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EARNINGS MANAGEMENT AND INVESTOR REACTION: THE CASE OF IRAN'S CAPITAL MARKET USING GAME THEORY

The purpose of the article is to investigate the interaction between the behavior of managers and investors toward Iran's capital market and the focus on agency theory which ends up with the conflict between the utilities of manages and investors because a conflict of interest implies an attempt to spread opportunistic behavior. In the current study, the benefit of reducing capital cost (manager's utility) and return on assets (investor's utility) are considered variables of interest of either party, in that Osborne's game theory was used in a two-step manner. The study population consisted of the companies listed on the Tehran Stock Exchange and Iran Over-the-Counter Market, classified in the game table according to managers' behavior toward high or low earnings management and investor's behavior toward acceptance non-acceptance of stock. The experimental results presented in this paper uphold the agency theory, indicating a conflict between managers and investors in Iran's capital market, particularly in the Tehran Stock Exchange. According to game theory, Nash's dominant equilibrium comes to the fore when dealing with the manager's low earnings management and investor's

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choice of strategy to accept a share in Iran's capital market and Tehran Stock Exchange. Alternatively, the presentation of transparent financial statements and the acceptance of such a company stock can maximize parties' utilities.

Keywords: *earnings management, game theory, agency theory, trading volume*

1. INTRODUCTION

Social behavior in the real world will end up with either collaboration or conflict. This situation promises to be a competitive and conflicting environment at all social and organizational levels, including human beings, organizations, and even organizational levels. As an example of such conflicts, agency theory is concerned, which deals with the conflict between owner and manager's utilities. Scot defined the conflict between manager and investor in game theory as a manager-investor game. Game theory deals with strategic decisions in the context of C79utility theory. According to utility theory, both owners and managers seek to increase their utility, which cannot be consistently achieved. James (1933), as Berle and Means (1932) quoted, maintains that managers can take on decision makers' roles and are required to be monitored by shareholders accordingly. The extent to which the company's goals are achieved in a capital market is considered a decision in this regard. If managers fail to reach their goals or are pursuing specific future goals, the likelihood of the behavior favoring earnings management grows. Schipper (1989) defined earnings management as a deliberate intervention in financial reporting to obtain managers' self-interest. Degeorge et al. (1999) believe that investors' management concerning a business unit is the strong ground for earnings management. Modigliani and Miller (1958) demonstrated that in the absence of taxes, bankruptcy costs, agency costs, asymmetric information, and an efficient market, the value of a firm is unaffected by how that firm is financed. It appears that earnings management is just the result of opportunistic behavior in this situation. But, there is a kind of financial friction in the current economy, and hence manager's behavior can be efficient, apart from opportunistic behavior. Efficiency behavior suggests delivering a utility message in an equilibrium situation (Ronen and Yaari, 2008). Therefore, in the manager-investor game, if the manager seeks the company's gain and sends a message accordingly, his behavior is shaped on efficiency grounds. Alternatively, there are scenarios like uncertainty and asymmetry in the manager-investor game, in which case management plays a one-sided game and expects the investor's response. Thus, this game continues as long as it reaches an equilibrium point. This equilibrium point does not necessarily refer to

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utilities but a strategy for making players not leave the game. According to game theory, if two parties are required to comply with a particular rule, a cooperative game occurs, and when there is no binding rule, a kind of non-cooperative game emerges (Bagnoli and Watts, 2000). Accordingly, game theory is equilibrium (dominant equilibrium) or a non-equilibrium or poor equilibrium. Studying a dominant and poor strategy that indicates a conflict is significant in the context of game theory. In the manager-investor game, the manager employs his own strategy as the investor expresses his own reaction. The consequence of a manager's movement can be a personal gain (opportunistic behavior and material utility and non-cash utility) or a corporate benefit (efficiency behavior and reduction of the company's cost of capital). And the consequence of the investor's reaction can be either long-term (control and remarkable influence) and short-term (return on share). In this research, the manager's strategy has been determined to be earnings management, which reduces capital cost. The investor's strategy is to purchase or not to purchase stock, in which case stock return is the outcome. As previous studies utilized regression models, such a strategic relationship based on game theory in the existing literature has been less frequently observed.

Our paper makes three contributions to knowledge. First, in this study, where the interest rate in the economy is deducted from the cost of capital, the savings are used as a variable of the manager's benefit. Since this benefit is not recorded in the accounting books, previous studies have not been applied. Second, in this study, the emphasis is on the existence of a balance point (agreement) despite the conflict between investors and managers. In previous studies, earning management has been viewed either from opportunism or efficiency, while both perspectives are examined in this research. Third, in previous studies on earnings management and the impact of its various factors, regression models have been used. In contrast, regression has been used as a calculation tool (for calculating earnings management variables). The analysis of the conflict between Investors and managers is based on game theory.

