0.135	0.127

Table 3: Frequency Distribution Distress

code	Frequency	percentage
1	175	15.85
0	929	84.15
Total	1104	100

Table4, Results of variance heterogeneity

Test model	Test statistics	Sig
Research model	224.46	0.0000

The results in Table 4 show that the significance level of the test in the research model is less than 5% and indicates the existence of variance variability in disruptive sentences, which in the final estimation of the models has been solved by the implementation of the GLS command and also using the facilities of powerful standard tools in Eviews 10 software.

According to the results of Table 5, it is observed that the significance level of the serial autocorrelation test in the research model, with a significance level of more than 5% indicates the absence of serial autocorrelation in the model (Platonic, 2018).

According to the results obtained in Table 6, it is observed that the significant level of variables in the stability test is less than 5%, which indicates the stability of the variables.

According to the results obtained in Table 7, it is observed that the significance level of the Chow test for the hypothesis test model is less than 5%, which indicates the acceptance of the panel data pattern that is required to provide the Hausman test, which is presented in the following. According to the results obtained in Table 7, it is observed that the significance level of the Housman test in the hypothesis test model is less than 5%, which indicates the acceptance of constant effects.

Table 5, Results of the serial autocorrelation test

Test model	Test statistics	Sig
Research model	4.229	0.12

Table 6, The results of the Stationarytest

Variable	Test statistics	Sig	Result
A.M	-16.3759	0.0000	Stationary
Debt	-30.3395	0.0000	Stationary
TAX	-9.93863	0.0000	Stationary
Q-Tobin	-13.0919	0.0000	Stationary
SIZE	-7.50637	0.0000	Stationary
ROA	-13.7720	0.0000	Stationary
IND	-4.12287	0.0000	Stationary
Growth	-8.26191	0.0000	Stationary
CASH	-13.9838	0.0000	Stationary

Table 7, The results of the F-Limer and Hausman tests

Model	Test statistics	Sig
F-Limer	1.417	0.002
Hausman	42.001	0.0000

Table 8, The results of the research hypotheses test

Variables	Coefficients	Std	t statistic	Sig	VIF
Distress	0.0153	0.007	2.040	0.041	1.57
Debt	-0.011	0.019	-0.59	0.55	1.04
TAX	0.150	0.023	6.357	0.0000	1.17
Q-Tobin	0.0003	0.0007	0.475	0.634	1.29
SIZE	-0.015	0.002	-6.474	0.0000	1.19
ROA	1.182	0.023	50.971	0.0000	2.29
IND	-0.0131	0.0102	-1.282	0.20	1.05
Growth	-0.0421	0.004	-8.611	0.0000	1.29
CASH	-1.458	0.0204	-71.45	0.0000	1.41
C	0.276	0.038	7.126	0.0000	-
coefficient determination	0.83				
Watson Durbin	2.43				
F statistic	64.710				
Sig	0.0000				

The results of Table 8 show that the financial crisis variable, with a positive coefficient of 0.0153 and a significance level below 5% (0.041), has a direct relationship with the company's earnings management. Therefore, the first hypothesis of the research is accepted at the 5% error level. The debt ratio variable, with a significance level of 5% (0.55), shows no relationship with the company's earnings management. As a result, the second hypothesis of the research is not accepted at the 5% error level. The tax rate variable, with a positive coefficient of 0.15 and a significance level below 5% (0.0000), has a direct relationship with the company's earnings management. Thus, the third hypothesis of the research is accepted at the 5% error level. Since the fourth hypothesis of the research evaluated the impact of all independent variables (financial crisis, debt ratio, and tax rate) on earnings management and only the financial crisis and tax rate were confirmed, the fourth hypothesis of the research is not supported. By comparing the regression coefficients of the two confirmed factors, the financial crisis and the tax rate, it is evident that the tax rate, with a coefficient of 0.15, has a much greater impact on earnings management than the financial crisis, with a coefficient of 0.015. This suggests a tendency of managers to avoid paying taxes and evade this important issue, which is not discussed in this article. Control variables, such as company size, return on assets, sales growth, and company liquidity, with a significance level below 5%, show a significant relationship with the dependent variable of the research. The coefficient of determination is 83%, indicating that the independent and control variables in the model explain 83% of the dependent variables. Watson's camera value is 2.43, falling between 1.50 and 2.50, indicating no strong correlation between the error terms. Collinearity statistics below 5 show no strong correlation between the variables in the research. Test statistics (F) with a significance level below 5% suggest that the research model is a good fit.

6. Discussion and Conclusion

This study aimed to investigate the impact of debt, taxation, and the financial crisis on earnings management. Earnings management occurs when managers use their judgment in financial reporting and manipulate the structure of transactions to alter financial reporting, intending to mislead some shareholders about the company's economic performance. Various factors can influence managers' actions in managing profits. The financial crisis is one of the most challenging periods for companies globally, casting doubt on the accuracy of their financial reports. Profit management, particularly

during times of crisis, may decrease as companies might minimize this aspect to show higher losses and avoid paying taxes. The financial crisis influences managers' decisions regarding earnings management. Some research suggests that during times of crisis and financial distress, companies tend to engage in earnings management to better reflect the company's value. According to the statistical results in the previous chapter, it was observed that the financial crisis directly impacts a company's earnings management. When a company faces a financial crisis and struggles to meet its obligations, managers may attempt to conceal this information from shareholders and investors to manipulate the company's profits, hoping that future periods will compensate for the deficit and crisis. These findings are consistent with the research of Mamatzakis et al. (2023), Macelli and Simini (2017), and Durdan and Scandi (2021). One of the key factors associated with earnings management is corporate debt, which can diminish the value of shareholders' shares by increasing debt and reducing the company's cash flow. Hence, debt serves as an alternative mechanism for shareholders and debt holders to influence the financial value of the company. Companies with higher debt ratios and overall leverage face a greater risk of bankruptcy, leading to increased debt costs. When companies carry high levels of debt, managers may engage in profit management to attract stakeholders, and investors, and meet expectations. Contrary to the hypothesis, the results obtained in the previous chapter indicate that in the statistical sample of the current study, the debt ratio does not impact the level of earnings management by managers. Taxes can incentivize managers to manipulate profits to maximize financial gain and minimize taxable profits. Some literature supports the notion that taxation raises the likelihood of corporate earnings management practices, particularly for companies with positive net profits, as they strive to maximize financial gain and minimize taxable profits. These studies suggest that managers resort to earnings management to reduce tax payments associated with financial statements. The statistical tests conducted in the previous chapter reveal that the tax rate directly affects a company's earnings management. Managers facing higher tax rates are more inclined to manipulate the company's profits to lower or evade taxes, indicating that corporate tax hikes can result in increased profit management. These results align with Mamatzakis et al. (2023), Pourheydari and Shafiei Hemmatabad (2013), and Ebrahimi and Ahmadi Moghaddam (2016). Based on the findings, it is recommended that companies proactively plan to avoid engaging in the financial crisis to prevent the need to manipulate profits to address it formally and deceive investors. Investors, institutions, and auditors should take into account the company's tax obligations and the financial crisis to detect earnings management and utilize these factors in making investment decisions and enhancing the efficiency of financial statement audits. Future researchers are encouraged to explore the impact of sustainable performance on corporate earnings management.

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Investigating the Role of Company Ownership in Investment Efficiency with Emphasis on Business Strategy

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Abstract

Objectives: The purpose of this study is to investigate the role of company ownership in investment efficiency, focusing on business strategy.

Design/methodology/approach: This research is applied, with a causal correlation methodology. The statistical population of the study included all firms listed on the Tehran Stock Exchange. Using a systematic sampling method, 135 companies were selected as the sample and examined over an 8-year period from 2015 to 2022. Three types of institutional ownership—management, family ownership—were considered.

Results: The results of testing the research hypotheses indicated that institutional ownership, as well as family ownership, have a direct and significant relationship with the investment efficiency of the company. However, managerial ownership showed no relationship with the efficiency of the company's investment. The interaction of family ownership with business strategy impacted investment efficiency. However, the interaction of institutional ownership and managerial ownership with business strategy did not affect the efficiency of the company's investment.

Innovation: The current research provides evidence that the types of company ownership have an impact on investment efficiency and emphasizes that the role of business strategy cannot be overlooked.

Keywords: Business Strategy, Investment efficiency, Corporate Ownership.

1. Introduction

Investment is the act of using funds to create future profitable returns. Investment efficiency refers to a company's performance in utilizing assets and generating income, measuring the productivity and resource utilization of business organizations and companies (Partovi and Besharatpour, 2021). According to Modigliani and Miller (1958), investment opportunities are ways to enter the market, with investing in companies considered a sound strategy. This theory suggests that companies should invest in projects with positive net present value until their final profit equals their cost, defining investment efficiency conceptually (Maleki et al., 2020; Aksar et al., 2022).

As large joint-stock companies emerged and active investors became prevalent in the capital markets, ownership of company shares shifted from individuals to institutions, laying the foundation for major shareholders. This shift raises the question: Does ownership structure impact a company's investment efficiency?

In general terms, strategy is the plan and vision of future goals for an entity in the market in which it operates. To achieve these goals, the entity formulates and pursues a strategy, crucial tasks in management science that form the basis of vital decisions for managers of companies and businesses (Tanani and Mohebkhah, 2014).

