

The Effect of the Internal Audit Attributes' on the Probability of Fraud Occurrences' in the Financial Statements of Iraq Companies

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Abstract

The existence of an internal audit unit is an undeniable necessity for strengthening corporate governance, upgrading the internal control system, assisting in strategic risk management and ensuring transparency in internal and external reporting. The purpose of this study is to investigate the effect of the characteristics of the internal audit unit on the probability of fraud in the financial statements. For this purpose, the data of 96 companies listed on the Iraqi Stock Exchange during the years 2014 to 2020 have been used. The number of employees, tenure, experience and degree have been the characteristics of internal audit that have been investigated in this study. Inventories are measured in current assets, equity liabilities, cash in current liabilities and the absolute value of changes in the current ratio. The research hypotheses were analyzed using regression model and Eviews software. The findings indicate that the experience, tenure and education of the audit unit manager have a significant negative effect on the likelihood of fraud in the financial statements of Iraqi stock exchange companies. However, no significant effect was observed on the probability of fraud in the financial statements of the companies under study due to the nature of the number of internal audit staff.

Keywords: *Fraud, Internal Audit, Financial Statements, Iraqi Stock Exchange*

1-1- Introduction

An increase in the number of frauds, misrepresentations and restatements, often associated with the bankruptcy of large companies, has raised concerns about the quality of financial statements. The increasing number of frauds, misrepresentations and restatements, often intertwined with the bankruptcy of large companies, has raised concerns about the quality of financial statements. The increasing number of frauds, misrepresentations and restatements, often intertwined with the bankruptcy of large companies, has raised concerns about the quality of financial statements. In order to minimize the possibility of fraud and abuse in any company, it is better to have the entire internal control system of each company professionally reviewed by experts and independent of the company, and the structure of the internal control system is prepared and implemented in a codified manner. to be Of course, this system of internal controls should be checked and updated regularly. Reasonable and greater confidence in organizations is increased by implementing internal controls in the environment of organizations, and the accounting and financial goals of internal controls are achieved, which makes it possible to prevent fraudulent reporting, and greatly improves the quality of auditing and The auditor's report will be added in these organizations. Therefore, it can be seen that internal controls not only have direct effects but also indirect effects in the cycle of financial reporting and building trust for it (Safarzadeh, 2010). Therefore, one of the main concerns of

the board of directors, managers, business owners and internal auditors is how to establish the internal control system and effectively and efficiently deal with the risk of fraud at the organization level. According to past research, it is claimed that an effective internal control system is a primary tool for preventing, detecting and correcting fraud and mistakes (Bara, 2010).

1-2- Statement of the research problem

Although fraud is a universally known term, most people are unable to define it in real terms. | Fraud is a commercial risk that executives and senior audit managers have been facing for a long time (Rahimian and Akhundzadeh, 2010). Statement of Auditing Standard No. 99 distinguishes error as "misrepresentation or unintentional omission of amounts or disclosures in financial statements" and fraud as "misrepresentation or intentional omission of amounts or disclosures in financial statements". The difference between fraud and error is the intentional or unintentional act that leads to distortion in financial statements. Fraud, unlike a mistake, is intentional and usually involves the conscious concealment of facts. Although the auditor may be able to identify potential opportunities for fraud, it is very difficult, if not impossible, for him to discern the intent of the perpetrator. Especially in matters that go back to management's judgment (such as accounting estimates and the correct and appropriate application of accounting standards). One of the main concerns of the board of directors, managers, business owners and internal auditors is how to establish the internal control system and effectively and efficiently deal with the risk of fraud at the organization level. The weakness of internal controls can lead to an increase in biased deviations and fraud (intentional or unintentional) in financial statements, reducing the effectiveness and efficiency of business operations, and as a result, the company's profitability will not continue. In recent decades, attention to internal controls has increased. In order to achieve competitive advantages, efficiency and effectiveness must be considered within companies, and an effective monitoring tool in the hands of companies is internal audit. Internal auditors, like the two eyes of an organization, have the duty to monitor the internal performance and report them well as soon as they observe deviations from principles, regulations and policies, or encounter frauds and violations, so that the future of the company is not threatened. This research seeks to examine the characteristics of the internal audit unit on the possibility of fraud in Iraqi companies. It is expected that characteristics such as the number of internal auditors, their expertise, the level of experience and the level of education of the managers of the internal audit unit will affect the probability of fraud in financial statements. During the last few decades, the frauds discovered in the financial reports of the companies have caused the capital market of different countries to undergo severe fluctuations. These frauds have a negative effect on the capital market and cause huge financial losses and the loss of trust in social systems or the destruction of economic and social enterprises. It is noteworthy that investors have gradually become more sensitive to the issue of fraud risks; Because losses caused by fraud significantly cause direct financial losses due to fraud. These losses cause an unpleasant public image of the company and affect its reputation, thus losing investors' trust in the leadership of the organization and their management methods, and this is a fact that affects the decrease in the value of the organization. The internal audit unit, with the opinion of the highest responsible official and respects professional ethics, reduces the corruption to a great extent. Internal audit is an obstacle to undermine internal controls and an effective obstacle to manager fraud. Fraud prevention

responsibilities within the organization are divided between various committees and internal auditors. In the mentioned activities, internal auditors must have sufficient knowledge to identify possible fraud, be aware of cases related to the risk of fraud, the possibility of re-inspecting files, be aware of the responsibility of the organization's people, and be able to take measures to eliminate or reduce the possibility of fraud.

1-3- The importance of the subject

Fraud is one of the most important issues that are raised in accounting and auditing of financial statements and in other audits. There are many evidences of many efforts in the fraudulent manipulation of companies' accounting offices (in other words, accounting). In recent years, scandals have become common and customary, which can be called financial scandals (Hass Yeganeh et al., 2009). The effect of internal controls on the correct implementation of policies and management methods and as a result improving the performance of companies and reducing fraud and distortions in financial statements is not hidden from anyone. The weakness of internal controls can lead to an increase in biased deviations and fraud (intentional or unintentional) in financial statements, reducing the effectiveness and efficiency of business operations, and as a result, the company's profitability will not continue. Larger institutions do audit work better because they have more credibility. In addition, due to the fact that larger companies have more resources to consume, they can attract employees with higher skills. Internal control and the possibility of fraud in this research are examined in the financial statements of Iraqi companies.

1-4- Research objectives

1-4-1- General and main goals

Studying the effect of internal audit characteristics on the possibility of fraud in financial statements

1-4-2- Research objectives

- 1- Investigating the effect of the number of employees of the internal audit unit on the possibility of fraud in financial statements
- 2- Examining the effect of the internal audit manager's tenure on the possibility of fraud in financial statements
- 3- Examining the effect of the education level of the internal audit manager on the possibility of fraud in financial statements
- 4- Examining the effect of the internal audit manager's experience on the possibility of fraud in financial statements.

