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Investigating the Effect of Audit Quality on Over-investment Using Measures of Auditor Specialty and Audit Tenure for Listed Companies in Tehran Stock Exchange

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Abstract

The main objective of this study was to investigate the effects of audit quality on over-investment in listed companies in Tehran Stock Exchange. In order to measure audit quality, two variables, namely auditor tenure and auditor expertise were used. The study population comprised three selected industries: cement, basic metals and automotive parts; after determining the sample through selection method, the data was collected for the period between 2009 and 2012. In order to analyze and test the hypotheses, linear regression and logit regression was performed in Eviews (version 7.1) and SPSS (version 20). Using logit regression, results showed that there is a significant inverse relationship between auditor specialization and over-investment. Studying the audit quality in tenures, it was also found that there is no significant relationship between over-investment in long term period and medium tenure in any of the logit or linear regression models; however, using logit regression, there was found a positive significant relationship in short term period.

Keywords: Audit Quality, Auditor Specialization, Audit Tenure, Investment Decisions, Over-Investment

Introduction

Due to the recent financial scandals in the world, many try to put the blame on auditors to the extent that these events are commonly referred to as audit failures. It is generally assumed that lack of independence and low audit quality has led to the occurrence of such events (Li, 2007). In order to maintain the professional value, professional reputation and

avoid litigation against them, auditors are looking to increase the audit quality. Companies that provide audited financial statements enjoy better information content and higher earnings quality. Accruals are dependent upon principals' judgments and the accounting process of companies with more accruals is more difficult. Auditing with higher quality is more likely to detect questionable accounting practices since auditing institutions with high quality have the expertise and resources to detect errors and frauds and they are also highly motivated to do so. On the other hand, quality that determines the audit performance is a function of several factors such as the auditor's ability and his professional performance. Generally, the auditors' objective is protecting the interests of shareholders against distortions and errors in financial statements. When companies manipulate their earnings, they may show an ideal result for investors, but such misrepresentations may also impact on inter-company decisions, and they may consequently lead to non-optimal and inefficient investment decisions. Firm's auditor may also affect the content of interest. High quality audit can make a firm use more conservative approach for its financial reporting (McNichols & Stubben, 2008).

One of the measures of assessing audit quality in the current study was auditor's tenure. According to the supporters of changing auditors, in case an auditor is to be changed mandatorily, the auditor is placed in a situation that can resist against manager's pressures and demands and apply a more impartial judgment. Auditor's prolonged tenure with an employer makes auditor willing to maintain and respect the views of the employer. In contrast, opponents of auditors' long term period argue that the efforts made by auditors to maintain their reputation or the fear of potential legal claims against them are among the mechanisms that prevent inappropriate behavior by auditors. According to them, auditors gain a better understanding of the client's activities with the passage of time and thus their ability for deciding about proper and improper accounting and reporting practices increases. So long term relationship between auditor and client can improve audit quality (Chen *et al.*, 2004).

According to what was mentioned above, this study seemed necessary since it examined the impact of audit quality on investment decisions and applying over investment by the company. It is hoped that this study clarifies the impact of these factors and improves investment decisions in institutions and presents proper information for the users in making investment decisions. Generally, by investigating the effect of audit quality on earnings quality and ultimately on internal business investment decisions, this study tries to address the question of whether the firm's audit quality, which is measured by audit specialty and audit tenure, can lead to over-investment in the firm or not?

Review of the Literature and Theoretical bases of the Study

Audit Quality

In one definition, audit quality is presented as market assessment. In fact, market assessment includes the possibility that the auditor both detects material misstatement in employer's system and reports the detected material misstatement. The possibility that a material misstatement is detected by the auditor is related to his competence and the possibility that the detected material misstatements are reported by him is related to his independence. Great institutions do the accounting of a large number of companies and the total fees are to be split between the owners and they are not dependent upon employers. Great audit institutions have more autonomy; therefore they do the accounting with higher quality (De Angelo, 1981). There are many incentives for managers to manipulate earnings in

order to be able to reach the forecasts of financial analysts. So if high quality audit is offered by large audit institutions, it can be expected that the analysts' forecast errors is much more in firms which are handled by smaller institutions.

Measures of Assessing Audit Quality

To measure audit quality, researchers have used three types of measures: The first type is the one which is based on audit reports, including audit failures, fraudulent reports and lawsuits against auditors that were used by researchers such as Pierre and Anderson. The second type of criteria is based on the assets included in the financial statements, such as discretionary accruals that were used by researchers such as Myers and his colleagues (Myers *et al.*, 2003). The third type is market-based measures such as capital expenditures and earnings response coefficients which were used by researchers such as Monsi and his colleagues (Monsi *et al.*, 2004).

The main quantitative measure of audit quality is auditor size; these two cases are linked together so that the larger the size of the auditor, the higher the audit quality will be (Chen *et al.*, 2005). In addition to audit institution size, some other researchers also used audit institution's expertise in order to measure audit quality. In this measure, of course, the audit institutions with expertise in the client's industry will do the auditing with higher quality. In their study, Zhou and Edler (2002) used auditor expertise in client's industry in order to measure audit quality. Audit institutions vary regarding their quality and it cannot be directly determined through observing which institution performs better. Research shows that the size, age, reputation and brand of audit institutions can be considered as distinguishing criteria for audit quality. In this study, two common criteria used to measure audit quality, which are briefly explained below.