The remainder of the paper is organized as follows. The next section theoretical literature and the presentation of hypotheses, and then in the third section, the study population, research plan, and research conduct will be addressed. In the fourth section, analytical analysis and test of the research hypotheses will be presented. In the end, a summary and conclusion will be put forward.

2. THEORETICAL LITERATURE AND PRESENTATION OF HYPOTHESES

2.1. Theoretical literature

In 1921 a French mathematician Émile Borel put forward for the first time a series of common games. He touched on the predictability of the results of such games in a rational rather than stochastic probability. Although Borel (1921) seriously dealt with games rationally for the first time, plenty of historians attributed game theory development instead of Neumann and Morgenstern (1944), the renowned Hungarian mathematicians. Neumann and Morgenstern (1944) found that games' results are not necessarily determined by probability theory. He formulated a method of bluffing in this game. Bluffing in the game includes a cheating strategy by other players and the concealment of information by them. Nash (1950) proved that if mixed strategies (where a player chooses probabilities of using various pure strategies) are allowed, then every game with a finite number of players in which each player can choose from finitely many pure strategies has at least one Nash equilibrium, which might be a pure strategy for each player or might be a probability distribution over strategies for each player. Nash equilibrium is a concept within game theory where the optimal outcome of a game is where there is no incentive to deviate from the initial strategy. More specifically, the Nash equilibrium is a concept of game theory where the optimal outcome of a game is one where no player has an incentive to deviate from their chosen strategy after considering an opponent's choice. The conflicting situation suggests a game with symmetry or asymmetry, perfect information or perfect information, cooperation or non-cooperation, a stochastic or non-stochastic state, and a zero-sum or non-zero-sum state. Winning or losing in the game is determined by predicting either of the game parties' reactions. This prediction can be built on the reception of the opposing party's game messages, not a random factor. According to game theory, the requirement of using a game is determined by the presence of players, rational behavior, strategy, and strategic thinking, which include players, reactions, and action profiles. A time balance is kept when the best response was given to other players' games, i.e., the maximum utility is not necessarily concerned. It is likely even to sustain a loss. Suppose players' outcome for each combination and strategy set becomes apparent for each player (assurance). In that case, the game is called static with perfect information, and the balance in this game is called Nash equilibrium. Suppose the combination and strategy set is not apparent for at least a single player. In that case, the game is called static with imperfect information, and the equilibrium is a mixed-strategy equilibrium. The game theory can explain

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and predict any game's process and outcome ranging from Dooz[1] to a game on the stock market.

According to the agency theory, owners of capital as agents delegate decision-making power to managers as brokers, and hence managers become shareholders' representatives. The representatives' decisions can be initiated to benefit them per se, causing the agents to sustain agency costs to control for the brokers. For the first time set forth by Jensen and Meckling (1976), the agency's cost was in their paper titled "Theory of the firm: managerial behavior, agency costs, and ownership structure". Earnings management is one of the outcomes of agency theory. The first structured research on earnings management was conducted by Hepworth (1953). He claimed that owners and creditors of a firm often trust management to report a more stable income than volatile income. Schipper (1989) described earnings management as a deliberate action to influence the process of financial reporting for the sake of personal gain. Healy and Wahlen (1999) contend that earnings management involves changing financial statements to mislead shareholders concerning an organization's core performance or influence contract outcomes depending on reported accounting figures. Degeorgeet al. (1999) define earnings management as management's artificial earnings manipulation to ensure the expected level of interest for certain decisions. For them, earnings management's primary incentive is to manage investors' perception of a business unit. Earnings management is built on two approaches. Benjamin et al. (2016) studied two earnings management approaches, i.e., the first one is artificial earnings management (strategic investment scheduling, financing, and agent's decision making). The second approach states that real earnings management is more likely to be more interesting than artificial earnings management. However, some researchers have a mindful look at earnings management and define it as manipulating earnings numbers on managers. Private and classified information of management about a firm's future performance can be passed on to investors (Jiraporn et al., 2008). In the literature of earnings management, there are a variety of hypotheses that are used to account for earnings management, which include mechanistic hypothesis (Dechow, 1994; Kaplan and Roll, 1973), efficient market hypothesis (Hines, 1982; Welker, 1995; Hand, 1990), and positive theory (Watts and Zimmerman, 1978). Yet in a general classification, Saghafi and Pourianasab (2010) categorized the theories of earnings management as follows; prospect theory (Schipper, 1989; Burgstahler & Dichev, 1997), agency theory (Jensen and Meckling, 1976; Prior et al., 2008), catering theory (Rajgopal et al., 2007), big bath theory (Holmstrom and Kaplan, 2001; Cohen and Zarowin, 2010), signaling theory (Aharony and Swary, 1980), game theory (Bagnoli and

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[1] Dooz is a game designed for two players, who take turns marking the spaces in a grid. The player who succeeds in placing three respective marks in a horizontal, vertical, or diagonal row wins the game.