1-4-4- practical goals

1) Managers of Iraqi stock companies: helping the managers of the production departments of organizations and similar institutions in analyzing and examining the impact of internal audit on the occurrence of fraud in financial statements and using the results of the research, as an expression of the role and functional position of internal audit in organizations, in addition On the duty of providing audit services. Using the results of the research, managers can analyze the impact of internal audit on the occurrence of fraud in financial statements in making optimal decisions to advance the goals of the organization.

2) Accountants and auditors: Accountants and auditors, as a group whose accounting ethics are crystallized in their performance, while being aware of this important function of accounting, while being more aware of their role and position in the process of the organization's affairs, are more bound to comply with the principles. They will know the rules and regulations of professional behavior.

3) Researchers: Researchers and researchers in the financial field can use the results of examining the effects of internal control variables on the occurrence of fraud in the present study in conducting their research.

4) Financial analysts: Considering the results of the research, they should be more confident in using financial statements in order to predict and make decisions in the financial markets.

5) Standardizers of the accounting profession: according to the research results, standard setting institutions can consider the standards related to internal audit.

5-1-Hypotheses

1) The number of employees of the internal audit unit has a significant effect on the possibility of fraud in financial statements.

2) The tenure of the internal audit manager has a significant effect on the possibility of fraud in financial statements.

3) The experience of the internal audit manager has a significant effect on the possibility of fraud in financial statements.

4) The educational qualification of the internal audit manager has a significant effect on the possibility of fraud in financial statements.

1-6-Methodology

1-6-1- Method type

The method of this research is applied and post-event descriptive, and multivariate regression is used to test the hypotheses, which analyzes the relationship using secondary data extracted from the financial statements of Iraqi companies. This research will be done in the framework of deductive-inductive reasoning. The reason for using the correlation method is to discover correlation relationships between variables. Correlational research is one of the types of

descriptive research. Correlational research is one of the types of descriptive research. In the current research, we first tested the correlation between the research variables, and if there is a correlation between the research variables, we will proceed to estimate the multiple regression models. On the other hand, the current research is post-event type (semi-experimental), that is, it is based on the analysis and analysis of past and historical information (financial statements of companies). Also, this research is an archival and analytical study. Research is considered as a development goal and as a correlation method.

1-6-2- Data collection method

The theoretical content and statistical data in this research are collected from two sources. In collecting theoretical literature and theoretical concepts, the archival method (collected data) is used. In this method, based on the content of articles, theses, scientific reports, the content of scientific websites that deal with the index of articles, scientific and research journals, and articles of national and international conferences, it will be used in reviewing and editing the subject literature. In collecting data related to testing hypotheses, in order to fulfill the goals and finally answer the questions raised and the future of this research, according to the compiled models and the studied variables from the audited financial statements of Iraqi companies and in some cases using software Information and websites related to the Iraqi Stock Exchange that contain Iraqi capital market data are collected.

-6-3- Society and statistical sample

The statistical population of this research is all the companies admitted to the Iraqi Stock Exchange during the period from 2015 to 2020 (5-year period). The reason for choosing companies from Iraq's capital market (Iraq Stock Exchange) is that it is possible to easily access the data and financial statements of companies admitted to the stock exchange compared to other active companies in the country, and also due to the continuous monitoring of auditors and inspectors. This information has high reliability, validity and transparency compared to the information of other companies.

Due to the large size of the statistical population and the existence of some inconsistencies among the members of the population, the companies from the time period of 2015 to 2020, which have the following characteristics and conditions, have been considered as available statistical population. Due to the limited statistical population of manufacturing companies in the Iraqi Stock Exchange, taking into account the applied conditions, it is selected as a statistical sample in order to achieve the most observations for statistical analysis.

- 1) During the years studied by the research from 2015 to 2020, their trading symbol has not been removed from the stock market board (continuous and stable activity in the capital market).
- 2) The studied companies should not have changed their financial year and activity during the periods in question (homogeneity of the financial year and activity during the study period).
- 3) The required financial information, especially the notes accompanying the financial statements, should be available.

4) The company in question had continuous activity during the research period and its shares were traded and there was no trading break.

1-6-4- Data analysis method

In this study, according to the type of data and statistical analysis methods available to test the existence of the relationship between the variables and it was also significant, the presented model was used to explain the variables from regression analysis and multiple regression models. categorized and summarized through Excel software, then we processed the research variables through Eviews software, our analysis includes two steps, which is as follows:

Descriptive statistics: First, the distribution of variables with three central indicators, dispersion and distribution in the society is investigated and analyzed with a descriptive test. **Inferential statistics:** We use regression to investigate the relationship between variables. In fact, regression analysis is a statistical technique to investigate and model the relationship between variables. It can be said that regression analysis is the most widely used method among statistical techniques.

7-1- Users of research results

It is obvious that after conducting any research, the results obtained should be used by those interested in order to be efficient and effective in making effective decisions. Therefore, this research will not be an exception to this.

On the other hand, the results of the researches will be significant for the managers of the companies themselves to achieve more positive results, so the results of the present researches can be used for the following groups: On the other hand, the results of the researches will be significant for the managers of the companies themselves to achieve more positive results, so the results of the present researches can be used for the following groups:

- 1- Private sector investors, people and government
- 2- Shareholders of companies admitted to the stock exchange
- 3- Company managers
- 4- Financial and credit institutions and investment
- 5- Financial experts and analysts
- 6- Researchers and students.

2- Theoretical foundations and research background

2-1-Internal auditor

The internal audit unit, with the opinion of the highest official and by observing professional ethics, reduces corruption to a great extent. Internal audit is an effective deterrent against internal control violations and fraud by managers. Responsibilities related to the prevention of fraud within the organization are divided between the executive board of the audit committee and the internal auditor. In the mentioned activities, internal auditors must have sufficient knowledge to identify possible fraud, be aware of cases related to the risk of fraud, the

possibility of subsequent inspections of a file, aware of the responsibility of the organization's people and able to take measures to eliminate or reduce the possibility of fraud.

2-2-fraud

During the last few decades, the frauds discovered in the financial reports of companies have caused the capital market of different countries to undergo severe fluctuations. These frauds have a negative effect on the capital market and cause huge financial losses and the loss of trust in social systems or the destruction of economic and social enterprises. The new point is that investors have become more sensitive to the issue of fraud risks because the losses caused by fraud significantly cause direct financial losses due to fraud. These losses cause an unpleasant public image of the company and affect its reputation. In this way, investors' trust in the leadership of the organization and its management method is lost, and this is a fact that affects the reduction of the value of the organization. According to the 240 audit standard, Fraud is any intentional act by one or more executive directors, governing bodies, employees, or third parties that involves deception to obtain an unfair or illegal advantage (Audit Standards Development Committee, 2015). Fraud in financial reporting can have a detrimental effect on a company's reporting to the extent that the nature of the company is compromised (American Center for Auditing Quality, 2010). In most cases, two major roles are considered for auditing.

2-3- Classification of types of fraud

2-3-1- Financial corruption

It is defined as fraud in which fraudsters misuse their influence in a financial transaction to work for their own or another person's personal gain. Such as bribery and manipulation of prices in tenders and auctions.