The second goal of this study is to determine whether business strategy has any impact on the relationship between ownership structure and investment efficiency.

Investment is a key component of company operations and normal activities, essential for capital development and the interests of investors and stakeholders. The more efficiently investments are made, the more benefits will be realized by the beneficiaries, leading to a stronger competitive position in the market.

Internal factors of a company, including ownership structure, play a significant role in influencing managerial decisions, with owners influencing decisions based on the extent of their influence. Additionally, the business strategy of a company is crucial in guiding investment decisions and shaping managerial thinking.

One important factor that researchers have recently focused on is the type of company strategy in the market. A company's strategy outlines its plans to outperform competitors and can provide solutions to various challenges. Given the lack of definitive findings on the impact of business strategy on the relationship between company ownership and investment efficiency, there is a research gap that needs to be addressed.

2. Theoretical, empirical, and hypotheses development

Investment is one of the main factors in the development of businesses; therefore, concerns related to investment are among the most important concerns of companies worldwide. Investment efficiency is crucial in achieving corporate goals and must be executed excellently to maximize shareholders' wealth (Bobaker et al., 2022). Investment efficiency can be seen as the performance of a company, measuring the productivity and utilization of its resources. According to Modigliani and Miller (1958), investment opportunities provide companies with access to appropriate investments. This theory suggests that investors will continue to invest in projects with positive net present value until the company's marginal profit and cost are equalized, defining investment efficiency conceptually (Siddiqueo & Rasheed, 2023).

Various internal and external factors within a company influence investment efficiency. Institutional researchers are increasingly interested in the differences between various forms of ownership, as they believe ownership types impact a company's procedures and outcomes. Recent research has explored the connection between ownership structure and company performance (Alkurdi et al., 2021; Bano et al., 2018). Efficient investment plays a crucial role in a company's sustainable development and production, creating value for shareholders. Efficient

investment occurs when there is no deviation from a positive or negative net present value, allowing businesses to provide benefits for future generations and contribute to the country's economic growth. Previous research has identified several determinants of optimal investment, including business strategy, corporate social performance, and corporate governance (Cao et al., 2019). Empirical studies have shown that family ownership, management, and institutional relationships impact investment efficiency (Cao et al., 2020; Shahzad et al., 2018). Different types of ownership have varying effects on investment efficiency. Institutional owners influence management investment decisions through oversight, expertise, proposals, risk-taking behavior, and improved financial disclosure to reduce agency friction and information asymmetry. Additionally, entity-owned companies increase investment efficiency through market activities (Cao et al., 2020; Siddique et al., Rashid, 2023). Therefore, the first hypothesis of the present study is as follows:

H1: There is a significant relationship between institutional ownership and investment efficiency.

Family firms utilize the social-emotional wealth approach in their business decisions to influence corporate investment decisions and investment efficiency. They must preserve capital for the next generation, which may impact their investments more or less (Shahzad et al., 2018). Family firms are averse to losses and prioritize maintaining their reputation and preserving capital for future generations. Therefore, they opt for low-risk investments and focus on effectively utilizing resources to maximize profitability through product quality (Ting et al., 2016). Shahzad et al. (2018) demonstrated that family ownership has a positive impact on investment efficiency. Therefore, the second hypothesis of this study is as follows:

H2: There is a significant relationship between managerial ownership and investment efficiency.

According to representation theory, when ownership and control of a company are separated from managers, management has the power to make strategic choices that prioritize their own interests over those of the shareholders, resulting in decreased investment (Cao et al., 2019). Managers' investments in the company can help reduce conflicts of interest between directors and shareholders. Companies with higher management ownership tend to outperform those with lower managerial ownership (Li et al., 2007). The alignment of shareholders' interests with management can be achieved by granting incentive shares to managers (Siddique & Rashid, 2023). Therefore, the third hypothesis of this study is as follows:

H3: There is a significant relationship between family ownership and investment efficiency.

A company's business strategy has a significant impact on organizational structure, resource allocation, long-term goals, and vision (Park & Byun, 2022). Strategy, in general terms, is the plan and vision of future goals for an entity in the market in which it operates. To achieve its goals, the company formulates and pursues a strategy. In management science, the development and formulation of strategy are two crucial tasks for managers, forming the basis of vital decisions for companies and businesses. Managers must ensure the survival and excellence of the organization.

Today, most organizations do not adopt a single comprehensive strategy but instead use a set of related strategies designed at different levels of the company (Akbari et al., 2019). Each strategy is aligned with environmental conditions, other company strategies, and the strengths and weaknesses of the unit. The success of these strategies relies on their integration and coordination across all levels.

Business strategy is typically implemented at the product or strategic business unit level, focusing on improving the competitive position of a company's goods and services in a specific industry or market segment. Organizations often use one of four types of adaptive strategies to reduce environmental impact and maximize opportunities: defenders, attackers, forward-looking analysts, and passives. Defenders (defensive strategy) and attackers (offensive strategy) represent

opposite ends of the strategy spectrum (Tanani and Mohebkhah, 2014).

The company's business strategy can impact the efficiency and capital allocation (Siddique & Rashid, 2023). Therefore, the fourth through sixth hypotheses of the present study are as follows:

H4: Business strategy influences the relationship between institutional ownership and investment efficiency.

H5: Business strategy influences the relationship between managerial ownership and investment efficiency.

H6: Business strategy influences the relationship between family ownership and investment efficiency.

Siddique and Rashid (2023) conducted research on the impact of ownership structure on investment efficiency, taking into account the influence of business strategy. They found that institutional ownership, managerial ownership, and family ownership all play a role in affecting investment efficiency, and that business strategy acts as a moderator for these relationships.

Aksar et al. (2022) analyzed the effect of cash holding on investment efficiency, considering the role of corporate governance in companies facing financial crises. Their results indicated that corporate governance increases cash holding and investment efficiency in Indian companies, while reducing it in Pakistani companies. They also found that in financially troubled companies in Pakistan, corporate governance strengthens the link between cash holding and investment efficiency, but does not have a moderating effect in Indian companies.

Ezzi et al. (2022) explored the mediating effect of corporate governance on the relationship between blockchain technology and investment efficiency. Their study revealed that the implementation of blockchain technology significantly improves corporate investment efficiency, with corporate governance playing a crucial role in mediating this relationship. Companies with better corporate governance performance experience a greater positive impact of blockchain technology on investment efficiency.

Rhodiawarni et al. (2022) argued in their study "Business Strategy and Competition in Industries" that aggressive companies outperform defenders financially, particularly in the two years following strategy implementation.

Airavati et al. (2022) suggested in their study "Family Firms' Investment Efficiency" that family businesses prioritize risk avoidance in investment decisions to protect their reputation. They also found that family firms with higher social responsibility tend to have higher investment efficiency.

Kumar et al. (2022) investigated the adoption of Information and Communication Technology (ICT) as an emergency business strategy during the Covid-19 crisis in small and medium-sized enterprises. Their findings indicated that the adoption of ICT during and after the pandemic was aligned with company needs, and that different IT adoption factors influence perceived benefits and organizational performance in Indian SMEs.

Kung et al. (2022) examined the relationship between business strategy, corporate social responsibility, and the intra-corporate wage gap. They concluded that social responsibility mitigates the impact of business strategy on the intra-corporate wage gap in aggressive companies compared to defensive firms, primarily due to differences in employee wage growth.

Habib and Hasan (2017) studied business strategy, overvalued stocks, and stock price crashes. Their results showed that trading strategy affects the risk of stock price crashes, with a greater impact in aggressive and defensive companies.

Faraji et al. (2023) conducted a study titled "The Effect of Managers' Ability on Investment Efficiency, Overinvestment, and Underinvestment," which found that managerial abilities have a positive and direct impact on the investment efficiency of companies. Additionally, managerial abilities were found to have a positive and direct effect on overinvestment. However,

the study also revealed that managerial abilities have a negative effect on underinvestment.

Naghshbavdi and Seyekkar (2022) conducted a study titled "The Impact of Financial Reporting Quality, Family Ownership, and Audit Quality on Investment Efficiency," which found a significant relationship between the quality of financial reporting and investment efficiency. However, no significant relationship was found between family ownership and investment efficiency. The quality of the audit did not moderate the relationship between family-owned companies and investment efficiency.

Bahrami and Farhadtosaki (2021) conducted a study titled "The Relationship between Managers' Overconfidence, Internal Financing, and Investment Efficiency," which found that the overconfidence of internal finance managers directly affects investment efficiency. When overconfidence is combined with financing through internal resources, it can reduce the efficiency of investment.

Partovi and Besharatpour (2021) conducted a study titled "The Impact of Free Cash Flow on Investment Efficiency," which found that excessive investment from free cash flow has a direct and significant effect on investment efficiency.

Rostami et al. (2021) conducted a study titled "The Impact of Competition in Product Market and Life Cycle on the Business Strategy of Companies," which found that product market competition significantly affects business strategy. Companies in high-competitive industries tend to adopt defensive business strategies. Additionally, the life cycle of a company significantly affects its business strategy, with companies in the growth stage being more likely to have aggressive strategies.

Asadi et al. (2021) conducted a study on "The Moderating Role of Business Strategy on the Relationship between Social Responsibility and Economic Performance of the Company," which found that corporate social responsibilities in different dimensions can increase economic value added and market value added. Business strategy has a positive and significant effect on this relationship, with more aggressive business strategies having a greater impact.