Audit Specialty

Theories of economy suggest that the auditing profession has progressed and reached maturity by finding new ways to distinguish between special services in audit institutions. One of these tools is specialization in a specific industry. The audit institutions holding a trademark try to increase their level of expertise. They also focus on industrial regulations and features that are less risky regarding legal proceedings, have quick growth, and are owned by relatively great employers. Auditor's expertise can be measured by the number of companies that are audited in the same industry, meaning that if an institution audits a huge number of firms which are categorized in the same industry, it enjoys better expertise. Also in some cases, the expertise of an institution can be measured by the ratio of audited sales of a firm done by an audit institution to total sales of related industry.

Audit Tenure

Another quantitative measure of audit quality is auditor's professional care and his ability to monitor it, i.e. audit tenure. The longer the audit tenure, the better his understanding of the employer and expertise in that specific industry will be; this consequently leads to improvement in audit quality (Myers *et al.*, 2003). In order to measure audit tenure, the year in which the auditor has been hired by the business unit must be known. If the auditor is working for an employer for more than 4 years out of the seven-year study period, this is considered a long term period; otherwise, it is taken as a short term period. They consider at least 3 years gaining the necessary knowledge to understand the institution.

Concept and Hypothesis of Over- and Under-Investment

In inefficient markets, financing and investment decisions are not independent of each other. In fact, some capital market imperfections such as information asymmetry and agency costs can lead to over-investment or under-investment. Information asymmetry causes several conflicts between the main stakeholders and this ultimately leads to such process (Morgado & Pindado, 2000). Due to their limited liabilities, shareholders have been encouraged to invest in higher-risk projects. This willingness is because on one hand, high risk projects provide them with higher profits, and on the other, if a great loss occurs, the creditors will be sufferers. In this case there is a big problem known as "transfer of assets from creditors to shareholders," and shareholders' power is reduced in developing investment projects. Thus, transferring assets is one of the mechanisms that will lead to the under-investment (Pindado and Torre, 2005).

On the other hand, conflicts between shareholders and creditors with intensified moral hazard, leads to under-investment. Given the legal priority of creditors in the time of bankruptcy, shareholders may find themselves to be exposed to the situation that creators are using part of the created value for their own sake. Thus, shareholders are willing to abandon those projects that are currently of pure positive value which its net positive value is less than the debt. On the other hand, creditors try to stay away from investing in non-optimal cases. In addition to this conflict between shareholders and creditors, under-investment occurs as the result of finding for optimal choice (Morgado & Pindado, 2000; Anghel, 2013).

The conflicts between actual and potential shareholders on the other hand, will lead to under-investment caused by inappropriate selection. Due to information asymmetry between actual and potential shareholders regarding investment projects and existing assets, the company may abandon projects with current positive net value since this asymmetry about the outlook for firm's future investment may cause them to feel that if they invest their money, it is more probable to loss something compared with the time you do not invest at all (Lyandres and Zhdanov, 2005).

The Model of Measuring Over- and Under-Investment

In order to explain over- and under-investment, a model should be provided to show the optimal level of investment. Many researchers have used the model of growth opportunities for a company. In the present study, the model proposed by Biddle and Hilary was used to measure over- and under-investment, according to which the ratio of fixed assets change to MTB was used to measure growth opportunities. In addition, the variable "cash flow obtained from operations and growth of company" was also entered the model as control variables. Figure 1 simply depicts these investing amounts.

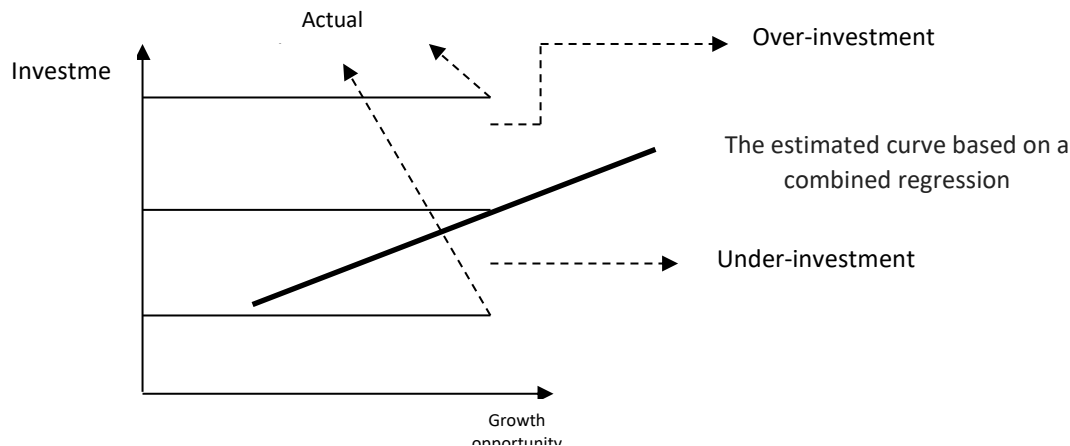


Figure 1. Presentation of under- and over-investment using growth opportunities

The theoretical basis for this model is based on the fact that company's growth opportunities need to justify new investment. In other words, it is expected that the growth opportunities for investment can be explained in the regression between these two variables. So if the investment fails to explain growth opportunities, the obtained error values will show under- and over-investment.