2-3-2- Abuse of assets

It includes theft or misuse of an organization's assets, such as theft of goods and illegal use of assets as personal property.

2-3-3- Financial reporting fraud

It is intentional distortion in the results of financial statements to present a false image of the company, such as exaggerating assets and understating expenses. In another classification, fraud is divided into 2 types of fraud by an organization and management fraud, which in the first type of an organization is divided into Committing fraud pays, and in the second type, the executive officers of the company, the members of the board of directors commit it. From a statistical point of view, misappropriation of assets accounts for about 80%, corruption accounts for 15%, fraudulent financial statements account for 4%, and other fraud accounts for 1%. But the remarkable thing is the huge difference in the losses of the victim companies, so

that the loss of fraudulent financial statements is 4 million dollars, the financial corruption is 660 thousand dollars, the misuse of assets is 85 thousand dollars, and other cases are 107 thousand dollars. 2008).

2-4- Factors of committing fraud

Many problems and difficulties arise when facing financial problems. Although non-financial problems such as the need to report results compared to actual performance, forecasting revenues, fame or greed can also be considered as motivations for committing fraud. For corporate executives, rationalization as one of the components of the fraud triangle may include the following "We should keep the stock price high", "It is good for the company's reputation" or; "The problem is temporary and will be compensated by positive future results" Finding opportunities to commit financial statement fraud include factors such as weak board of directors, weak internal controls and the inadequacy or ability to conceal frauds with a combined structure or transactions with related parties. It is business law and their opinions are supported by judicial rulings, the expertise of this group is court accounting that these people are appointed by governments and can work in companies and organizations before and after committing financial crimes. (Furqan Dost, 2008).

2-5- Research background

2-5-1- Domestic background

In a research, Bandanipour and Nakhai (2019) studied the effect of internal audit characteristics on the effectiveness of internal control during operations and compliance. The research was applied in terms of purpose and survey in terms of nature. The statistical sample was the data of companies affiliated to Astan Quds. Razavi, in which an attempt was made to investigate the relationship between internal audit quality and internal control defects in operations and compliance. Data analysis was done by PLS software. The results indicated that an internal audit team with more people can increase internal audit performance for both operations and reporting compliance, while internal auditor competence affects internal control effectiveness and not performance.

In a research, Saedi et al. (2019) studied the effect of the delay in the audit report and the weakness of internal controls on the investment efficiency of companies admitted to the Tehran Stock Exchange. The statistical sample of 104 active companies in the Tehran Stock Exchange using the method Purposive sampling was selected and then research hypotheses were tested using multivariate regression method. In other words, the number of days passed between the date of signing the auditor's report and the end of the financial year did not affect the inefficiency of investment (over-investment and under-investment).

Aghaei and Mohammad Rajabi (2019), in a research entitled "Investigation of the effect of weak internal control and company characteristics on the renewal of financial statements and audit expenses of companies listed on the Tehran Stock Exchange", the relationship between the weakness of internal controls and the renewal of financial statements and expenses The audit of the companies admitted to the Tehran Stock Exchange during the years 2012 to 2016

was investigated using logistic regression. The research results show that, based on the research model,

Hijazi and Bayat (2018) investigated a research entitled "The relationship between large data and fraud in accounting". In this research, massive data and their analysis have been used in accounting frauds. Based on the opinions of academics and experts regarding the importance, demand, relevance, benefits and use of big data, the following points were received:

- 1- The demand for big data analysis and its relationship with forgery and accounting fraud will increase;
- 2- Big data analysis should be included in business programs from undergraduate and graduate levels;
- 3- Many topics discussed in big data should be included in accounting and business curricula;
- 4- Many techniques of descriptive analysis and forecasting of large data are important in the training and method of doing accounting work.

In a research, Nejad Tolmi et al. (2018) investigated the role of procedural, interactive and distributive justice in the willingness to disclose fraud among accountants. The statistical population is accounting employees in private and public sectors, and the sample size is 596 people. The data collection tool is a questionnaire and specific accounting fraud disclosure and organizational justice scenarios adapted from Seifert et al.

The findings of the research show that at the 95% confidence level, procedural, interactive and distributive justice has a positive effect on the willingness to disclose, and of course, there is no significant difference between accountants working in the private and public sectors in the willingness to disclose. Based on the findings, the result is that the presence of procedural, interactive and distributive justice leads to a significant willingness of both private and public Badi Abadi (2016), investigated a research titled "Examination of the role of internal audit and internal control in detection and prevention of fraud". The task of accounting is to prepare and present financial statements for users of financial information. Fraud, as a factor causing crisis in the financial field, is considered a serious threat to public trust in financial information and financial reporting, and entails costs and consequences for investors and other groups. accountants to disclose.

Internal controls and internal audit are considered as two important factors in fraud detection and prevention. Internal controls play a major role in preventing fraud and fraudulent reporting. It is also effective on the quality of the audit and determining how the auditors are handled. Internal audit is a function that helps management in better management of the organization in line with organizational goals.

The purpose of this article is not a brief description of the role of internal audit and internal control in detecting possible frauds; Rather, it is to highlight its importance in preventing fraud in the economic unit.

Nurollahi et al. (2015), in an article entitled "The role of internal audit in preventing and detecting fraud", considered that not only in summary the role of internal audit in detecting possible frauds, but also to highlight its importance in preventing the formation of fraud committees. In addition, this analysis intends to express the benefits that internal audit can provide to the management and its partners, and to the society in particular.

Starting with this introduction that auditors are not the enemies of the business unit, let us remember that: internal audit plays the role of providing suggestions to the management of the business unit to improve the management of their activities. The internal auditor expresses his judgment in relation to all the decisions taken by the management which ensures the effective and efficient performance of its activities and aims to create added value.

2-5-2- Foreign background

Al-Azabi et al. (2020) investigated the effect of risk management and senior management support on internal audit activities and reducing fraud in the Libyan banking sector. Research data was collected through questionnaire and analyzed using structural equation method. The research results show that there is a significant positive relationship between risk management and fraud reduction, and a significant positive relationship between senior management support for employees and fraud reduction.

Sahiti et al. (2017) conducted a research titled "The effect of internal audit in discovering anomalies and fraud in financial reports" with the premise that internal audit can play a role as a starting point for discovering fraud and mistakes in companies. This research was done with the questionnaire tool and with the data collected from the public companies of Kosovo. The results showed that the existence of internal audit increases the reliability of financial reports and reduces the possibility of fraud in financial statements.

Tupper (2017) during a research entitled "Auditors' responsibility to discover errors and fraud in financial statements", investigated the risk factors related to the occurrence of fraud in audit activities. These factors were analyzed in 5 main categories including liabilities, customers, shareholders, profit and loss accounts and inventory. In this research, the researcher has pointed out the various duties of auditors in the prevention and detection of fraud in the form of these 5 classes.