Masoumi and Nesagaran (2021) conducted a study on "Investigating the Effect of Managers' Overconfidence and Free Cash Flow on Firms' Investment Efficiency," which found that free cash flow and managerial overconfidence both have significant effects on the investment efficiency of companies.

Pourmousa and Sharifzadeh Darban (2021) examined the effect of liquidity on the relationship between financial constraints and investment, finding that financial constraints directly affect investment efficiency and that free cash flow moderates this relationship.

Mamarabadi et al. (2019) conducted a study on "The Relationship between Business Strategy and Weaknesses of Internal Controls," using least squares and logistic regression methods for testing research hypotheses. The study found a significant relationship between business strategy and weaknesses in internal controls.

Moradi et al. (2018) investigated the relationship between audit quality, auditor expertise criteria, and investment efficiency, finding a negative and significant relationship between auditor expertise in the industry and return on investment.

Shehri Anaghiz et al. (2016) studied the effects of corporate governance on investment efficiency, finding that corporate governance has a direct effect on investment efficiency.

Baradaran Hassanzadeh et al. (2014) studied the effects of agency costs and financing constraints on capital efficiency, finding that financial constraints have no significant relationship with investment efficiency, while agency costs have a significant negative effect on investment efficiency.

3. Research Methodology

Due to the basic theoretical foundations related to the variables under study, the present research is classified as applied research in terms of its purpose and method. It is considered descriptive-causal research because it

aims to study variables as they are, without manipulating them. Historical and post-event data were collected using library and archival methods to test the research hypotheses.

The statistical population of this study includes all firms listed on the Tehran Stock Exchange, excluding those with financial periods ending other than March, those that changed their financial period during the study, and firms with insufficient information for comparability. Investment companies, banks, and insurance firms were also excluded to ensure data homogeneity.

A total of 135 companies were selected using a systematic screening pattern, and data was collected over an 8-year period from 2015 to 2022. By combining data from different time periods, the researcher obtained complete and reliable information.

To investigate relationships in the study, it is recommended to use regression analysis with powerful standard error tools. A multivariate linear regression model is suitable for this research due to the combined nature of the data. The software Eviews 12 can be utilized for regression analysis, along with appropriate statistical methods to test hypotheses effectively.

Table 1: How to Choose a Statistical Sample of Research

The statistical population in 2022		**546**
Lack of Corporate Responsibility	-189	
Firms with stock trading freezes	-31	
Firms that have changed the course of finance	-50	
Firms that entered the stock market during the research period	-92	
Investment Firms, Banks, and Holdings	-49	
Final Sample of Research		**135**

3.1. Regression model

Following Siddique and Rasheed (2023) research, the following models are introduced to test the research hypotheses:

The regression model tests the first, second, and third hypotheses

$$\begin{aligned}\mathrm{INEFF}_{it} = \beta_0 + \beta_1 \mathrm{Inst-own}_{it} + \beta_2\, \mathrm{Manage-own}_{it} \\ + \beta_3 Family-own + \beta_4 \mathrm{Age}_{it} \\ + \beta_5 \mathrm{Leverage}_{it} + \beta_6\, \mathrm{Firm\ size}_{it} \\ + \beta_7\, \mathrm{Growth}_{it} + \beta_8\, \mathrm{Cash}_{it} + \varepsilon_{it}\end{aligned}$$

The regression model tests the fourth, fifth, and sixth hypotheses.

$$\begin{aligned}\mathrm{INEFF}_{it} = \beta_0 + \beta_1 \mathrm{Inst-own}_{it} + \beta_2\, \mathrm{Manage-own}_{it} \\ + \beta_3 Family-own + \beta_4\, \mathrm{Strategy}_{it} \\ + \beta_5 \mathrm{Inst-own}_{it} \times \mathrm{Strategy}_{it} \\ + \beta_6 \mathrm{Manage-own}_{it} \times \mathrm{Strategy}_{it} \\ + \beta_7 Family-own \times \mathrm{Strategy}_{it} \\ + \beta_8 \mathrm{Age}_{it} + \beta_9 \mathrm{Leverage}_{it} \\ + \beta_{10}\, \mathrm{Firm\ size}_{it} + \beta_{11}\, \mathrm{Growth}_{it} \\ + \beta_{12}\, \mathrm{Cash}_{it} + \varepsilon_{it}\end{aligned}$$

3.2. Operational definitions of variables

Independent variables of research: company ownership structure (institutional, managerial, and family ownership)

First independent variable: Inst-own

The percentage of shares is owned by institutional investors such as banks, insurance companies, and so on, as well as those holding more than 5% of the company's shares.

Second independent variable: Manage-own

Management ownership is the amount of shares held by the board of directors of the company, which is ultimately the sum of shares held by the board of directors of the company as managerial ownership.

The third independent variable: is family ownership.

To identify family companies in this research, we will follow studies such as Mehrazin et al. (2013), Sahe et al., and Amour et al. (2022). Family ownership will be defined as follows:

The actual shareholder must own a minimum of 20% of the company's common stock, or one of the board

members must own at least 5% of the common stock. Alternatively, the combined shares of the actual board member and their family members must total at least 5% of the company's shares. Companies meeting these criteria will be classified as family companies and assigned a code of (1), while the rest will be assigned a code of (0).

The dependent variable of research: Investment Efficiency (INVEFF)

Following the research by Seydico and Rashed (2023), the Biddle model (2009) is utilized to determine investment efficiency. The residual value of the model highlights overinvestment and underinvestment. The absolute error value of the model reveals investment inefficiency and serves as an inverse measure of efficiency, as demonstrated in the study by Taghizadeh Khanghah and Badavaran Hendi (1397). To obtain a direct measure of investment efficiency, the absolute error value of the model is multiplied by -1. The model is represented as follows:

$$Investment_{i,t} = + \beta \beta 0_1 \, salegrowth_{i,t} + \varepsilon_{it}$$

In the above model:

Investment: The ratio of change in total fixed assets and long-term investment over the average total assets of the company.

Sales growth: Sales growth (sales period minus previous sales divided by previous period)

Modification Variable Research: Business Strategy

In this research, we are using the combined scoring system developed by Ittner and Larcker (1997) to determine the type of strategy employed by each company, following the methods outlined by Rostami et al. (2021) and Tenani and Mohebkhah (2014). This system involves analyzing five key ratios: sales growth rate, advertising cost to total sales, number of employees to sales, market value of the company to its book value, and the ratio of fixed assets to total assets.

The scoring process begins by dividing the companies into five groups based on the first four ratios, with the top quantile receiving a score of 5, the bottom quantile receiving a score of 1, and the middle companies receiving scores based on their respective quantiles. The companies are then ranked based on the fifth ratio, again divided into five groups with the highest quantile receiving a score of 1, the lowest quantile receiving a score of 5, and the middle companies receiving scores accordingly.

By combining the scores from these two steps, we calculate a final score for each company, ranging from 5 to 25. Companies with total scores between 5 and 15 are classified as defensive firms, while companies with scores between 15 and 25 are classified as aggressive. The total score of 5-25 serves as an indicator of the company's business strategy.

Table 2: How to Score a Business's Competitive Strategy

Quantile	Sales Growth Rate	Advertising Costs	Number of Employees	Market Value of the Company	Fixed Assets
		Total Sales	Total Sales	Book Value of the Company	Total assets
First	5	5	5	5	1
Second	4	4	4	4	2
Third	3	3	3	3	3
Fourth	2	2	2	2	4
Five	1	1	1	1	5

3.3. Control variables of research

Building on previous research, such as Seydiko and Rashed (2023), and other studies in this field, the following factors have been identified as control variables to mitigate potential unwanted effects on the investment efficiency of companies:

Growth: Calculated as sales revenue minus previous sales divided by previous period sales.

Leverage: The ratio of total liabilities to total assets.
Age: The natural logarithm of the year of establishment of the company from the desired year.
Cash: The ratio of operating cash at the end of the period to total assets.
Company Size (SIZE): Natural logarithm of total assets.

4. Research Findings

The main central indicator is the average, which represents the equilibrium point and center of gravity of the distribution and is a good indicator of the centrality of the data. For example, the average value for the leverage variable is 0.54, indicating that most data is centered around this point. In general, dispersion parameters are a criterion for determining the amount of dispersion from each other or their scattering relative to the average. One of the most important dispersion parameters is the standard deviation. The value of this parameter is equal to 31.3 for institutional ownership and investment efficiency (0.09), which shows that these two variables have the highest and lowest standard deviations, respectively. The lowest and highest in each variable.

The results from Table 4 indicate that the significance level of the test in the research models is less than 5%, showing a difference in variance in disturbing sentences. Additionally, the significance level of the serial autocorrelation test in the research model, with a significance level lower than 5%, suggests the presence of serial autocorrelation in the model. By using robust standards and error-resistant facilities in the final model, the issues of variance and serial autocorrelation have been successfully addressed (Aflatooni, 2018).

Based on the results from Table 5, it is evident that the significance level of variables in the stability test is less than 5%, indicating the stability of the variables.