Review of the Literature

Investigating the relationship between firm value and investment, in order to test under- and over-investment hypotheses, Morgad (2000) found that there is an optimal level of investment. Companies that invest less than this optimal level suffer from under-investment and those companies that invest more than the optimal level suffer from under-investment. He also showed that companies with more investment opportunities than others keep their investment level close to the optimal level.

Myers *et al* (2003) showed that the longer the auditor's work, the less dispersion can be found in the distribution of discretionary accruals. In other words, long-term relationships can be controlled by auditors' power; thereby, manipulating accruals by managers can be reduced. In a study entitled "Audit quality and earnings management for companies involved in offering Taiwan's shares 3", Chen *et al* (2005) chose four big audit institutions as high quality auditors and compared the earnings of the companies audited by them with the earnings of companies other than those. They tried to investigate the relationship between audit quality and earnings management before and after public offer of shares and concluded that first earnings management occurs in such companies and, second, there is a significant relationship between earnings management and audit quality in such a way that the higher the audit quality, the lower the profit management in these companies will be.

In his study entitled "financial reporting quality and investment efficiency", Verdi (2006) showed that there is a strong relationship between financial reporting quality and under-investment in firms with financing constraints; he also found that there is a strong relationship between financial reporting quality and over-investment in companies with large cash balances. In another study entitled "Does earnings management affect company's investment decisions?", Tendello and Vanstraelen (2008) showed that earnings management can influence not only internal decision making process, but also the external target parts. They found that the manipulation of financial information into a form that can be measured by the value of fixed asset investments leads to non-optimal investment decisions. Biddle *et al.*

(2009) studied the internal decision making process in an article entitled "How financial reporting quality is related to investment efficiency?". There, they investigated accruals and revealed that high-quality accounting improves investment effectiveness. This is in such a way that the audit quality measures in companies that try for over-investment is negatively correlated with investment.

In their study, John Lenard and Yu (2012) investigated about how earnings quality affects investment decision making of those Chinese companies that do not hire auditors from Big4. They evaluated earnings management by discretionary accruals using Jones model and also in order to calculate audit quality, they used two measures, namely audit tenure and client's importance. The data was analyzed using one multivariate regression model and two logistic regression models. Their results showed that discretionary accruals are important indicators for over-investment of Chinese companies. Regarding the audit quality also, it was determined that the investing in the group of important clients was more than investing in group of trivial clients. Moreover, the companies hiring auditors for longer tenure enjoy over-investment when compared with those with short term period.

Measuring the Variables and Research Model

Measuring Research Variables

Variables used in this study were of three categories: dependent variable which is over-investment carried out by companies and audit quality which is the independent variable that determines and represents over-investment. In order to explain audit quality, the variables "audit tenure" and "audit specialization" are defined in this section. In addition, some descriptions of effective control variables including operating cash flow, business growth and business growth opportunities (investment opportunity) are presented.

Over-investment (Dependent Variable)

The rate of firm's investment (investment in fixed assets) which is over average is called industrial investment (John Lenard and Yu, 2012). In this study, over-investment was calculated through the following equation in which two linear regression models and logit regression were used. In linear regression, it was calculated as a continuous variable and in logit regression; it was calculated as zero and one. The IND_INV_{it} is company's adjusted investment based on industry (over-investment).

$$IND_{INV_{it}} = \text{company's investment in fixed assets} - \text{Mid} - \text{industry} \quad (1)$$

Audit Specialties (Independent Variable)

Audit quality can be defined as market assessment. Market assessment is in fact the possibility that an auditor both detects material misstatement of financial statements and reports the detected material misstatement. The possibility that a material misstatement is detected by the auditor is related to his competence and the possibility that the detected material misstatements are reported by him is related to his independence (DeAngelo, 1981).

Auditor's expertise as a measure of audit quality can be obtained in such a way that the ratio of audited sales of a special company by an auditor in a year to the sales of related industry of that company (Li, 2010). The equation below shows how it can be calculated.

$$\text{Audit specialty} = \frac{\text{audited sales of companies of the same industry by auditor}}{\text{total audited sales of related industry by that company}} \quad (2)$$

Audit Tenure (Independent Variable)

In order to measure the tenure, the year in which the auditor has been hired by the business unit must be known. Determining this date is not so difficult for companies that change their audit in the research period. But for companies that have had the same audit during the research period, determining the first year of hiring the auditor may not be possible by the available information. In this study, in order to find the first year an audit started his career in a company, the last year of research period (2011) was set as the beginning year and the auditor of that company was followed in the reverse years to get to the changing of auditor. Finally, the number of these years was considered as auditor tenure.