Machiri and Jagungo (2017) investigated the relationship between internal audit and financial performance in government organizations. Researchers aimed to investigate the role of internal audit on profitability and return on capital. From fraud in the banking industry. The results indicated that internal control alone was effective in preventing fraud, but not all employees were committed to it.

Soranke (2016) in a research entitled Internal Audit and Fraud Control in Nigerian Public Organizations states that it is easier to commit fraud in public organizations and every year significant resources from public resources are lost due to fraud caused by the ineffectiveness of internal and independent audit. . The findings of the data analysis showed that the internal audit unit does not have a significant role in fraud prevention and detection.

Kanapikin and Grandin (2015) proposed a model to detect fraud based on financial ratios. Using logistic regression and data extracted from the financial statements of 40 fraudulent companies and 125 healthy companies (which also had acceptable audit reports), researchers presented a model to determine the probability of fraud. In this research, 51 financial ratios were examined, finally 4 ratios of inventory to assets, sales to fixed assets,

Debt-to-asset and cash-to-current liabilities remained in the model due to the existence of the most significant effect, so that they can be used to determine the probability of fraud in financial statements.

Osman (2015) conducted a research titled "Internal Audit Techniques and Fraud Prevention" in Nigeria. The results of this research show that internal audit techniques have the ability to prevent fraud, but there is no freedom of action and independence for them; Because internal auditors must be accountable to their executives, which threatens their independence.

In an article, Ima (2015) examined the relationship between the effectiveness of internal controls and fraud prevention. The results of this research indicate that the internal control system in Nigeria is not very reliable. The researcher suggested that it is possible to reduce the risk of fraud by creating a more active internal audit unit, ensuring the independence of these units, paying attention to internal audit reports and regular and effective evaluation of internal audit units.

Jancis (2014), researched "the role of internal audit as a starting point for discovering irregularities in the financial reports of public companies". The main purpose of this article is to investigate the effect of internal audit in detecting irregularities and fraud in the financial reports of public companies in Kosovo. To achieve this goal, we developed a questionnaire and distributed it to public companies in the Republic of Kosovo.

The questionnaires included open and closed questions in the form of a Likert scale, which helped the respondents to complete the questionnaire. Answers were analyzed using SPSS software and hypotheses were checked using correlation analysis. Based on the findings, it can be concluded that internal audit can be effective as a starting point in finding fraud and mistakes in financial reports.

3- Research method

3-1- Research methodology

In this part of the research, the type of research method is discussed in terms of its purpose and nature, population and statistical sample, and methods and tools of data collection and preparation.

3-1-1- Type of research

Scientific researches are divided into three categories: basic research, applied research and developmental research. The method of this research is applied and post-event descriptive, and multivariate regression is used to test the hypotheses, which analyzes the relationship using secondary data extracted from the financial statements of companies admitted to the Iraqi Stock Exchange. This research will be done in the framework of deductive-inductive reasoning. The reason for using the correlation method is to discover correlation relationships between variables. Correlational research is one of the types of descriptive research. In the current

research, we first tested the correlation between the research variables, and if there is a correlation between the research variables, we will proceed to estimate the multiple regression models. On the other hand, the current research is post-event type (semi-experimental), that is, it is based on the analysis and analysis of past and historical information (financial statements of companies). Also, this research is an archival and analytical study. The research is considered to be applied in terms of purpose and in terms of correlational method.

3-1-2- Society and statistical sample

The sum of all units with people is called society. Society may be limited or unlimited. If the number of units in a society is limited, it is called a limited society, and if the number of units in a society is unlimited, it is called unlimited. A society may be continuous or discontinuous. A sample is a part of the society, the process of choosing a sample is called sampling. In statistical inference about a society and using a sample, it is necessary that the samples are representative of the society. There are several reasons why researchers use sampling, including: low cost, up-to-date, accuracy, time, destructive testing. The statistical population includes all companies admitted to the Iraqi Stock Exchange, and the statistical The statistical population of this research is all the companies admitted to the Iraqi Stock Exchange during the period from 2015 to 2020 (a 5-year period). The finances of production companies admitted to the stock market are higher than other active companies in the country, and also due to the continuous monitoring of auditors and inspectors. sample includes companies that meet the following conditions:

This information has high reliability, validity and transparency compared to the information of other companies. Due to the large size of the statistical population and the existence of some inconsistencies among the members of the population, the companies of the time period of 2015 to 2020, which have the following characteristics and conditions, have been considered as available statistical population.

- During the years studied by the research from 2015 to 2020, their trading symbol has not been removed from the stock market board (continuous and stable activity in the capital market).
- The manufacturing companies under study should not have changed their financial year and activity during the desired periods (homogeneity of the financial year and activity during the study period).
- The required financial information, especially the notes accompanying the financial statements, should be available.
- The company in question has been continuously active during the research period and its shares have been traded and there has not been a trading break of more than 3 months.

By applying the above criteria and after estimating and collecting primary information, The appropriate research sample was selected and related data was extracted from financial statements, activity reports and other information software. Data collection and classification was done by Excel software, and analyzes were done by Aviuse statistical software. Based on the available information and applying the above conditions, the examined sample was determined as described in Table 1-3:

**Table 3-1:
 companies
 and
 in the
 sample**

Number	Description
284	All existing companies
38	:It is deducted Companies whose fiscal year does not end in March
44	Insurance, investment, banking and financial
65	intermediation companies
86	Companies whose information is not available for the period under review
	They had a long-term trading halt
51	The number of investigated companies

**The
 studied
 included
 research**

**3-1-3-
 and tool
 collection**

**Method
 of data**

The theoretical content and statistical data in this research are collected from two sources. In collecting theoretical literature and theoretical concepts, the archival method (collected data) is used. In this method, based on the content of articles, theses, scientific reports, the content of scientific websites that deal with the index of articles, scientific and research journals, and articles of national and international conferences, it will be used in reviewing and editing the subject literature. In collecting data related to testing hypotheses, in order to fulfill the goals and finally answer the questions raised and the future of this research, according to the compiled models and the studied variables from the audited financial statements of Iraqi companies and in some cases using software Information and websites related to the Iraqi Stock Exchange that contain Iraqi capital market data are collected.

3-1-4- Data preparation and analysis

In this study, according to the type of data and statistical analysis methods available to test the existence of the relationship between the variables and it was also significant, the presented model was used to explain the variables from regression analysis and multiple regression models. It was categorized and summarized through Excel software, then we processed the research variables through Eviews software. Our analysis consists of two steps, which are as follows:

Descriptive statistics: First, with a descriptive test, the distribution of variables with three central indicators, dispersion and distribution in the society is examined and analyzed.

Inferential statistics: We use regression to investigate the relationship between variables. In fact, regression analysis is a statistical technique to investigate and model the relationship between variables. It can be said that regression analysis is the most widely used method among statistical techniques.

2-3- Formulation of the hypothesis

In order to formulate the research hypothesis, first it is necessary to provide information about the research variables, then based on the provided information, hypotheses can be formulated. After that, the hypothesis test plan will also be discussed.