Furthermore, the results from Table 6 show that the significance level of the Chow test for the models in the research hypothesis test is less than 5%, suggesting the acceptance of the panel data pattern necessary for the Hausman test as outlined in (Platonic, 2018). Additionally, the obtained results indicate that the significance level of the test in the hypothesis test model of the research is less than 5%, confirming the acceptance of fixed effects.

Table 3: Descriptive statistics of research variables

Variable	Mean	Max	Min	ST.D
Inst-own	53.6	90.17	0.0000	31.3
INEFF	-0.079	-0.001	-0.50	0.092
Manage-own	56.3	88.6	0.0000	26.6
Family-own	0.17	1.00	0.00	0.38
Strategy	14.98	24.00	6.00	3.04
Age	3.64	4.24	2.48	0.36
Leverage	0.54	1.38	0.10	0.21
Firm size	14.89	20.00	11.11	1.73
Growth	0.36	1.80	-0.39	0.47
Cash	0.11	0.48	-0.21	0.13

Table 4: Results of White, Brush Godfrey

Test Model	Test Statistics	Sig
White Test	126.05	0.0000
White Test	214.45	0.0000
The Brush Godfrey Test	11.99	0.0025
The Brush Godfrey Test	11.24	0.0036

Table 5: Stability Test Quantity of Variables

Variable	Test Statistics	Sig	Results
Inst-own	-9.35637	0.0000	Stationary
INEFF	-34.4894	0.0000	Stationary
Manage-own	-4.11442	0.0000	Stationary
Strategy	-14.1043	0.0000	Stationary
Age	-76.7269	0.0000	Stationary
Leverage	-12.8010	0.0000	Stationary
Firm size	-9.27232	0.0000	Stationary
Growth	-28.8606	0.0000	Stationary
Cash	-8.35455	0.0000	Stationary

Table 6: F-Limmer (Chow) and Hausman Test Results

Test Model	Test Statistics	Sig
F Limer	2.372	0.0000
F Limer	2.110	0.0000
Hausman	129.7	0.0000
Hausman	124.2	0.0000

Table 7: Test results for 1, 2, and 3 hypotheses

Variables	Coef	ST.D	Statistic t	Sig	VIF
Inst-own	0.0002	9.60e05	2.84	0.004	2.17
Manage-own	0.0001	57.40e05	1.41	0.15	1.54
Family-own	0.027	0.011	2.37	0.017	1.56
Age	0.19	0.031	6.07	0.0000	1.06
Leverage	0.038	0.012	3.09	0.002	1.21
Firm size	-0.034	0.003	-9.99	0.0000	1.16
Growth	0.002	0.004	0.59	0.54	1.09
Cash	0.004	0.013	0.29	0.76	1.14
C		-0.27	0.083	-3.23	0.001
Coefficient of determination		0.33			
Watson Durbin		2.01			
F		3.348			
Sig		0.0000			

The results of Table 7 show that the institutional ownership variable has a positive coefficient (0.0002) and a significance level below 5% (0.004), indicating a direct relationship with investment efficiency. Therefore, the first hypothesis of the research is accepted at a 5% error level. The managerial ownership variable, with a significance level of 5% (0.15), does not have a significant relationship with investment efficiency. Therefore, the second hypothesis of the research is not accepted at a 5% error level. The family ownership variable, with a positive coefficient (0.027) and a significance level below 5% (0.017), shows a direct relationship with investment efficiency. Therefore, the third hypothesis of the research is accepted at a 5% error level.

Control variables such as company age, financial leverage, and company size, with a significance level below 5%, have a significant relationship with the dependent variable of the research. The coefficient of determination is 33%, indicating that the independent

and control variables in the model explain 33% of the variation in the dependent variables. Additionally, Watson's kamera value is 2.01, falling within the range of 1.50 to 2.50, showing that there is no strong correlation between the error terms. The collinearity statistics are below 5, indicating no strong correlation between the variables in the research. Test statistics (F) with a significance level of less than 5% suggest that the research model is a good fit.

The results of Table 8 show that the interaction of institutional ownership with business strategy, with a significance level above 5% (0.51), does not affect investment efficiency. Therefore, the fourth hypothesis of the research is not accepted at the 5% error level. The interaction of managerial ownership with business strategy has a significance level higher than 5% (0.54) on capital efficiency. The assessment is not effective, so the fifth hypothesis of the research is not accepted at the 5% error level. The interaction of family ownership with business strategy, with a positive coefficient (0.003) and a significance level of less than 5% (0.022), affects investment efficiency. Therefore, the sixth hypothesis of the research is accepted at the 5% error level. The control variables of company life, financial leverage, size of the company, and sales growth, with a significance level below 5%, have a significant relationship with the dependent variable of the research. The coefficient of determination is equal to 32%, indicating that the independent variables and controls in the model have been able to explain 32% of the variation in the dependent variable. Additionally, Watson's camera value is 2.00, which falls between 1.50 and 2.50, showing that there is no strong correlation between the error terms in the model. The collinearity statistics are below 5, indicating that there is no strong correlation between the variables in the research. Test statistics (F) with a significance level below 5% show that the research model is a good fit.

Table 8: The results of the 4, 5, and 6 hypotheses

Variables	Coef	ST.D	Statistic t	Sig	VIF
Inst-own	9.32e05	0.0003	0.29	0.76	2.18
Manage-own	0.0002	0.0002	0.93	0.35	3.12
Family-own	0.078	0.023	3.29	0.001	3.65
Strategy	0.007	0.001	4.33	0.0000	1.50
Inst-own× Strategy	-1.22e05	1.86e05	-0.65	0.51	1.05
Manage-own × Strategy	-1.16e05	1.90e05	-0.60	0.54	2.83
Family-own × Strategy	0.003	0.001	2.28	0.022	3.38
Age	0.14	0.034	4.20	0.0000	1.11
Leverage	0.026	0.010	2.44	0.014	1.28
Firm size	-0.029	0.004	-7.24	0.0000	1.33
Growth	-0.017	0.005	-3.02	0.002	1.45
Cash	0.004	0.013	0.36	0.71	1.16
C	-0.28	0.093	-3.05	0.002	-
Coefficient of determination	0.32				
Watson Durbin	2.00				
F	3.0538				
Sig	0.0000				

5. Research Results

The purpose of this study is to investigate the role of company ownership in investment efficiency, with a focus on business strategy. Investment is a key factor in business development, and investment efficiency is crucial for achieving corporate goals and maximizing

shareholder wealth. Efficient investment is essential for company growth and sustainable production, creating value for shareholders. Efficient investment occurs when there is no deviation from a positive or negative net present value. Investment efficiency enables businesses to benefit future generations and drive economic growth.

Different types of ownership have varying effects on investment practices. Institutional owners influence management decisions by providing oversight, expertise, proposals, and risk-taking behavior for long-term investments. They also improve financial disclosure to reduce agency friction and information asymmetry. The first hypothesis of this research confirms a positive relationship between institutional ownership and investment efficiency, indicating that increased institutional ownership leads to greater investment efficiency.

The separation of ownership and control, as outlined in the representation theory, allows management to make strategic decisions that align with shareholders' interests and promote investment. The results show that managerial ownership does not impact investment efficiency, supporting the representation theory. Family firms prioritize preserving capital for future generations, influencing their investment decisions and efficiency. Family ownership is positively correlated with investment efficiency, likely due to power distribution among family members and a focus on long-term capital preservation.

Business strategy plays a significant role in organizational structure, resource allocation, and long-term goals. The interaction of different ownership structures with business strategies can impact investment efficiency. The study found that the interaction of business strategy with institutional and managerial ownership does not affect investment efficiency, but it does impact investment efficiency in family-owned companies. Family companies, with their focus on maximizing efficiency and making strategic choices aligned with long-term goals, tend to have higher investment efficiency compared to other ownership structures.

In conclusion, this study highlights the importance of ownership structures and business strategies in influencing investment efficiency. Family ownership, in particular, plays a crucial role in driving investment efficiency through strategic decision-making aligned with long-term goals. The results of this study align with previous research findings and provide valuable insights for companies seeking to optimize their investment strategies.

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Investigating the Effect of Corporate Governance and Social Responsibility on the Relationship between Earnings Management and Board Compensation in Firms Listed on the Tehran Stock Exchange

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Abstract

Objectives: The purpose of this research is to examine the relationship between the board of directors' compensation and earnings management in companies listed on the Tehran Stock Exchange. The moderating effects of corporate governance and social responsibility are also examined.

Design/methodology/approach: To measure corporate governance, criteria such as ownership concentration, institutional investors, and the presence of internal auditors are utilized. Earnings management is measured using Jones' modified model (1991), and accountability is assessed by using a checklist. The statistical population for this research includes 147 firms over 8 years from 2012 to 2019. Research hypotheses are tested using multiple regressions based on the panel data method.

Results: The findings indicate a positive and significant relationship between earnings management and Board compensation. Additionally, the company's social responsibility, ownership concentration, institutional investors, and internal auditors influence the relationship between earnings management and board compensation.

Innovation: This research examines the relationship between earnings management and board compensation, while also considering the moderating role of corporate governance and social responsibility in firms listed on the Tehran Stock Exchange. This study aims to contribute by providing new evidence to existing research and enriching the theoretical foundations in the field of earnings management relationships.

Keywords: Board Compensation, Earnings Management, Corporate Governance, Social Responsibility.