Control Variables

Investment opportunities or growth opportunities

In this study, the ratio of market value to book value (MTB) was used to evaluate investment opportunities. Book value of assets is an indicator of a company's assets in place and market value of assets is an indicator of both assets in place and company's growth opportunities. Therefore, MTB describes the combination of assets in place and growth opportunities. MTB ratio is usually more of one and the greater this ratio, the greater the growth opportunity will be (Myers, 1997). The ratio of market value of equity to its book value describes growth opportunities. The ratio of market value to book value is the most suitable variable as the indicator of investment opportunities. The ratio of market value to book value can be usually more than one and the higher this ratio, the greater the investment opportunities will be (Adam and Goyal, 2008). ☒

In this study, the following equation represents growth opportunities (investment opportunities) in a company:

$$\text{investment opportunity} = \frac{\text{market value of investments}}{\text{book value of investments}} \quad (3)$$

Company's growth

Growth opportunities represent company's potentiality in investment and profitability. If the general activity level of a business is a growing, the companies working on that industry need greater financial resources in order to expand their activities. In this study, the growth of the company is operated through the equation below.

$$\text{Growth} = \frac{\text{Natural logarithm of total assets at end of year}}{\text{total assets at the beginning of the year}} \quad (4)$$

Operating cash flows

The activities that generate income for the company are called company's operating activities. Cash flows from operating activities that are the results of cash transactions and economic events and are considered in determining operating profit are generally called operating cash flows. In this study, operating cash flow were obtained from cash flow statements of sample companies in operating activities and in the form of negative or positive net flows of operating activities.

Research Models

In this study, firstly to see whether or not audit quality help over-investment, Mc Nicols and Staben's (2008) model was used with trivial change in it so that the ratio of market value to book value was used to evaluate investment opportunities (growth opportunities). Variables placed in this model represent the factors that influence firm's investment behavior. With regard to other factors affecting investment, three additional variables including investment opportunities, growth and operating cash flows were entered in the model. To investigate the factors affecting the likelihood of over-investment by the company, in addition to the use of linear regression model, logistic regression model was also used to compare company's investment with the average of its industry. For testing the first sub-hypothesis of the main hypothesis, the following model was used.

Model (1)

$$OVERINV = \alpha + \beta_1 LESS + \beta_2 MTB_{it} + \beta_3 CF_{it} + \beta_4 GROWTH_{it} + \varepsilon \quad (5)$$

In order to determine audit quality, two variables were used namely audit tenure and audit specialization. In the above model, a dummy variable was used for investigating audit specialization. This dummy variable equals 1 if the auditor's specialization is lower than the industry median; otherwise, it will be zero. For testing the first sub-hypothesis, the following linear regression model was used.

Model (2)

$$IND_INV_{it} = \alpha + \beta_1 LESS + \beta_2 MTB_{it} + \beta_3 CF_{it} + \beta_4 GROWTH_{it} + \varepsilon \quad (6)$$

To investigate the audit tenure, a model similar to Model (2) was utilized except that instead of audit specialization (LESS), the auditor tenure was used. The variable "tenure" was also used as a dummy variable and was entered to the model as zero and one. In order to investigate the effect of auditor tenure on over-investment, this variable was divided into three tenures, namely long (9 years), medium (4 to 8 years) and short term period (1 to 3 years); using logit regression and dummy variable, the effect of each of these tenures on over-investment were studied.

Using logit regression, models (3), (4) and (5) were utilized to test sub-hypotheses 2, 3 and 4, respectively.

Model (3)

$$OVERINV = \alpha + \beta_1 Long - Term Period + \beta_2 MTB_{it} + \beta_3 CF_{it} + \beta_4 GROWTH_{it} + \varepsilon \quad (7)$$

Model (4)

$$OVERINV = \alpha + \beta_1 Middle - Term Period + \beta_2 MTB_{it} + \beta_3 CF_{it} + \beta_4 GROWTH_{it} + \varepsilon \quad (8)$$

Model (5)

$$OVERINV = \alpha + \beta_1 Short - Term Period + \beta_2 MTB_{it} + \beta_3 CF_{it} + \beta_4 GROWTH_{it} + \varepsilon \quad (9)$$

To test sub-hypotheses 3, 4 and 5, the following models were used respectively through the linear regression.

Model (6)

$$IND_INV_{it} = \alpha + \beta_1 Long - Term\ Period + \beta_2 MTB_{it} + \beta_3 CF_{it} + \beta_4 GROWTH_{it} + \varepsilon \quad (10)$$

Model (7)

$$IND_INV_{it} = \alpha + \beta_1 Middle - Term\ Period + \beta_2 MTB_{it} + \beta_3 CF_{it} + \beta_4 GROWTH_{it} + \varepsilon \quad (11)$$

Model (8)

$$IND_INV_{it} = \alpha + \beta_1 Short - Term\ Period + \beta_2 MTB_{it} + \beta_3 CF_{it} + \beta_4 GROWTH_{it} + \varepsilon \quad (12)$$

Methodology of Research

Since the results of this research could be used by corporations, audit institutions and organizations, students and researchers, it is considered as applied research; regarding data collecting and methodology, this study is an analytical-descriptive one. Regarding the nature of data, it is also considered as post-occurrence study. In such investigations, the researcher has no control over the collected data and since this study sought to determine the relationship between audit quality and over-investment, it is considered as correlational study. The population under study comprised cement, basic metals and automotive parts industries which were chosen among all firms registered by March 20, 2010. Selection of these industries was based on market values obtained from the market performance of the listed companies in Tehran Stock Exchange. The reason behind selecting among Listed Companies in Tehran Stock Exchange was that the access to financial information of these firms was much easier compared with non-member firms. Also, because of the regulations and standards of Exchange Organization of Iran, reported financial information for these companies is more homogeneous. Taking into account the spatial and temporal domains of the study and regarding the following criteria and constraints, the knockout sampling method was used and three industries were selected, namely basic metal industries, cement, automobile parts manufacturing.