3-2-1- Explanation and measurement of variables

A variable is an attribute or characteristic that changes from one person to another and from one phenomenon to another. In fact, the distinguishing characteristics of a group are called variables. A variable is a concept that is assigned more than two or more values or numbers and changes from one state to another. Elements that are manipulated, measured, compared and controlled in research are variables (Georji, 2019). The variables of this research include dependent variables, independent variables, and control variables, which are described below, and how they are calculated is described in the following sections.

3-2-1-1- Explanation and measurement of the dependent variable

In this research, the farmer's genetic planning model (2015) was used to measure the probability of fraud in financial statements. Genetic programming is a generalization of the genetic algorithm that was first presented based on Darwin's theory. Unlike the genetic algorithm, genetic programming works on a tree structure of formulas instead of a series of binary numbers. In addition to being able to extract the relationship between input and output variables, genetic programming automatically and intelligently selects the variables that have the most influence in the model. In this model, first, 90 financial ratios were extracted from the financial reports of companies, and with the help of genetic programming, 7 financial ratios affecting the probability of fraud were finally identified, which include the ratio of working capital to total assets, accounts receivable to income. Services and sales, debt to equity, Gross profit to assets, cash to current liabilities, inventory to current assets and absolute value of changes in working capital. Table No. 1 shows the use of the above ratios in other models for calculating the probability of fraud.

Table 2-3: Financial ratios used in the research

Researcher and year of presentation of the model	Financial ratio
Alnard and Alam (2009), Ravistaker et al. (2011)	Working capital to total assets
Stace et al. (1991), Pearson (1995), Kaminsky et al. (2004), Copper Kess et al.	Accounts receivable to service and sales revenue
Spottis et al. (2002), Copper Kess et al. (2007), Dalneil et al. (2014).	Debt to equity
Kair Kes et al. (2007)	Gross profit to assets
Kanapikin and Grandin (2015)	Cash to current liabilities
Kanapikin and Grandin (2015)	Inventory to current assets
-	Absolute value of changes in working capital

Source: Kanapikin and Grandin (2015)

The relationship between fraud and input variables based on the genetic model of the farmer (2015) is as follows:

$$\begin{aligned}
 \text{Fraud} = & (WC / TA - TD / TE)^2 - (8.0378 * D / TE * \Delta cur) - \Delta cur^5 - TD / TE + (GI / TA + \exp(\Delta cur))^8 \\
 & / ((GI / TA + CASH / CL)^8 * (REC / S - 4.5021)^8) + WC / TA^3 * \cos(\Delta cur)^3 * (2 * REC / S + INV / CA \\
 & - 9.0575)^3 * (2 * WC / TA + REC / S + \Delta cur * \Delta cur^39.0210 -)
 \end{aligned}$$

that in the above relation

WC / TA :Working capital to total assets

REC / S :Accounts receivable for sale

TD / TE :Debt to equity

GI / TA :Gross profit to total assets

$CASH / CL$:Cash to current liabilities

INV / CA :Inventory to current assets

Δcur :The absolute magnitude of changes in the current ratio

After calculating the probability of fraud based on the above model, if the resulting number is greater than 0.5, the number one (presence of fraud) and zero (absence of fraud) will be assigned otherwise.

3-2-1-2- Explanation and measurement of independent variables

:The number of employees of the internal audit unit of company i at the end of the year t $Numstaff_{it}$

, $Tenure_{it}$:The number of years of tenure of the manager of the internal audit unit of company i in year

, $Exprince_{it}$: The logarithm of the number of years that the company's internal auditor manager has worked and gained experience in the field of auditing and finance. This experience includes his presence in other companies as well.

, $Degree_{it}$:The level of education of the internal audit manager of company i in year t , in such a way that if the company's internal audit manager has a bachelor's degree, master's degree, and doctorate, numbers 1 to 3 will be considered respectively

It should be noted that the data related to the characteristics of the internal audit unit discussed in this research were used from the notices entitled "Specifications of the Audit Committee and Internal Audit Unit" extracted from the information obtained from the Iraqi stock exchange companies.

3-2-2- Hypothesis test design

The regression model used in the research hypothesis test based on the research Ganapikin and Grandin (2015) are as follows:

Relationship (2-3)

$$Fraud_{i,t} = a_0 + a_1 Numstaff_{i,t} + a_2 Tenure_{i,t} + a_3 Exprince_{i,t} + a_4 Degree_{i,t} + a_5 age_{i,t} + a_6 lev_{i,t} + a_7 BTM_{i,t} + a_8 ROA_{i,t} + e_{i,t}$$

In the above regression models, if the β_1 value is significant at the error level of 0.05, then the research hypothesis is confirmed. In the current research, it uses logistic regression equation analysis, based on the significance of the coefficients of the independent variables of the research hypotheses.

3-3- Hypothesis test plan

According to the hypothesis investigated in this study and the model described in relation 2-3, the research hypotheses are tested according to the significance of the coefficients of the independent variables, so that in order to test the significance of the coefficients, the F-statistics and the probability level of the F-statistics (p-value) is used. It should be noted that the confidence level of the current research is 95%. The research hypothesis testing method is described below. To test the hypothesis, relation (2-3) was used. F test was used to check the significance of the whole model. The statistical assumptions of this test are as follows:

H_0 : All the coefficients except for the width from the origin are zero

H_1 : At least one of the coefficients other than the width from the origin is opposite to zero

If the probability of F statistic is less than 0.05, the H_0 hypothesis is not accepted and the model is significant. The decision to accept or reject the null hypothesis is based on the value and probability of the t statistic. The value of the t statistic is compared with the values of the t table and its probability is 0.05. If the probability of this statistic is less than 0.05, the null hypothesis of no influence of the independent variable on the dependent variable is rejected and a significant effect between the independent and dependent variable is accepted.

If the probability of F statistic is less than 0.05, the H_0 hypothesis is not accepted and the model is significant. The decision to accept or reject the null hypothesis is based on the value and probability of the t statistic. The value of the t statistic is compared with the values of the t table and its probability is 0.05. If the probability of this statistic is less than 0.05, the null hypothesis of no influence of the independent variable on the dependent variable is rejected and a significant effect between the independent and dependent variable is accepted.

4- Research findings

In the previous chapter, operational definitions of the variables used in the research, how to calculate them and how to analyze the information were described. First, descriptive statistics are presented and the correlation of the research data is discussed, and then by analyzing the regression model resulting from the research process and checking the significance of the regression model and the coefficients of the variables, the hypotheses are confirmed or rejected. Data analysis is a multi-step process during which, after collecting data and calculating the values of the desired variables for testing research hypotheses, the resulting information is tested and based on the results of the tests, compared to Confirmation or rejection of research hypotheses and their interpretation is done. In general, analysis in order to organize and summarize data in a clear informational form, It is used in a reasoned and interpretable manner, so that the relationships in the research problems can be discovered, examined and tested. Data analysis consists of the following two parts:

- A- Data description
- B- Data analysis

The beginning of this chapter has started with the description of data for independent and dependent variables. Descriptive statistics including mean, median, variance, skewness and kurtosis have been calculated for all variables. These indices show the statistical distribution of the variables. Data analysis in the descriptive statistics section has started with the calculation of central indices such as mean, median and dispersion indices such as standard deviation, skewness and kurtosis. The inference about the hypothesis test is based on the significance level obtained from the test. Thus, when the value of the significance level is less than 0.05, the null hypothesis is rejected at the 95% level, and otherwise, the null hypothesis is confirmed.