1. Introduction

Considering the rationality of people's behavior, it can be assumed that all individuals seek to maximize their wealth. Managers are not exempt from this principle, and given their freedom to use accounting procedures, they strive to increase their wealth. Nowadays, due to the representation problems caused by the separation of ownership from management, aligning the interests of owners and managers has become an important challenge. If compensation is not proportional to the real performance of the managers, not only will it fail to increase the value of the company, but it will also be a tool to transfer wealth from the owners to the managers. Higher executive compensation can result from the lack of effective corporate governance mechanisms. In general, it can be said that in institutions with stronger corporate governance, the CEO's compensation depends on their performance. Additionally, strong corporate governance mechanisms allow managers to influence remuneration regulations for their benefit (Khalsizadeh and Barzegar, 2016). Sufficient monitoring and oversight should be conducted to ensure the accountability of companies and managers in front of the public and interested parties. Applying supervision and oversight in this area requires the presence of effective mechanisms, which include the design and implementation of appropriate management systems in firms and economic enterprises (Chang et al., 2017). On the other hand, social responsibility is also a moral framework and scope in which various duties are defined for the benefit of the public and are assigned to a specific individual, organization, or institution. The concept of corporate social responsibility involves the connection and alignment between an organization's activities and values in a way that reflects the interests of all stakeholders, including shareholders, customers, employees, investors, and the public, in the organization's policies and performance. In essence, the organization should always view itself as a part of the community, feel responsible towards the community, and strive to improve public welfare regardless of the company's direct interests (Mashaikhi et al., 2014).

In general, the presence of high levels of responsibility in the management of a company can also be effective in determining the compensation of managers. Previous studies have investigated the two-way relationship between earnings management and board compensation (Bagheri et al., 2021; Quaidi and Mir Abbasi, 2016; Mahmoudi et al., 2016; Khosh Taynet and Khani, 2003; Harris et al., 2019). Additionally, the impact of social responsibility on board compensation has been examined (Rahnamay Roodpashti and Zandi, 2019).

However, research that examines the impact of corporate governance on board compensation and explores the moderating role of corporate governance and social responsibility on the relationship between earnings management and board compensation is lacking, representing an aspect of innovative work. The purpose of this research is to examine the relationship between earnings management and board compensation, considering the moderating role of corporate governance and social responsibility in firms listed on the Tehran Stock Exchange. This study aims to enrich the theoretical foundations in the field of earnings management relationships, as well as explore the compensation of managers and the role of corporate governance and social responsibility mechanisms. In this regard, the presence of institutional investors, ownership concentration, and an internal auditor are used as criteria for the corporate governance mechanism, and accountability is assessed using a checklist (Khodai, 2016).

In addition to enhancing backgrounds, it enriches theoretical foundations in the field of earnings management relationships. The compensation of managers as well as the roles of corporate governance and social responsibility mechanisms are interconnected. The presence of institutional investors, ownership concentration, and an internal auditor are used as criteria for evaluating the corporate governance mechanism, with accountability assessed through a checklist (Khodai, 2016).

This paper begins by outlining the theoretical foundations and backgrounds, followed by the methodology and findings, and concludes with a discussion, conclusions, and sources.

2. Literature review

First, the theoretical background is introduced, followed by the literature review.

2.1. Earnings management and compensation

Earnings management is a targeted intervention in the financial reporting process aimed at personal benefits, but it comes with risks. Risks include damaging the company's credit and managers< reputations, as well as potential lawsuits. Manager will only engage in earnings management if the benefits outweigh the costs and risks. Motivations for earnings management included:

1) Increasing stock returns by creating a stable earnings floe and reducing company risk .
2) Presenting an optimal image of the company's future to secure better financing terms in the market (Zarei et al., 2016).
3) Avoiding violations of debt contracts, as some contracts have restrictions on certain ratios like working capital or current ratio (Khushtaint and Khani, 2012).
4) Companies in politically sensitive industries may engage in earning management to mitigate risks (Hass Yeganeh and Yazdanian, 2012) .
5) Managing tax payments effectively (Bagheri et al., 2021).
6) Signaling earnings continuity or growth to attract investors through targeted information (Hossam and Khodadadi, 2021).

In addition to these motivations, managers also seek to increase their well-being by enhancing their earning potential. Compensation plans tied to accounting earnings, job security, job category, and company size impact management welfare and can lead to earnings manipulation (Bones and Cruz, 2011).

2.2. Social Responsibility

Social responsibility is defined as a trans-organizational behavior or task, separate from the traditional duties of companies. This means that companies should not only focus on their earnings but also on increasing social welfare and providing a foundation for increasing the productivity and satisfaction of stakeholders, which can also be defined as part of a company's social responsibility (Mehravar and Kargar, 2018). Among the theories of social responsibility, we can mention social contracts, which are used to explain the behavior of companies. Managers, due to the social contract with other stakeholders, must, in exchange for accepting them, take measures to fulfill some social and environmental goals and provide economic resources to society; otherwise, legal requirements will be determined for them. Another theory is organizational legitimacy; it refers to the condition that the value system of the company is aligned with the value system of a larger social network called society, which does not mean moral or legal success; finally, it is a theory of politics and economy that discloses information. Considered by the company as a tool to prevent others from interfering in the company's affairs. In other words, the company is an active and powerful participant in its performance (Mehrani, 2015). Social responsibility in this research has four dimensions: social participation, employee relations, environment, and product characteristics, which are measured based on the criteria of the American KLD Institute (Khodai, 2016) and its impact on the relationship between earnings and compensation management is measured.

2.3. Corporate governance

Corporate governance can be defined as the set of rules, regulations, institutions, and procedures that determine how companies are run and for what benefit (Beaver, 1996). Corporate governance is the set of laws, regulations, structures, processes, cultures, and systems that aim to achieve accountability, transparency, justice, and respect for the rights of stakeholders (Hassyaganeh, 2016) .

Among the theories that govern corporate governance, the following can be listed: based on agency theory, managers prefer to pursue their own benefits, such as obtaining the highest possible compensation, which leads to their focus and investment in projects with short-term benefits. This is especially true when managers' salaries, benefits, and compensations are tied to earnings and do not consider the long-term interests of shareholders. According to stakeholder theory, companies have grown significantly, affecting society profoundly, and must be accountable to various parts of society in addition to shareholders. Stakeholders include shareholders, employees, vendors, customers, creditors, related companies, and the public, all of whom should be considered by managers. The transaction cost theory suggests that people are often opportunistic, and managers arrange transactions opportunistically to gain personal benefits (Gafran et al., 2022). This research aims to investigate the impact of different types of corporate governance on the relationship between earnings management and board compensation. The study will focus on ownership concentration, institutional investors, and the presence of an internal auditor as key criteria.

2.4. Research background

In the field of the relationship between earnings and compensation management, as well as the influence of accountability variables on corporate governance, research has been conducted and is presented below.

Hesaam and Khodadadi (2021) investigated the relationship between corporate governance and various dimensions such as board size, board independence, accounting quality, and company size with earnings management in companies listed on the Tehran Stock Exchange. The data from 142 companies over the past six years was analyzed using multivariate regression. The results indicated a significant relationship between company size and earnings management, while board size, board independence, and accounting quality did not show a significant relationship with earnings management.

Bagheri et al. (2021) studied the effect of managers' board compensation plans and financial performance on earnings management in companies listed on the Tehran Stock Exchange. They collected financial statements from 104 companies between 2010 and 2015 and analyzed them using regression methods. The results revealed that institutional ownership had a significant impact on earnings management.

Rahnema Roudpashti and Zandi (2019) explored the impact of corporate social responsibility performance on the compensation structure of senior managers in a sample of 152 companies between 2010 and 2015. Their findings showed that corporate social responsibility positively influenced the bonuses of senior executives, leading to a reduction in agency problems and an increase in the company's value.

Mehravar and Kargar (2018) examined the relationship between social responsibility, tax evasion, and earnings management in companies listed on the Tehran Stock Exchange. They analyzed data from 82 companies using regression analysis and found a significant relationship between social responsibility and earnings management.

Dabbagh et al. (2018) investigated the effect of corporate governance mechanisms on earnings management and social responsibility reporting in companies listed on the Tehran Stock Exchange. Their analysis of 69 companies over five years from 2013 to 2017 showed that corporate governance mechanisms, such as institutional ownership and audit committee independence, had a negative impact on earnings management and a positive impact on corporate social responsibility reporting.

Qaidi and Mir Abbasi (2016) explored the relationship between board compensation and earnings management. They examined 201 firms listed on the Tehran Stock Exchange from 2009 to 2015 using regression analysis, which revealed a significant relationship between board compensation and earnings management.

Gaffran et al. (2022) investigated the effect of corporate governance, specifically the audit

committee, on earnings management in English companies between 2007 and 2013. Their regression analysis showed that the busyness of audit committee members had a negative impact on earnings quality, indicating that members with more board seats had less oversight over managers.

Harris et al. (2019) examined the relationship between earnings management among female CEOs and their compensation. They collected data from 147 female managers in American companies between 2010 and 2018 and analyzed it using a structural equation approach. The results indicated that female CEOs did not necessarily reduce earnings management, but at lower compensation levels, female CEOs manipulated earnings to a lesser extent than their male counterparts.