1. Due to the required data that must cover the research period, the companies had to be listed on the Stock Exchange before March 2010.

2. In order to have homogeneous date and remove seasonal effects, the fiscal year of these firms must be ended by March.

3. During the period under study, their financial year must not be changed.

The archiving method was used to collect data in this study. In order to collect the require information for theoretical bases section, a wide variety of Persian and English specialized journals were used. To gather the other required data, databases of Tehran Stock Exchange, financial statements of the firms and Tadbir Pardaz software program was used. The initial analyses of the data were performed by Excel 2010 and statistical analysis was conducted by Eviews (version 7.1) and SPSS (Version 20). To answer the research question, one main hypothesis and four sub-hypotheses were developed as follows:

Main hypothesis: there is a relationship between audit quality and over-investment in listed companies in Tehran Stock Exchange.

Sub-hypothesis 1: there is a relationship between audit specialization and over-investment in listed companies in Tehran Stock Exchange.

Sub-hypothesis 2: there is a significant relationship between short audit tenure and over-investment in listed companies in Tehran Stock Exchange.

Sub-hypothesis 3: there is a significant relationship between medium audit tenure and over-investment in listed companies in Tehran Stock Exchange.

Sub-hypothesis 4: there is a significant relationship between long audit tenure and over-investment in listed companies in Tehran Stock Exchange.

Testing Hypotheses and Research Findings

Testing sub-hypothesis 1 (logit regression model)

Logit regression model and linear regression model were used to test this hypothesis. Since the dependent variable here (OVERINV) is either zero or one, therefore, logit regression model should be used. Results from testing sub-hypothesis 1 are presented in Table 1.

Table 1

The first sub-hypothesis estimation model (logit model)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
LESS	-0.549455	0.217444	-2.526877	0.0115
MBT	-0.005158	0.008069	-0.639300	0.5226
CF	9.65E-07	2.56E-07	3.765094	0.0002
GROWTH	-1.286599	3.658478	-0.351676	0.7251
C	1.363115	3.695978	0.368810	0.7123
McFadden R-squared	0.111399	Mean dependent var		0.517949
S.D. dependent var	0.500320	S.E. of regression		0.468593
Akaike info criterion	1.261486	Sum squared resid		84.31838
Schwarz criterion	1.322504	Log likelihood		-239.9898
Hannan-Quinn criter.	1.285674	Deviance		479.9796
Restr. deviance	540.1521	Restr. log likelihood		-270.0761
LR statistic	60.17254	Avg. log likelihood		-0.615358
Prob(LR statistic)	0.000000			

As can be seen, the significance level of the independent variable (LESS) is less than 5% (0.0115/0) and it is significant. Therefore, sub-hypothesis 1 is confirmed. In other words, auditor's specialty has a significant effect on over-investment. The coefficient of the independent variable is negative (- 0.5494), which means it has a negative relationship with the dependent variable. Since the value is zero when the audit specialization is greater than the average of industry, and it is one when the audit specialization is less than the average of industry, LESS variable is an inverse measure for audit quality. Consequently, it can be said that in the sample of firms under investigation, by increasing the auditor's specialty, the over-investment will also increase. Among the control variables, operating cash flow variable is positively and significantly correlated with over-investment. The (t) for logit regression (LR) was significant (0.000) indicating the significance of the overall regression model. The determining coefficient model (McFadden statistic) was 0.11 which means that 11% of the changes in dependent variable can be explained by the entered variables in the model.

Testing sub-hypothesis 1 (linear regression model)

First, selecting the model of combined data was tested; results are presented in Table 2. Accordingly, common effect method was used based on testing statistics (0.9998). Since the statistic for Chow test was more than 5%, common effect model was selected and Hausman test was not required. The results can be found in Table 3.

Table 2

Test of selecting the model of combined data

Redundant Fixed Effects Tests			
Equation: Untitled			
Test period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Period F	0.009390	(4,380)	0.9998
Period Chi-square	0.038546	4	0.9998

Table 3

Estimation model for sub-hypothesis1 (linear model)

Dependent Variable: INDINV				
Method: Panel Least Squares				
Periods included: 5				
Cross-sections included: 78				
Total panel (balanced) observations: 390				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LESS	-28585.83	79135.86	-0.361225	0.7181
MBT	-344.0502	2805.847	-0.122619	0.9025
CF	0.372389	0.016798	22.16858	0.0000
GROWTH	383050.2	1050098.	0.364776	0.7155
C	-382723.7	1061691.	-0.360485	0.7187
R-squared	0.574318	Mean dependent var		264512.7
Adjusted R-squared	0.568775	S.D. dependent var		1157930.
S.E. of regression	760386.2	Akaike info criterion		29.93631
Sum squared resid	2.22E+14	Schwarz criterion		29.99732
Log likelihood	-5831.580	Hannan-Quinn criter.		29.96049
F-statistic	103.6163	Durbin-Watson stat		1.688080
Prob (F-statistic)	0.000000			

Changing the type of dependent variable and using linear regression, this time the independent variable LESS would be non-significant. The desire significance value for independent variable coefficient was 0.7181 with more than 5% error; therefore, it can be said that this has no significant effect on dependent variable. The independent variable being significant in the logit model and not being significant in the linear regression indicates that this type of independent variable (audit specialization) can only predict the presence or absence of over-investment and it is not able to predict its value. Cash flow variable, as the logit model, is also significant this model with a positive coefficient, which means it has a direct relationship with the dependent variable. Other control variables such as logit models are not significant.