4-1-Descriptive statistics

Descriptive statistics is a set of methods that provide data processing. In order to check the general and basic characteristics of the variables in order to estimate the model, their detailed analysis and to know the statistical population under research, it is necessary to be familiar with the descriptive statistics related to the variables. Table No. 4-1 includes the values of the statistics related to the central and dispersion indicators. Knowledge of the descriptive statistics is a step towards understanding the average trend of the data.

Table 4-1: Descriptive statistics of research variables

Elongation	crookedness	standard deviation	at least	Max	middle	average	symbol	Variable
1/028	0/185	0/511	0	1	0	0/518	Fraud	cheating
7/874	2/285	2/214	1	14	3	2/481	Numstaff	Number of employees
4/125	2/939	3/778	1	18	3	3/421	Tenure	Tenure
3/211	-0/891	0/368	0	1/325	0/897	1/061	Experience	experience
3/962	1/400	0/524	1	3	1	1/286	Degree	Degree
6/214	-0/526	0/198	0	1/412	1/109	0/982	AGE	stock market value
4/528	0/665	0/268	0/138	1/658	0/542	0/584	LEV	Financial leverage
3/489	1/645	6/109	1/548	1/856	3/856	1/561	BM	An office to the market
1/025	0/547	0/741	0/521	1/912	0/118	0/198	ROA	Rate of return on assets

Since the unprofitability of the company is one of the most important factors and motivations for the occurrence of fraud in financial statements, therefore, we have tried to get results with high generalization power by considering this type of companies in the research sample. The number of 1.658 for the maximum financial leverage and 0.521 for the minimum rate of return on assets is a proof of the presence of companies with high accumulated losses among the investigated companies. According to the artificiality of the fraud variable and its average value of 0.518, it can be seen that in this research, the number of non-fraudulent companies is slightly more than the number of fraudulent companies. A general look at the collected data indicates that the number of employees of the internal audit unit in most companies is about 3 people,

and the educational qualification of most of the managers of the internal audit unit is bachelor's and the highest tenure among the managers is 18 years.

4-2- Test of hypotheses

Considering that equation 1-3 was used to measure the dependent variable of the research, in the estimation of the model using the criterion depending on the nature of zero and one of this criterion from the logit regression model and to check the validity and justification of the model using the Hosmer-Lemshow test and McFadden coefficient of determination is used.

4-2-1- Hosmer-Lemshow model goodness of fit test

To check the goodness of fit in regression models with binary dependent variable, various tests and criteria can be used. One of the tests used for the goodness of fit of binary choice models is the Hosmer-Lemshow test. In this test, the significance of the regression coefficients is examined by comparing the predicted and actual value of the dependent variable in different groups. If the difference between the actual and predicted values of the dependent variable is large, it indicates a poor fit of the model (Hasmer and Lemshow, 2000).

Considering that the probability of the Hosmer-Lemshow test statistic is greater than 0.05, therefore the estimated model has a good fit and the explanatory variables of the model have the ability to explain fraud (the output of the test results using the software The evidence for testing the hypothesis based on the first criterion is provided in Appendix No. (3) of the thesis).

Table 2-4: The results of Hosmer-Lemshow test

test H-L			
the result	Meaningfulness	statistics	Test type
Perfect fit for the model	0/1159	6/25	Touch Hosmer

4-2-1-1- Research hypothesis test

Considering that in any research, the goal of the researcher is to collect data and information in a correct and scientific way, as well as analyze them, so that in this way he can find the answer to the research question and evaluate the hypotheses. Therefore, after the end of the analysis operation, the researcher comments on his hypotheses based on the results of the work and confirms or rejects them according to the obtained results. Now, in this section, considering the framework of the research models and using statistical tests, the research hypotheses are tested.

Table No. (4-3) shows the results of the estimation of the model based on the first criterion of the research using Eviews software (the final estimation results of the model based on the first criterion are presented in Appendix No. (4) of the thesis). In order to solve the possible problem of heterogeneity of variance, the GLM method is used to estimate the patterns. The significance level of the probability ratio is equal to 0.000 and this means that the constrained and unconstrained model have a significant difference and therefore the explanatory variables have significant explanatory power, which in fact can be said to be significant at the 95% confidence level. and is valid. Based on the results of this hypothesis, the value of McFadden's coefficient, 0.36, shows that 36% of the dependent model changes are explained by the regression model.

Table 3-4: The results of model estimation

meaningfulness	Statistics z	Standard deviation	Coefficient	symbol	Variables
0/626	0/66	0/118	0/076	Numstaff	number of employees
0/036	3/12	0/054	0/167	Tenure	Tenure
0/036	-2/13	0/567	-1/34	Experience	Experience
0/435	0/71	0/395	0/315	Degree	Degree
0/072	1/96	0/647	1/57	AGE	Company age
0/138	-1/56	0/752	-1/48	LEV	Financial leverage
0/359	0/96	0/356	-0/036	BM	book value
0/008	-2/66	0/003	-0/008	ROA	Rate of return on assets
0/6686	The mean of the dependent variable		0/3612	Determination of McDuffin coefficient	
51	Number of observations		0/4832	Variance of the dependent variable	
0/0001	Statistical probability LR		25/2430	LR statistics	

4-2-1-2- Test of the first hypothesis

This hypothesis examines the effect of the number of employees of the internal audit unit on the possibility of fraud in financial statements. By referring to the results of the main model in Table No. 3-4, the results of the Z test can be seen. The value of Z statistic and probability for this variable is 0.66 and 0.626 respectively. This value is lower than Z corresponding to the probability distribution table and the non-influence of this variable on the dependent variable is confirmed.

4-2-1-3- Second hypothesis test

This hypothesis examines the effect of the internal audit director's tenure on the possibility of fraud in financial statements. By referring to the results of the final model in table number 3-4, you can see the results of the Z test. The value of Z statistic and probability for this variable is 3.12 and 0.032, respectively, which confirms the influence of this variable on the dependent variable. This variable affects the probability of fraud in financial statements, and the positive sign of the coefficient of the variable indicates its direct effect on the probability of fraud.

4-2-1-4- Third hypothesis test

This hypothesis examines the effect of internal audit manager's experience on the probability of fraud in financial statements. By referring to the results of the final model in table number 3-4, you can see the results of the Z test. The value of Z statistic and probability for this variable is -2.13 and 0.036 respectively. Therefore, this variable affects the probability of fraud in

financial statements at the 95% confidence level, and the negative sign of the coefficient of the variable indicates its inverse effect on the probability of fraud.