Tahir et al. (2019) investigated the relationship between board compensation contracts and earnings management. They analyzed a sample of 1570 firm-years among companies with the Dow Jones index from 2005 to 2014 using multiple regression. Their results showed that including non-financial performance criteria in managers' board compensation contracts, along with financial performance criteria, reduced manipulation to increase earnings through accruals and discretionary expenses. Additionally, the use of long-term performance measures led to lower earnings management.

Mills et al. (2017) explored the relationship between corporate governance, earnings management, and tax management. Their research from 2005 to 2010 included, 1478 selected firms from Thailand. The regression results indicated that corporate governance mechanisms could be effective factors in both earnings management and tax management.

Considering the theoretical foundations and the backgrounds mentioned above, the research hypotheses were formulated as follows:

Hypothesis 1: there is a significant relationship between earnings management and managers' compensation.

Hypothesis 2: corporate social responsibility affects the relationship between earnings management and board compensation.

Hypothesis 1: corporate governance affects the relationship between earnings management and board compensation.

Sub-hypothesis 1-3: Ownership concentration affects the relationship between earnings management and board compensation.

Sub-hypothesis 2-3: Institutional investors affect the relationship between earnings management and board compensation.

Sub-hypothesis 3-3: An internal auditor affects the relationship between earnings management and board compensation.

3. Methodology

The purpose of this research is practical. In terms of inference, the research method used is descriptive-analytical, and in terms of research design, it is a post-event type of research. Additionally, the research philosophy is positivist, the approach is inductive, and the methodology is quantitative. The research goals and strategy are descriptive in nature. Data collection is done through library research, using document searches to collect information on theoretical foundations and backgrounds. Field research is also conducted using the new Rehavard software and the Codal site. Data is then entered into Excel software for analysis using Eviews software.

The statistical population for this research consists of all companies listed on the Tehran Stock Exchange, with a sample of 147 companies selected using the systematic elimination method outlined in Table 1.

Table 1. Statistical sample selection process

Number	Number	Description
612		Total number of companies accepted in the stock market until the end of 2019
	131	They were not present in the stock market in the periods from 1392 to 1399
	124	Their fiscal year does not end at the end of March
	117	The company has changed the financial year between 2019 and 2019
	93	Financial intermediation, investment, and analytical companies due to their special nature
465		Total companies removed
147		Number of sample companies

3.1. Variables and research model

Research variables in the form of independent and dependent variables and control and adjustment are proposed:

independent variable _ Earnings management ($DACC_{it}$)

According to the modified model of Jones (1in firms listed on the Tehran Stock Exchange991) which was also used in the research of Okofu et al. (2021), in this research, the variable of discretionary accruals is to be managed for discovery. The company is used

$$\frac{TA_{ccri,t}}{\text{ASSETS}_{i,t-1}} = \propto + \beta_0 \frac{1}{ASSETS_{i,t-1}} + \beta_1 \frac{(\Delta REV_{i,t})}{ASSETS_{i,t-1}} + \beta_2 \frac{PPE_{it}}{ASSETS_{i,t-1}} + \varepsilon_{it} \quad (1)$$

$TA_{ccri,t}$ =Total accrual items for the current year (the difference between operating cash flow and earnings before unexpected items)

$\text{ASSETS}_{i,t-1}$ =Total assets at the beginning of the period

$\Delta REV_{i,t}$ =Difference in operating income of the current year compared to the previous year

PPE_{it} = Property, Plant, and equipment

ε_{it} = error component (accrual items)

After estimating the parameters of model number 1, non-discretionary accrual items (NDA) are calculated as follows:

$$NDA_{it} = \propto + \beta_0 \frac{1}{ASSETS_{i,t-1}} + \beta_1 \frac{(\Delta REV_{i,t} - \Delta REC_{it})}{ASSETS_{i,t-1}} + \beta_2 \frac{PPE_{it}}{ASSETS_{i,t-1}} + \varepsilon_{it} \quad (2)$$

$\Delta REC_{i,t}$It represents the change in the net Accounts Receivable for the current year compared to the previous year. In the last step, discretionary accruals (DA) are calculated as described in equation (3).

$$DA = \frac{TA_{ccri,t}}{\text{ASSETS}_{i,t-1}} - NDA_{it} \quad (3)$$

3.2. Dependent variable compensation managers

According to Article 241 of the Business Law, which amends certain provisions of commercial law, the annual general meeting has the authority to allocate a specific percentage of the company's annual net profit as board compensation for board members, provided it is outlined in the company's articles of association. Under this provision, the board compensation for executives must not exceed 3% of the dividends distributed to shareholders in the same year for public corporations and 6% for private joint stock companies. This calculation method was utilized in a study conducted by Haidari and Ranjbari in 2014.

3.3. Moderator variables

Corporate governance is measured using three criteria, as follows:

A- Concentration of ownership【CON】_it: The ownership concentration percentage refers to the total percentage of shareholders who own more than 5% of the company's shares. If there is a concentration of ownership, the number is one; otherwise, the number is zero (Azadi and Mohammadi, 2014).

B. Existence of institutional investors【INST】_it: Institutional investors refer to banks, insurance companies, holding companies, investment companies, pension funds, capital providers, and investment funds registered with the Securities and Exchange Organization, as well as government and public organizations, institutions, and government-owned companies. According to Khodadadi and Tucker

(2012), if there are institutional investors present, the value is one; otherwise, it is zero.

C- Presence or absence of internal auditor 〖INAUDIT〗_it company: It is a dummy variable. If a company has an internal auditor in the year, the number 1 is assigned to it; otherwise, the number 0 is assigned to it (Hass Yeganeh and Yazdanian, 2016).

Social responsibility: Social responsibility in this research encompasses four dimensions: social participation, employee relations, environment, and product characteristics. Each dimension is evaluated on a scale of one for relevant weaknesses or strengths, and zero for none. By comparing strengths and weaknesses within each dimension, a score is calculated. The total social responsibility score is then determined by summing up scores across all dimensions. If the company's responsibility score surpasses the midpoint, it is assigned a value of one; otherwise, it is assigned zero (Khodaei, 2016).

$$SG_{it} = COM_{it} + PRO_{it} + EMP_{it} + ENV_{it} \qquad (4)$$

Table2. Dimensions of social responsibility

Dimension of product's specification		Dimension of environment		Dimensions of employee relations		Dimensions of social participation	
Negative items	Positive items	Negative items	Positive items	Negative items	Positive items	Negative items	Positive items
Paying fines for regarding product safety	Product Quality	Production of hazardous waste	clean energy	Poor health and safety	Sharing Dividend	Factory shutdowns	Charitable donations
Paying advertising penalties Paying	product security	Paying penalties	Air pollution control	Labor force reduction	Retirement benefits	Failure to pay taxes	Innovative contributions

Source: (Khodayi, 2016)

3.4. Control variables

Financial leverage (LEV) is the ratio of total liabilities divided by equity (Qalibaf Asl and Rezaei, 2016).

The ratio of book value to the market value of equityBM〗_it

RET〗_it: annual changes in the rate of return on assets. The rate of return on assets is measured as the ratio of net earnings after tax divided by total assets (Efza et al., 2016).

Company size〖SIZE〗_it: natural logarithm of the company's total sales (Qalibaf Asl and Rezaei, 2016).

The main research models are as follows:

Research model for testing hypotheses

The research model is designed, according to Okofu et al. (2021), as follows:

The first main hypothesis test model

$$COM_{it} = \alpha_0 + \alpha_1 DACC_{it} + \alpha_2 RET_{it} + \alpha_3 \Delta ROA_{it} + \alpha_4 SIZE_{it} + \alpha_5 LEV_{it} + \alpha_6 BM_{it} + \varepsilon_{it}$$

The second main hypothesis test model

$$COM_{it} = \alpha_0 + \alpha_1 DACC_{it} + \alpha_2 CSR_{it} + \alpha_3 DACC_{it} \times CSR_{it} + \alpha_4 RET_{it} + \alpha_5 \Delta ROA_{it} + \alpha_6 SIZE_{it} + \alpha_7 LEV_{it} + \alpha_8 BM_{it} + \varepsilon_{it}$$

Third hypothesis test models:

Sub-hypothesis 3-1:

$$COM_{it} = \alpha_0 + \alpha_1 DACC_{it} + \alpha_2 CON_{it} + \alpha_3 DACC_{it} \times CON_{it} + \alpha_4 RET_{it} + \alpha_5 \Delta ROA_{it} + \alpha_6 SIZE_{it} + \alpha_7 LEV_{it} + \alpha_8 BM_{it} + \varepsilon_{it}$$

Sub-hypothesis 3-2:

$$COM_{it} = \alpha_0 + \alpha_1 DACC_{it} + \alpha_2 INST_{it} + \alpha_3 DACC_{it} \times INST_{it} + \alpha_4 RET_{it} + \alpha_5 \Delta ROA_{it} + \alpha_6 SIZE_{it} + \alpha_7 LEV_{it} + \alpha_8 BM_{it} + \varepsilon_{it}$$

Sub-hypothesis 3-3:

$$COM_{it} = \alpha_0 + \alpha_1 DACC_{it} + \alpha_2 INAUDIT_{it} + \alpha_3 DACC_{it} \times INAUDIT_{it} + \alpha_4 RET_{it} + \alpha_5 \Delta ROA_{it} + \alpha_6 SIZE_{it} + \alpha_7 LEV_{it} + \alpha_8 BM_{it} + \varepsilon_{it}$$

4. Findings

4.1. Descriptive Statistics

The results of the descriptive characteristics of the research variables are presented in Table 3. For example, the average and median size of the company are 13.752 and 14.808, respectively, falling within the range of 9.866 to 16.307. Additionally, the data shows acceptable skewness and kurtosis.