Testing Sub-hypothesis 2 (Logit Regression Model)

In order to test this hypothesis, logit and linear regression model, like testing sub-hypothesis 1, were used except that instead of the variable "audit specialty" (LESS), audit tenure was used in this model. In order to investigate the effect of auditor tenure on over-investment, this variable was divided into three tenures, namely long (9 years), medium (4 to 8 years) and short term period (1 to 3 years); using logit regression and dummy variable, the effect of each of these tenures on over-investment were studied.

Table 4

Estimation model for sub-hypothesis 2 - long audit tenure (logit model)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Long-Term Period	-0.267348	0.216619	-1.234184	0.2171
MBT	-0.004241	0.007814	-0.542682	0.5873
CF	9.91E-07	2.52E-07	3.931155	0.0001
GROWTH	-0.876959	3.543198	-0.247505	0.8045
C	0.786629	3.573276	0.220142	0.8258
McFadden R-squared	0.102302	Mean dependent var		0.517949
S.D. dependent var	0.500320	S.E. of regression		0.471075
Akaike info criterion	1.274086	Sum squared resid		85.21425
Schwarz criterion	1.335103	Log likelihood		-242.4467
Hannan-Quinn criter.	1.298274	Deviance		484.8935
Restr. deviance	540.1521	Restr. log likelihood		-270.0761
LR statistic	55.25865	Avg. log likelihood		-0.621658
Prob (LR statistic)	0.000000			

As can be seen, the independent variable coefficient (Long-term period) is -0.267 and its significance is 0.2171. Given the significance of the test, the independent variable "long-term period" is not significantly related to the dependent variable "over-investment". Consequently, the hypothesis that states the correlation between these two variables is not accepted. Among the control variables, "operating cash flow" is positively and significantly related with over-investment. In this model, the statistic LR (significance of the whole model) is 55.25 and its significance is 0.000, which indicates the significance of the overall regression model. Also, coefficient of model determination (Mc Faden statistic) is 0.102 which means that 10.2 percent of the changes in the dependent variable can be explained by the entered variables in the model.

Testing sub-hypothesis 2 (logit regression model)

At first, test of model selection was performed, the result of which is presented in the table below.

Table 5

Test of selecting model for combined data

Redundant Fixed Effects Tests			
Equation: Untitled			
Test period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Period F	1.333400	(4,380)	0.2569
Period Chi-square	5.435897	4	0.2454

According to the statistic (0.2569), common effects method was selected. Results of testing the model are presented in Table 6.

Table 6

Estimation model for sub-hypothesis 2 - long-term period (linear model)

Dependent Variable: INDINV				
Method: Panel Least Squares				
Periods included: 5				
Cross-sections included: 78				
Total panel (balanced) observations: 390				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
T1	14643.18	78497.27	0.186544	0.8521
MBT	-379.6109	2813.908	-0.134905	0.8928
CF	0.373240	0.016579	22.51265	0.0000
GROWTH	394508.1	1049575.	0.375874	0.7072
C	-416155.5	1058522.	-0.393148	0.6944
R-squared	0.574212	Mean dependent var		264512.7
Adjusted R-squared	0.568668	S.D. dependent var		1157930.
S.E. of regression	760480.9	Akaike info criterion		29.93655
Sum squared resid	2.22E+14	Schwarz criterion		29.99757
Log likelihood	-5831.628	Hannan-Quinn criter.		29.96074
F-statistic	103.5713	Durbin-Watson stat		1.687724
Prob (F-statistic)	0.000000			

Like logit regression, the independent variable is not significant because the significant of its coefficient is more than 5 percent (0.8521). Only the variable "cash flow" is significant.

Testing sub-hypothesis 3 (logit regression model)

At first, logit regression model was used to test sub-hypothesis 3. Results are presented in Table 7.

Table 7

Estimation model for sub-hypothesis 3 – Middle-term period (logit model)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Middle-Term Period	-0.192627	0.230986	-0.833936	0.4043
MBT	-0.005172	0.007873	-0.656941	0.5112
CF	9.78E-07	2.56E-07	3.821129	0.0001
GROWTH	-1.009454	3.543916	-0.284842	0.7758
C	0.857962	3.577033	0.239853	0.8104
McFadden R-squared	0.100764	Mean dependent var		0.517949
S.D. dependent var	0.500320	S.E. of regression		0.471827
Akaike info criterion	1.276216	Sum squared resid		85.48626
Schwarz criterion	1.337234	Log likelihood		-242.8621
Hannan-Quinn criter.	1.300404	Deviance		485.7243
Restr. deviance	540.1521	Restr. log likelihood		-270.0761
LR statistic	54.42784	Avg. log likelihood		-0.622723
Prob (LR statistic)	0.000000			

As can be seen, the coefficient for independent variable (Middle-Term Period) is -0.192 and its significance are 0.404. Given the significance of the test, the independent variable "middle-term period" was not significantly related to the dependent variable "over-investment". Therefore, the hypothesis stating the significant relationship between these two variables is not accepted. Among the control variables, the variable "operating cash flow" is positively and significantly correlated with over-investment. In this model, LR statistic (significance of the whole model) is 54.52 and its significance is (0.000) indicating the significance of the overall regression model. The determining coefficient model (McFadden statistic) was 0.10 which means that 10% of the changes in dependent variable can be explained by the entered variables in the model.