4-2-1-5- Testing the fourth hypothesis

This hypothesis examines the effect of the internal audit manager's educational qualification on the probability of fraud. By referring to the results of the main model in Table No. 3-4, the results of the Z test can be seen. The statistical value of this test is 0.71. This value is lower than Z corresponding to the probability distribution table and the non-influence of this variable on the dependent variable is confirmed. The probability value of this variable is also 0.435. Therefore, at the 95% confidence level, this variable does not affect the probability of fraud in financial statements and is removed from the model due to its lack of significance.

4-3- Interpretation of coefficients

Considering that the logit model is a logarithmic model, its coefficients cannot be interpreted directly. The solution used in this context is the calculation of the marginal effect of the variables, which is shown in table 5-4. According to the numbers in Table 5-4, if the tenure of an entity increases, the likelihood of financial statement fraud increases by 16%. Also, a unit increase in the experimental variable leads to a 129% decrease in the probability of fraud. Also, with an increase of one unit in the number of years of the company's activity in the stock market, the probability of fraud increases by 120%, and with an increase of one unit of return on assets, the probability of fraud in financial statements decreases.

Table 5-4: Marginal effects of variables

marginal effects	symbol	Variable
0/162	Tenure	Tenure
-1/296	Experience	experience
1/121	AGE	The history of the stock market
-0/006	ROA	Rate of return on assets

5- Conclusion

5-1- Summary of the research

The purpose of this research is to examine the characteristics of the internal audit unit on the possibility of fraud in the financial statements of Iraqi companies admitted to the Iraqi Stock Exchange. In the first chapter, the research problem was discussed in the beginning, in the following sections, the importance and necessity, objectives, scope and method of the research were briefly presented, and thus the overall design of the research was determined. In the second chapter, the literature and research background were examined. In the third chapter, the research method was explained, based on which, the type of research is applied in terms of purpose and descriptive correlation in terms of data analysis. The research community is the companies accepted in the Iraqi stock exchange that have a series of special conditions, as a result, 51 companies from different industries were selected. The spatial domain of this research is the Iraqi Stock Exchange, the temporal domain is the period from 2015 to 2020,

and the subject domain is also within the scope of accounting and auditing. And the subject area is also within the scope of accounting and auditing. The information needed to calculate the variables was collected using the financial software of Rahavard Navin and the websites of the Iraqi Stock Exchange. Then the investigated model of the relationship between research variables was presented. Finally, explanations were given about the tests related to the research model. In the fourth chapter, data analysis was done using Excel and Eviuse software at two levels of descriptive and inferential statistics. In the descriptive statistics section, indicators such as mean, standard deviation, minimum and maximum values for each variable were presented. Then, research hypotheses were examined in the inferential statistics section. In this chapter, while interpreting the results of the hypothesis test and stating the limitations of the research, the research process ends by presenting practical suggestions and suggestions for future researches.

5-2- Analysis of the research hypothesis test results

In this section, the results of the hypothesis tests have been analyzed.

5-2-1- The first hypothesis

1) The number of employees of the internal audit unit has a significant effect on the possibility of fraud in financial statements. Based on this hypothesis, it was expected that with the increase in the number of employees, the volume of proceedings will be more, the internal control of the companies will be more effective, as a result, the probability of fraud in the financial statements of the companies will decrease. In order to test this hypothesis, the logistic regression test was used. The results show that the statistic value and Z probability for this variable are 0.66 and 0.626, respectively. The results of the data analysis showed that there is no significant relationship between this variable and the possibility of fraud in the financial statements of companies. The results obtained in this section are similar to the results of Shabani (2016), Soranke (2016).

5-2-2- The second hypothesis

2) The tenure of the internal audit manager has a significant effect on the possibility of fraud in financial statements.

By choosing the tenure variable of the manager of the internal audit unit, it was expected that the increase of this factor would lead to the mastery and nobility of the managers over the internal control, the company's accounts, and also their more effective supervision over the preparation of financial statements, which ultimately leads to an increase in the reliability of the statement. and reducing the possibility of fraud in financial statements. But unlike theoretical discussions, The results of the data analysis indicated that the tenure of the internal audit manager has a positive and significant effect on the probability of fraud in financial statements. Observing such a result can be a sign that the internal auditor is too close to the management of companies and the existence of common interests between them, which may have a negative effect on the internal auditor's organizational position and impartiality. The long-term presence of the internal auditor manager next to the employer, It creates a desire to maintain and respect the management's opinion, a situation that distorts his independence and impartiality. It is also possible that a long tenure creates a series of emotional relationships to the extent that it creates a sense of loyalty in internal auditors and compromises their independence. This result is consistent with the findings of Ima (2015) and Osman (2015).

5-2-3- The third hypothesis

3) The experience of the internal audit manager has a significant effect on the possibility of fraud in financial statements.

Regarding experience and work history, it was expected that the improvement of this factor would lead to a better understanding of the company's activities, a more favorable review of the adequacy of the internal control system, and a more effective monitoring of its compliance. Therefore, it can be expected that with continuous presence, a better understanding of the organization and internal control is created in a more specific way and through the evaluation and test of the adequacy and effectiveness of the internal control by using analytical methods and other methods, unusual items are identified and the details of the account balances are implemented to detect fraud. . The results of the third hypothesis test in line with the theoretical topics show that there is a negative and significant relationship between the internal auditor's experience and the probability of fraud. These results are in agreement with the findings of Abdul Khaliq, Snoball and Rag (1983), Brown (1983), Margim (1986), Haroun and Jonathan (2005) and Froidlo (2014), who in their research focused on the role of internal auditors in evaluating internal control and the use of auditors. Independently of their reports, they have mentioned the condition of observing independence, knowledge and experience, it is consistent.

5-2-4- The fourth hypothesis

4) The educational qualification of the internal audit manager has a significant effect on the possibility of fraud in financial statements.

Regarding the level of education of internal audit managers, it was expected that with the upgrading of educational qualifications, due to the acquisition of accounting and auditing knowledge at university levels, the individual's skill to prevent and detect fraud will increase. According to the regression test, the statistical value of this test is 0.71. This value is lower than Z corresponding to the probability distribution table and the non-influence of this variable on the dependent variable is confirmed. The probability value of this variable is also 0.435, which shows that there is no significant relationship between the educational qualification of internal audit managers and the possibility of fraud. This can be attributed to the fact that the work environment and the university and the conditions governing these two positions are different and the absence of financial benefits in the university environment, unlike the work environment, can be one of the reasons for the lack of a significant relationship between this variable and fraud in be considered Also, in most auditing and internal control environments, in order to advance the company's goals, as well as reduce costs and stabilize the job position, it can be considered as another factor, and the results obtained from this hypothesis are contrary to the results of Dean et al. (2017). and it is in line with the results of Rice and Weber (2012).