Table 3- Descriptive statistics of research variables

Prominence	crookedness	maximum	Minimum	standard deviation	Middle	Average	
-0.400	-0.10	83.3	0	16.3	2.5	2.8	Board Compensation
0.480	0.190	307.16	9.866	311.2	808.14	752.13	Company size
0.640	-0.520	101.2	-0.718	0.146	0.0821	0.1054	The rate of return on assets
0.010	0.330	0.883	0.017	740.2	0.243	0.266	Assets book to the market value
-0.400	-0.10	0.894	0.066	0.1998	0.416	0.671	Leverage ratio
914.50	611.6	330.8	8.76-	216.1	1.115	295.1	Stock returns
172.2	337.2	0.6482	0.3316	0.1304	0.2114	0.2549	Earnings management

Source: Research calculations

4.2. The results of research hypothesis testing

Initially, the normality of the compensation-dependent variable was assessed using the Jarque-Bera test, yielding a Jarque-Bera statistic of 5.033 with a significance level of 0.048. Subsequently, the presence of collinearity between variables was examined using the Variance Inflation Factor (VIF) test. A VIF test statistic close to one indicates the absence of collinearity. The results of these tests are displayed in Table 4.

Table 4 - VIF test results to check the absence of collinearity between variables

The fifth model		The fourth model		The third model		The second model		The first model	
VIF	Variable	VIF	Variable	VIF	Variable	VIF	Variable	VIF	Variable
----	Fixed model	---	Fixed model	---	Fixed model	---	Fixed model	----	Fixed model
1.84	DACC	1.84	DACC	1.31	DACC	1.81	DACC	1.81	DACC
1.116	COM	1.150	COM	1.129	COM	1.156	COM	1.03	COM
1.005	ΔROA	1.011	ΔROA	1.004	ΔROA	1.004	ΔROA	1.015	ΔROA
1.576	SIZE	1.573	SIZE	1.576	SIZE	1.576	SIZE	1.576	SIZE
1.603	LEV	1.511	LEV	1.603	LEV	1.602	LEV	1.623	LEV
1.91	RET	1.84	RET	1.141	RET	1.41	RET	1.192	RET
1.05	INST	1.126	INST	1.012	INST	1.025	INST	1.014	INST
1.085	BM	1.015	BM	1.593	BM	1.586	BM	1.516	BM

significant at the5% level

Source: Research calculations

4.3. The first hypothesis test

Initially, the non-homogeneity of the variance of the residuals was assessed using the LR test. The LR chi2 statistic yielded a value of 198.75, with a significance level of 0.059, indicating no issue of heterogeneity. Subsequently, the type of model was determined through Chow and Hausman tests. The Chow test statistic was 35.716, with a significance level of 0.0001, suggesting the necessity of employing a panel model for this dataset. Additionally, the Hausman test statistic was 135.918, with a significance level of 0.0001, leading to the selection of the fixed effect method. The results of the significance test of the coefficients can be found in Table 5.

The first hypothesis is accepted in this case, considering the β-1 coefficient in the regression model, which is equal to 0.134 and statistically significant. In other words, it can be concluded that there is a direct relationship between the amount of earnings management in the company and the increase in managers' compensation. Additionally, the results indicate a positive impact of company size and the ratio of market to book value of the company's shares on managers' compensation. A larger company and a higher stock market value directly influence the board's compensation.

Table 5. Summary of the regression model results of the first hypothesis

$COM_{it} = \beta_0 + \beta_1 DACC_{it} + \beta_2 RET_{it} + \beta_3 \Delta ROA_{it} + \beta_4 SIZE_{it} + \beta_5 LEV_{it} + \beta_6 BM_{it} + \varepsilon_{it}$				
$P-Value$	**statistics t**	**The standard deviation**	**Coefficient**	**Variable**
***0.0001	1.970	0.241	0.474	Fixed model(β_0)
***0.0001	2.410	0.056	0.134	Earnings management ($DACC_{it}$)
0.432	0.710	0.008	0.006	Stock rate of return (RET_{it})
0.657	0.220	1.455	0.320	Change in the rate of return on assets(ΔROA_{it})
***0.0001	2.910	0.014	0.041	size of the company($SIZE_{it}$)
0.890	0.066	1.318	0.087	Financial Leverage (LEV_{it})
***0.0001	2.920	0.018	0.054	Book value over the market value of equity(BM_{it})
19.26	F- statistic		2.18	N - Durbin-Watson statistic
0.41	Adjusted coefficient of determination		0.44	The coefficient of determination

Significant at the5% level
Source: Research calculations

4.4. The results of the second hypothesis test

Initially, the non-homogeneity of the variance of the residuals was assessed using the LR test. The LR chi2 statistic yielded a value of 183.18 with a significance level of 0.056, indicating no heterogeneity issue. Subsequently, the model type was determined through Chow and Hausman tests. The Chow test statistic was 39.651 with a significance level of 0.0001, suggesting the use of a panel model for this dataset. The Hausman test statistic was 139.358, with a significance level of 0.0001, leading to the selection of the fixed effect method. The significance test results of the coefficients can be found in Table 6.

Table 6 indicates that earnings management has a positive effect on Board compensation, with a coefficient of 0.147. Social responsibility was not effective, with a significant value of 0.415, and the presence of responsibility in the company did not impact Board compensation. Additionally, when examining the interactive role of social responsibility and earnings management with a coefficient of 0.129, it is significant compared to the coefficient of earnings management of 0.147. If there is social responsibility in the company, the relationship between earnings management and compensation will decrease. In other

words, accountability in the company will lead to a decrease in earnings management.

Sub-hypothesis test results

Initially, the non-homogeneity of the variance of the residuals was assessed using the LR test, with the LR chi-squared statistic yielding a value of 221.64 and a significance level of 0.109, indicating no heterogeneity issue. Subsequently, the type of model was determined through Chow and Hausman tests. The Chow test statistic was 41.125 with a significance level of 0.0001, necessitating the use of a panel model for this dataset. The Hausman test statistic was 161.221, with a significance level of 0.0001, leading to the selection of the fixed effect method. The significance test results of the coefficients can be found in Table 7.

Table 7 indicates that earnings management has a positive effect on board compensation, with a coefficient of 0.106. While the concentration of ownership was not effective, with a significant value of 0.025, it can be said that the presence of ownership concentration in the company did not affect board compensation. Additionally, examining the interactive role of ownership concentration and earnings management with a coefficient of 0.121 is significant compared to the earnings management coefficient of 0.106. If there is ownership concentration in the company, the relationship between earnings management and compensation will be incremental. In other words, if there is a concentration of ownership in the company, earnings management towards increasing bonuses will increase.

Sub-hypothesis test results

Initially, the non-homogeneity of the variance of the residuals was assessed using the LR test. The LR chi2 statistic yielded a value of 221.11 with a significance level of 0.071, indicating no issue of heterogeneity. Subsequently, the type of model was determined through Chow and Hausman tests. The Chow test statistic was 39.141 with a significance level of 0.0001, necessitating the use of a panel model for this dataset. The Hausman test statistic of 115.281, with a significance level of 0.0001, led to the selection of the fixed effect method. The results of the significance test of the coefficients can be found in Table 8.

Table 8 shows that earnings management positively impacts board compensation, with a coefficient of 0.146. The presence of institutional investors, however, did not have a significant effect, as indicated by a value of 0.484. This suggests that institutional shareholders did not influence board compensation. Furthermore, analyzing the interaction between institutional shareholders and earnings management did not yield meaningful results. Therefore, it can be concluded that the presence of institutional shareholders in a company does not affect the relationship between earnings management and compensation.

Sub-hypothesis test results

Initially, the non-homogeneity of the variance of the residuals was assessed using the LR test, with a LR chi2 statistic value of 242.35 and a significance level of 0.121, indicating no heterogeneity issue. Subsequently, the model type was determined through Chow and Hausman tests. The Chow test statistic was 32.129 with a significance level of 0.0001, indicating the need for a panel model for this dataset. The Hausman test statistic was 191.251 with a significance level of 0.0001, leading to the selection of the fixed effect method. The results of the coefficient significance test are detailed in Table 9.

Based on the findings in Table 9, it is evident that earnings management has a positive impact on Board compensation, with a coefficient of 0.182. Interestingly, the presence of an internal auditor did not show a significant effect, with a value of 0.711, indicating that having an internal auditor in the company does not influence the board's compensation. Furthermore, when considering the combined influence of an internal auditor and earnings management, the coefficient is 0.155, slightly lower than the coefficient for earnings management alone. This suggests that if there is an internal auditor present, the relationship between earnings

management and compensation is weakened. Essentially, having an internal auditor in the company tends to reduce the extent of earnings management.