Testing Sub-hypothesis 3 (Linear Regression Model)

At first, the test of selecting model for sub-hypothesis 3 was conducted by linear regression and the results are presented in Table 8. With regard to test statistic (0.2567), common effects method was selected.

Table 8

Test of selecting model for combined data

Redundant Fixed Effects Tests			
Equation: Untitled			
Test period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Period F	1.333892	(4,380)	0.2567
Period Chi-square	5.437890	4	0.2452

Results of testing the model are presented in the following table. Like logit regression model, the independent variable is not significant since the significance of its coefficient is greater than 5% (0.7299). The only significant variable is cash flow.

Table 9

Estimation model for sub-hypothesis 3 – Middle-term period (linear model)

Dependent Variable: INDINV				
Method: Panel Least Squares				
Periods included: 5				
Cross-sections included: 78				
Total panel (balanced) observations: 390				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
T2	-29551.59	85523.44	-0.345538	0.7299
MBT	-370.3057	2807.177	-0.131914	0.8951
CF	0.372799	0.016615	22.43740	0.0000
GROWTH	387518.0	1049718.	0.369164	0.7122
C	-392740.3	1059991.	-0.370513	0.7112
R-squared	0.574305	Mean dependent var		264512.7
Adjusted R-squared	0.568763	S.D. dependent var		1157930.
S.E. of regression	760397.1	Akaike info criterion		29.93633
Sum squared resid	2.22E+14	Schwarz criterion		29.99735
Log likelihood	-5831.585	Hannan-Quinn criter.		29.96052
F-statistic	103.6110	Durbin-Watson stat		1.687951
Prob (F-statistic)	0.000000			

Testing sub-hypothesis 4 (logit regression model)

At first, logit regression model was used to test this hypothesis. The results are presented in Table 10.

Table 10

Estimation model for sub-hypothesis 4 – Short-term period (logitr model)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Short-Term Period	0.679288	0.274587	2.473851	0.0134
MBT	-0.003940	0.008071	-0.488159	0.6254
CF	9.85E-07	2.53E-07	3.890899	0.0001
GROWTH	-1.016839	3.556479	-0.285912	0.7749
C	0.665478	3.586597	0.185546	0.8528
Mcfadden R-squared	0.111115	Mean dependent var		0.517949
S.D. dependent var	0.500320	S.E. of regression		0.468222
Akaike info criterion	1.261879	Sum squared resid		84.18497
Schwarz criterion	1.322897	Log likelihood		-240.0665
Hannan-Quinn criter.	1.286067	Deviance		480.1329
Restr. deviance	540.1521	Restr. log likelihood		-270.0761
LR statistic	60.01922	Avg. log likelihood		-0.615555
Prob (LR statistic)	0.000000			

As can be seen, the independent variable coefficient (Short-term period) is 0.679 and its significance is 0.0134. Given the significance of the test, the independent variable "short-term period" is significantly related to the dependent variable "over-investment". Consequently, the hypothesis stating the correlation between these two variables is

accepted. The independent variable coefficient is also positive indicating direct relationship with dependent variable. In fact according to observations, the shorter the audit tenure, the more the over-investment will be. Among the control variables, "operating cash flow" is positively and significantly related with over-investment. In this model, the statistic LR (significance of the whole model) is 60.01 and its significance is 0.000, which indicates the significance of the overall regression model. Also, coefficient of model determination (Mc Faden statistic) is 0.111 which means that 11.1 percent of the changes in the dependent variable can be explained by the entered variables in the model.

Testing sub-hypothesis 4 (linear regression model)

At first, the test of selecting model was conducted. The results are presented in the table below. With regard to test statistic (0.2566), common effects method was selected. Results of testing the model are presented in table 12.

Table 11

Test of selecting model for combined data

Redundant Fixed Effects Tests			
Equation: Untitled			
Test period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Period F	1.334133	(4,380)	0.2566
Period Chi-square	5.438866	4	0.2452

Table 12

Estimation model for sub-hypothesis 4 – Short-term period (linear model)

Dependent Variable: INDINV				
Method: Panel Least Squares				
Periods included: 5				
Cross-sections included: 78				
Total panel (balanced) observations: 390				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
T3	14998.27	94970.19	0.157926	0.8746
MBT	-315.9299	2810.611	-0.112406	0.9106
CF	0.373635	0.016435	22.73415	0.0000
GROWTH	397285.0	1049387.	0.378588	0.7052
C	-415101.2	1058487.	-0.392165	0.6952
R-squared	0.574201	Mean dependent var		264512.7
Adjusted R-squared	0.568656	S.D. dependent var		1157930.
S.E. of regression	760490.6	Akaike info criterion		29.93658
Sum squared resid	2.22E+14	Schwarz criterion		29.99760
Log likelihood	-5831.633	Hannan-Quinn criter.		29.96077
F-statistic	103.5667	Durbin-Watson stat		1.687706
Prob (F-statistic)	0.000000			

As can be seen, unlike logit model, the regression model was used and the coefficient of independent variable for short-term period is 0.8446 and is not significant. Only the variable "cash flow" is significant like the others.