5-3- Suggestions based on the results of the research

According to the results of the research and the impact of the role of auditing on the possibility of fraud, it is suggested that by increasing the level of awareness and employing internal auditors, organizations and companies can provide more correct information and financial reports to the beneficiaries. Also, the results showed that the mere presence of internal audit in an industry cannot prevent fraud in financial statements. According to the results of this research, it is suggested that institutions that develop accounting standards, such as the

Standards Audit Organization, use the creation of audit units to monitor the performance of all companies in the stock exchange and update the standards in a direction that leads to a reduction in the incidence of Fraud in financial statements and also increase the quality of financial reports.

5-4- Research limitations

Movement towards any goal is slowed down by limitations as a reality. research; It is a movement and a process for the purpose of solving a problem or an answer to a question. Therefore, most researches are faced with a series of limitations and the current research is not exempt from this fact. Some limitations and problems that existed in the implementation of the research and in the interpretation and interpretation of the research results and its generalizability should be considered. The limitations of this research are as follows;

1- This research was conducted in the time range of 2015 to 2020, so it cannot be generalized to the times after and before the time of the research.

2- The location of the research is the Iraqi Stock Exchange, and its results cannot be generalized to companies outside the Iraqi Stock Exchange or companies that entered the stock market after the date of the research.

3- Inflation makes financial statement information unable to show the financial status and performance results of companies correctly, therefore, considering the effect of inflation, different results may be obtained.

4- The effects of differences in accounting methods in measuring and reporting financial events may affect the results, which have not been adjusted due to lack of access to information. In other words, companies may use the change in accounting procedures in some way to affect the reported numbers.

5- The existence of some discrepancies between the statistical information reported by the Iraq Stock Exchange website and the information contained in other databases is another limitation of this research, which in this case relied on the information provided by the Iraq Stock Exchange website.

5-5- Suggestions for future research

With each research, the way to a new path is opened and the continuation of the path requires conducting other researches. In this sense, the researches that seem necessary in the continuation of the results of the present research are suggested as follows.

- Examining the effect of free cash flow on the relationship between the auditor's expertise and the probability of fraud
- Examining the influence of the auditor's reputation on the probability of fraud
- Examining the impact of the audit committee on the relationship between audit quality and the possibility of fraud

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Attachment number (2)

Descriptive statistics of research variables

	Fraud	Numstaff	Tenure	Experien ce	Degree	AGE	LEV	BM	ROA
Mean	0.518268	2.481368	3.42077	1.06125	1.28641	0.982114	0.584125	1.561258	0.197923
Median	0	3	3	0.897256	1	1.109247	0.524158	3.855963	0.118236
Maximum	1	14	18	1.325871	3	1.411958	1.658254	8.856436	0.912523
Minimum	0	1	1	0	1	0	0.137958	-1.54869	-0.521478
Std. Dev.	0.511128	2.214398	3.778254	0.367895	0.524358	0.198205	0.268027	6.109087	0.547321
Skewness	0.184902	2.285647	2.939125	0.891257	1.400258	-0.526147	0.665129	1.645214	0.741369
Kurtosis	1.028147	7.874365	4.125301	3.211027	3.962412	6.214278	4.528365	3.489117	1.025147
Jarque-Bera	5426.43	2351458.	1425.40	132.372	2478.02	599.6985	125.1478	1248503	2548.214
Probability	0.00000	0.000000	0.00000	0.00000	0.00000	0.000000	0.000000	0.000000	0.000000
Sum	3087.931	6630.713	0.465701	0.6416	3087.931	358.0516	460.9181	2174.112	0.212003
Sum Sq. Dev.	-	-	-	-	-	-	-	-	-
Observatio ns	51	51	51	51	51	51	51	51	51

Attachment No. (3)

Hosmer-Lemshow test

Goodness-of-Fit Evaluation for Binary Specification

Andrews and Hosmer-

Lemeshow Tests

Equation: EQ01

Date: 08/09/21 Time: 04:59

Grouping based upon predicted risk (randomize ties)

	Quantile of Risk		Dep=0		Dep=1		Total Obs	H-L Value
	Low	High	Actual	Expect	Actual	Expect		
1	0.2689	0.5314	28	24.9408	21	12.0592	51	0.00498
2	0.5315	0.5776	27	22.2480	23	26.7120	51	0.40662
3	0.5792	0.4850	15	19.9591	34	36.0410	51	0.01075
4	0.6058	0.6363	18	17.9082	32	42.1818	51	0.02116
5	0.6789	0.6547	15	17.3986	34	32.6214	51	1.70507
6	0.6559	0.6811	14	16.5585	36	34.1415	51	0.31452
7	0.6814	0.7111	18	15.8967	31	33.0928	51	1.46465
8	0.7120	0.7441	18	13.5623	32	35.3674	51	1.74596
9	0.7455	0.7847	6	11.5304	43	36.4696	51	0.41811
10	0.7855	0.9998	10	7.99732	40	41.0014	51	0.10606
Total			169	169.000	326	326.000	495	12.4162
H-L Statistic			6.2536		Prob. Chi-Sq(8)		0.1159	
Andrews Statistic			9.4355		Prob. Chi-Sq(10)		0.1301	

Attachment No. (4)

Model estimation based on logistic regression

Dependent Variable: Fruad

Method: ML - Binary Logit (Newton-Raphson / Marquardt steps)

Date: 08/09/21 Time: 05:00

Sample (adjusted): 2015 2020

Included observations: 51 after adjustments

Convergence achieved after 4 iterations

Coefficient covariance computed using observed Hessian

GLM adjusted covariance (variance factor =1.00841064842)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
NUMSTAFF	0.076221	0.118022	0.662113	0.6264
TENURE	0.167512	0.054171	3.125755	0.0360
EXPERIENCE	-1.341290	0.567233	-2.129517	0.0360
DEGREE	0.315267	0.395102	0.711005	0.4350
AGE	1.570005	0.647114	1.958965	0.0723
LEV	-1.482369	0.752317	-1.557420	0.1382
BM	-0.036514	0.356489	0.964219	0.3591
ROA	-0.008254	0.003514	-2.664317	0.0081

McFadden R-squared	0.361242	Mean dependent var	0.668612
S.D. dependent var	0.483211	S.E. of regression	0.414533
Akaike info criterion	1.236231	Sum squared resid	104.4121
Schwarz criterion	1.298195	Log likelihood	-302.1647
Hannan-Quinn criter.	1.277238	Deviance	598.3294
Restr. deviance	635.5493	Restr. log likelihood	-301.7747
LR statistic	25.24301	Avg. log likelihood	-0.616494
Prob(LR statistic)	0.000122		

Obs with Dep=0	151	Total obs	51
Obs with Dep=1	319		

Variance heterogeneity test

Panel Cross-section Heteroskedasticity LR Test

Null hypothesis:

Equation: EQ01

Specification: TENURE(-1) EXPERIENCE(-1) AGE(-1) ROA(-

1

	Value	Df	Probability
Likelihood ratio	269.55 39	99	0.0000

LR test summary:

	Value	Df
Restricted LogL	1848.9 71	51
Unrestricted LogL	1983.7 48	51