Table 6. Summary of the Results of the Regression Model of the Second Hypothesis

$$COM_{it} = \alpha_0 + \beta_1 DACC_{it} + \beta_2 CSR_{it} + \beta_3 DACC_{it} \times CSR_{it} + \beta_4 RET_{it} + \beta_5 \Delta ROA_{it} + \beta_6 SIZE_{it} + \beta_7 LEV_{it} + \beta_8 BM_{it} + \varepsilon_{it}$$

$P-Value$	statistics t	The standard deviation	Coefficient	Variable
***0.041	1.985	0.210	0.416	Fixed model(α_0)
***10.000	2.415	0.061	0.147	Earnings management ($DACC_{it}$)
0.415	0.713	0.017	0.012	Social Responsibility (CSR_{it})
***10,000	2.290	0.056	0.129	The interaction of social responsibility and earnings management ($DACC_{it} \times CSR_{it}$)
***0.032	1.987	0.016	0.032	Stock rate of return (RET_{it})
0.512	0.118	0.332	0.039	Change in the rate of return on assets (ΔROA_{it})
0.098	1.716	0.049	0.084	The size of the partnership ($SIZE_{it}$)
.	1.513	0.060	0.091	Financial Leverage (LEV_{it})
0.362	0.596	0.050	0.030	Book value over the market value of equity (BM_{it})
18.25804	F statistic		2.178697	N - Durbin-Watson statistic
0.440105	Adjusted coefficient of determination		0.468384	The coefficient of determination

significant at the5% level

Source: Research calculations

Table 7- Summary of regression model results of hypothesis 1-3

$$COM_{it} = \beta_0 + \beta_1 DACC_{it} + \beta_2 CON_{it} + \beta_3 DACC_{it} \times CON_{it} + \beta_4 RET_{it} + \beta_5 \Delta ROA_{it} + \beta_6 SIZE_{it} + \beta_7 LEV_{it} + \beta_8 BM_{it} + \varepsilon_{it}$$

$P-Value$	statistics t	The standard deviation	Coefficient	Variable
***0.001	1.965	0.161	0.316	Fixed model (β_0)
***10.000	2.465	0.043	0.106	Earnings management ($DACC_{it}$)
0.918	0.187	0.135	0.025	Concentration of ownership (CON_{it})
***10.000	2.216	0.055	0.121	Interaction of ownership concentration and earnings management ($DACC_{it} \times CON_{it}$)
***10.000	2.327	0.015	0.036	Stock rate of return (RET_{it})
***10.000	2.418	0.007	0.018	Change in the rate of return on assets (ΔROA_{it})
***0.012	1.915	0.040	0.077	The size of the partnership ($SIZE_{it}$)
***10.000	2.264	0.039	0.089	Financial Leverage (LEV_{it})
0.832	0.169	0.242	0.041	Book value over the market value of equity (BM_{it})
19.08304	F – statistic		2.49113	N - Durbin-Watson statistic
0.311105	Adjusted coefficient of determination		0.3301384	The coefficient of determination

significant at the5% level

Source: Research calculations

Table 8- Summary of regression model results

$COM_{it} = \alpha_0 + \beta_1 DACC_{it} + \beta_2 INST_{it} + \beta_3 DACC_{it} \times INST_{it} + \beta_4 RET_{it} + \beta_5 \Delta ROA_{it} + \beta_6 SIZE_{it} + \beta_7 LEV_{it} + \beta_8 BM_{it} + \varepsilon_{it}$				
$P-Value$	statistics t	The standard deviation	Coefficient	Variable
***10.000	2.912	0.277	0.806	Fixed model (α_0)
***10.000	2.301	0.063	0.146	Earnings management ($DACC_{it}$)
0.484	0.632	0.056	0.035	The presence of institutional investors ($INST_{it}$)
0.793	0.21	0.184	0.039	The interaction between the presence of institutional investors and earnings management ($DACC_{it} \times INST_{it}$)
***10,000	2.143	0.006	0.012	Stock rate of return (RET_{it})
0.413	0.224	0.112	0.025	Change in the rate of return on assets (ΔROA_{it})
***10.000	2.511	0.049	0.122	The size of the partnership ($SIZE_{it}$)
0.541	1.289	0.066	0.085	Financial Leverage (LEV_{it})
0.689	0.189	0.169	0.032	Book value over the market value of equity (BM_{it})
17.33304	F- statistic		2.079685	N - Durbin-Watson statistic
0.520105	Adjusted coefficient of determination		0.538384	The coefficient of determination

significant at the5% level

Source: Research calculations

Table 9- Summary of regression model results of hypothesis 3-3

$COM_{it} = \beta_0 + \beta_1 DACC_{it} + \beta_2 INAUDIT_{it} + \beta_3 DACC_{it} \times INAUDIT_{it} + \beta_4 RET_{it} + \beta_5 \Delta ROA_{it} + \beta_6 SIZE_{it} + \beta_7 LEV_{it} + \beta_8 BM_{it} + \varepsilon_{it}$				
$P-Value$	statistics t	The standard deviation	Coefficient	Variable
***10.000	2.085	0.191	0.398	Fixed model (β_0)
***10.000	2.406	0.075	0.182	Earnings management ($DACC_{it}$)
0.711	0.181	0.196	0.036	Having an internal auditor ($INAUDIT_{it}$)
***10.000	2.226	0.070	0.155	The interaction between the internal auditor and earnings management ($DACC_{it} \times INAUDIT_{it} + \beta_4$)
***10.000	2.363	0.020	0.046	Stock rate of return (RET_{it})
***10.000	2.422	0.008	0.020	Change in the rate of return on assets (ΔROA_{it})
***10.000	1.931	0.006	0.011	The size of the partnership ($SIZE_{it}$)
0.345	1.369	0.069	0.095	Financial Leverage (LEV_{it})
0.839	0.120	0.433	0.052	Book value over the market value of equity (BM_{it})
18.18215	F- statistic		2.249931	N - Durbin-Watson statistic
0.1589502	Adjusted coefficient of determination		0.281635	The coefficient of determination

significant at the5% level

Source: Research calculations

5. Discussion and conclusion

Ac According to the results of the first main hypothesis, as earnings management increases, managers' compensation also increases. Financial reports are crucial sources of information for economic decisions, utilized by managers, investors, creditors, and other users to fulfill their needs. Due to unequal access to information between users and managers, with managers possessing more undisclosed information about the company's operations and future prospects compared to investors, there exists an information asymmetry. This information gap creates an opportunity for managers to engage in earnings management. Essentially, managers have exclusive access to certain information and can manipulate financial data, aided by features like accrual accounting, incentives such as compensation incentives, earnings smoothing, and regulation avoidance. This situation motivates managers to potentially increase their compensations and benefits, conflicting with the interests of other stakeholders, and initiating earnings management. These findings align with the research of Qaidi and Mir Abbasi (2016) and agency theory. Based on these results, it is recommended for company shareholders and accounting standard setters to implement measures like strengthening corporate governance, high-quality independent auditing, and establishing appropriate accounting standards to regulate managers' earnings management.

The results of the second hypothesis suggest that the presence of social responsibility within a company leads to a reduction in earnings management for managers' bonuses. Companies that disclose more information about their social activities experience lower levels of earnings management. Social responsibility acts as a deterrent for managers seeking compensation through manipulation. According to organizational legitimacy theory, when a company upholds social responsibility, its values align with those of society, resulting in increased board compensations. High social performance positions managers as role models, leading to pride and recognition for doing the right things, along with non-cash benefits. These outcomes are consistent with the research of Roud Pashti and Zandi (2019) and political economic theory. Stakeholders and analysts are advised to acknowledge that while responsible companies may still engage in earnings manipulation for board compensation, the extent is significantly lower compared to other companies. Therefore, social responsibility can be viewed as a positive aspect in analyzing companies' conditions.

The results of hypotheses 1-3 indicate a significant positive relationship between earnings management and board compensation, with ownership concentration playing a moderating role. When ownership is concentrated in a company, manipulating earnings to increase compensation becomes more prevalent. As ownership percentage rises, investors become more interested in monitoring management decisions. In today's companies, with a large number of owners and shareholders, direct monitoring of performance is not feasible for shareholders. Therefore, emphasizing the role of ownership concentration in corporate governance is logical to protect the interests of all groups and ensure optimal management control. These results contradict Ahmedpour and Javan's (2014) research and align with the transaction cost theory. It is recommended that shareholders do not reduce ownership concentration to control manager's opportunistic activities but instead involve a more diverse group of shareholders in the company.

The results of hypotheses 2–3 show no significant relationship between earnings management and board compensation when institutional investors moderate ownership. The presence of institutional shareholders does not affect the positive relationship between earnings management and board compensation. Using institutions and organizations in the company's ownership structure to control the relationship between earnings manipulation and manager compensation is ineffective. Shareholders should assess the company's status and monitor earnings management to influence board compensation, considering factors like

managerial responsibility, ownership concentration, and the presence of internal auditors instead of relying on institutional shareholders.

The results of hypotheses 3-3 reveal a positive and significant relationship between earnings management, board compensation, and the moderating role of internal auditors. If a company has internal auditors, managers may still manipulate earnings to increase board compensation, but to a lesser extent. A stronger internal auditor role creates a fair system for determining executive managers' salaries, benefits, and compensations, promoting long-term value creation and manager reputation while reducing the impact of earnings management on compensation. These results align with Okofu et al. (2021) and Dabbagh et al. (2018) research.

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