Discussion and Conclusion

Since two criteria namely audit specialty and audit tenure were used to measure audit quality, the main hypothesis was tested through four sub-hypotheses. In hypothesis 1, the significant relationship between auditor specialization and over-investment was studied in listed companies in Tehran Stock Exchange. Test results using a logit regression model indicates that sub-hypothesis 1 is accepted. In other words, auditor's specialty has significant effect on over-investment. Independent variable coefficient is negative, indicating a reverse relationship with dependent variable. Since the value is zero when the audit specialization is greater than the average of industry, and it is one when the audit specialization is less than the average of industry, LESS variable is a reverse measure for audit quality. Consequently, it can be said that in the sample of firms under investigation, by increasing the auditor's specialty, the over-investment will also increase. Among the control variables, operating cash flow variable is positively and significantly correlated with over-investment. The (t) for logit regression (LR) was significant (0.000) indicating the significance of the overall regression model.

Changing the type of dependent variable and using linear regression, this time the independent variable LESS was not significant. The significance value for independent variable coefficient was greater than 5% of the desired error; therefore, it can be said that this has no significant effect on dependent variable. The relationship between dependent and independent variable was significant in logit regression while it was not so in this regression. This can be explained this way: in logit regression, dependent variable indicates the existence of either over-investment or under-investment. But in the linear regression, the dependent variable "over-investment" shows the difference between firm's investment to the related industry and it includes both negative and positive values.

The independent variable being significant in the logit model and not being significant in the linear regression indicates that this type of independent variable (audit specialization) can only predict the presence or absence of over-investment and it is not able to predict its value. Cash flow variable, as the logit model, is also significant this model with a positive coefficient, which means it, has a direct relationship with the dependent variable. Other control variables such as logit models are not significant. Thus, this type of independent variable (audit specialization) can only predict the presence or absence of over-investment and it is not able to predict its value. Cash flow variable, as the logit model, is also significant this model with a positive coefficient, which means that it, has a direct relationship with the dependent variable. Other control variables such as logit models are not significant.

Sub-hypothesis 2 examined the significant relationship between long-term audit tenure and over-investment in listed companies in Tehran Stock Exchange. In testing hypothesis in the form of logit regression, the independent variable "long-term period" was significantly related to the dependent variable "over-investment". Thus, then hypothesis stating the correlation between these two variables is not accepted. In this model, the statistic LR (significance of the whole model) indicates the significance of the overall regression model. In testing sub-hypothesis 2 in the form of linear regression model, like logit regression, the independent variable is not significant since the significance of its coefficient is more than 5%. Only the variable "cash flow" is significant.

Sub-hypothesis 3 examined the significant relationship between middle audit tenure and over-investment in listed companies in Tehran Stock Exchange. Given the significance of the test, in testing hypothesis in the form of logit regression, the independent variable "middle-term period" was significantly related to the dependent variable "over-investment". Thus, the hypothesis stating the correlation between these two variables is not accepted. Moreover, among control variables, the variable "operating cash flow" has positive and significant relationship with over-investment. In this model, the statistic LR (significance of the whole model) indicates the significance of the overall regression model. In testing sub-hypothesis 3 in the form of linear regression model, like logit regression, the independent variable is not significant since the significance of its coefficient is more than 5%. Only the variable "cash flow" is significant.

Sub-hypothesis 4 was used in order to examine the significant relationship between short-term audit period and over-investment in listed companies in Tehran Stock Exchange. Given the significance of the test, in testing hypothesis in the form of logit regression, the independent variable "short-term period" was significantly correlated with the dependent variable "over-investment". Thus, the hypothesis stating the correlation between these two variables is accepted. In fact, according to observations the shorter the audit tenure, the more the over-investment will be. Among the control variables, "operating cash flow" is positively and significantly related with over-investment. In testing sub-hypothesis 4 in the form of linear regression model it can be seen that, unlike logit regression, the independent variable "short-term period" is not significant. Like the other states, only the variable "cash flow" is significant.

Suggestions based on the Results of the Present Study

Based on observations, it was found that there is a significant relationship between short term audit period and over-investment in companies under investigation so that the shorter the audit tenure, the more the over-investment will be. Thus, since over-investment is considered inefficiency, it is recommended that audit tenure increases; this definitely must be done by keeping other effective issues. Also, since the results indicated the relationship between applied over-investment of the investigated firms and only the short-term audit period and that this relationship is reverse, it is therefore suggested that Stock Exchange Organization sets some rules and regulations to prevent firms from changing auditors for auditing their financial statements.

Results showed that in the firms under investigation, the increase in auditor's specialty will lead to over-investment. This may be a consequence of excessive rigor of specialist auditors; they should be required to act in such a way that minimizes the occurrence of this phenomenon, since having independent auditors is of many advantages.

The past information can be a good basis for future decisions. According to the results which show that there is a relationship between audit quality and over-investment, it is recommended that before making any investment decision, the audit quality be analyzed through auditor tenure and auditor specialization; companies should be chosen that enjoy professional auditors with short term audit period. It is recommended to firms' boards and shareholders to prevent over-investment, which is an indicator of inefficiency, by applying more regulatory mechanisms.

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