Watts, 2000), and stakeholder theory (Marc and Friedman, 1994). Similarly, earnings management incentives can be categorized as follows; opportunistic incentive (Christie and Zimmerman, 1994; Olsen and Zaman, 2013), efficiency motivation (Christie and Zimmerman, 1994), signaling motivation (Scott 2003; Healy and Wallen, 1999; Olsen and Zaman, 2013), and smoothing motivation (Olsen and Zamman, 2013). When it comes to a manager's efficiency behavior, this behavior is generally illustrated according to signaling theory. Akerlof (1970) claims that if information about a commodity's quality is low, that commodity's market will shrink. Having further information by one side of trading versus the other side of trading causes the information holder to communicate the information he is willing to present. To put it simply, the presentation of information is signaling by the holder of the information. As for the challenges of this, we can refer to adverse selection (false choice), moral hazard (inappropriate behavior), and market failure (monopoly of information). On the other hand, the equilibrium of signaling theory was for the first time proposed by Spence (1973) as to the relationship between labor and the market. According to this theory, if a firm with good activity sends a signal to the market and another firm with an unfavorable situation sends the same signal, the information user will have the same perception of the information until there are no grounds for invalidation this signal. In this paper, earnings management in companies is studied as a signal sent out by managers. So is investors' decision-making as the signal's reception's outcome (Guizani and Kouki, 2012; Lotfi, 2018; Ali et al., 2019).

Hypothesis development

One of the agency's problems is information asymmetry, directly linked to earnings quality (Aghaei et al., 2017). It is at some time caused by managers' intrinsic optimism (Scott Asay, 2017). Dechow et al. (2010) believe that earnings management is dependent on the context of decision making, holding that firm performance affected by the quality of high earnings—has a fundamental impact on the future forecast. This can make a difference to competitors and investors (Einhorn et al., 2018). Companies with high earnings management incur additional costs compared to enterprises with low earnings management. The findings show that the quality of accounting information can reduce the benefit of asymmetric information and the costs of wrong choices (Garcia-Teruel et al., 2009). In this vein, Biddle et al. (2009) reported a positive relationship between the quality of financial reporting and investment efficiency, claiming that financial reporting quality may reduce moral hazard and adverse selection. Low quality of earnings escalates information asymmetry between domestic and foreign stockholders, causing

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a rise in agency costs (Sun et al., 2012). Alternatively, capital market pressure is considered one of the most crucial motivating factors in managers' earnings management. They strategically use flexibility and powers of accounting accruals that an accounting environment delegates to them to smooth earnings. Similarly, firm managers, for the most part, utilize the income increase resulting from earnings management to defer bad news and deviate earnings patterns. Indeed, earnings are managed with an incentive to avoid the report of profit reduction. Time management encountering earnings reduction can help deviate earnings and frequently make it incline upward. Martinez (2005) experimented with experimental evidence that Brazilian public companies perform earnings management to respond to capital markets' pressures more with incentives relating to the capital market. He documented evidence that Brazilian firms manage their earnings with incentives to avoid loss reporting and maintain the latest performance. Soon and Wee (2011) argue that earnings management and smoothing can make firm owners or creditors incur huge expenses whenever earnings management favors a manager's gain or is performed to deviate creditors and investors case earnings management is bad. Reviewing the two approaches of earnings management: accrual-based (i.e., using accruals, estimation, and accounting policies), real earnings management (strategic investment timing, financing, and agent's decision-making), Benjamin et al. (2016) demonstrated that real earnings management are probably more interesting than accounting earnings management. Auditors can detect this earnings management, and it can also cause many concerns in the future. It seems that this kind of earnings management can be more operative following Sarbanes-Oxley Act (2002). However, investors require a financial statement that provides influential and reliable information to estimate the risk and value expected for their investment. Simultaneously, managers set out to manipulate financial statements (making accounts) according to opportunistic or efficient approaches to contracts. This conflict in the game theory framework suggests a non-cooperative game, even though the number of players will increase if the market is perfect in economic terms. The action of a single player cannot affect what goes on in the market. The research aims to investigate managers' strategic decisions by using game theory according to earnings management, managers' behavior toward the benefit of reducing capital costs and buying stocks, and behavior of stockholders toward the benefit of stock return. Alternatively, each player seeks the maximum utility; this maximum is called the dominant strategy. It is evident that every player has a dominant strategy, so equilibrium in the dominant strategy set is called dominant strategy equilibrium (dominant Nash equilibrium). Hence, four hypotheses are presented as follows:

Choosing a high earnings management strategy by the manager leads to an increase in investor's risk. So, investors are expected to choose the buy low-volume stock strategy. Therefore, the first hypothesis is presented as follow:

H1. The investor will buy low-volume stock by choosing a high earnings management strategy on the manager's part.

Choosing a low earnings management strategy by the manager leads to a decrease in investor's risk. So, investors are expected to choose the buy high-volume stock strategy. Therefore, the second hypothesis is presented as follow:

H2. The investor will buy high-volume stock by choosing a low earnings management strategy on the manager's part.

Prior research is consistent with the control hypothesis prediction that leverage increases reduce opportunistic behavior. Kaplan (1989) finds that the leverage-increasing hostile takeovers improvements in shareholder value. By choosing a high-volume stock buying strategy by the investors, managers are expected to choose the low earnings management strategy. Therefore, the third hypothesis is presented as follow:

H3. By choosing a high-volume stock buying strategy by the investors, the manager's strategy will be low earnings management.

Similarly, when choosing a low-volume stock buying strategy, managers are expected to choose a high earnings management strategy. Therefore, the fourth hypothesis is presented as follow:

H4. By choosing a low-volume stock buying strategy by the investors, the manager's strategy will be high earnings management.

3. RESEARCH METHOD

The present research is applied research by purpose, descriptive research by nature and method, and a library study regarding the Codal website, Iran's Central Bank website, and Rahavard-e Novin software. The study population of the research consists of all companies listed on the Tehran Stock Exchange and Iran Over-the-counter Market between the years 2013 and 2017, in five years, provided that:

1. Their fiscal year ends on March 21, 2. They make no change in their fiscal year in the study period, 3. The selected companies are among nonfinancial and non-investment companies, 4. They have been listed in Tehran Stock Exchange and Iran Over-the-Counter Market from 2013. With the given limitations, a number of 177 out of 324 companies listed on the Tehran Stock Exchange and 25 out of 99 Iran Over-the-counter were selected. Data analysis was run by SPSS v.22 and Eviews V.10 software, in that game theory model with a significant difference was used in the game sets, and firm size was used for the analysis of sensitivity.

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Earnings management variable

As with Jones (1991), Dechow et al. (1995), and Kothari et al. (2005), discretionary accruals were used as earnings management variables. Our estimation of discretionary accruals is based on the Jones model augmented for return of assets (Kothari, Leone, and Wasley 2005). Thus, the model is:

$$\frac{TACC_{i,t}}{A_{i,t-1}} = \beta_0 + \beta_1 \frac{1}{A_{i,t-1}} + \beta_2 \frac{\Delta REV_{i,t}}{A_{i,t-1}} + \beta_3 \frac{PPE_{i,t}}{A_{i,t-1}} + \beta_4 ROA_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where consistent with previous studies of earnings management (Healy 1985 and Jones 1991), total accruals $TACC_{i,t}$ are defined as the change in non-cash current assets minus the change in current liabilities net of the current portion of long-term debt, minus depreciation and amortization of the company i in time t, $A_{i,t-1}$ are total assets of the company i in time $t-1$ (or the beginning of the period), $\Delta REV_{i,t}$ is a variation of the sales of the company i in year t as compared to the prior year, $PPE_{i,t}$ are the gross fixed assets of the company i in year t, $ROA_{i,t}$ is the return on the assets of the company i in year t, and $\varepsilon_{i,t}$ is the error (discretionary accruals) of the panel data regression model. The panel data equation model is a combination of cross-section data and time-series data. In panel data analysis, there are several analytical methods, such as the Common Effects Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). Common Effect Model (CEM) refers to a model with non-different (constant) intercept and slope coefficients, thus ignoring the site and time dimensions of the panel data and using the OLS Regression Estimation for the estimation (Gujarati, 2004). This method can be analyzed using two-approach models, i.e., Fixed Effect Model (FEM) and Random Effects Model (REM). This paper used Fixed Effects Panel Data Model.

In this research, the error component's absolute value (discretionary accruals is earnings management variable) is categorized as high earnings management (EM-UP) and winsorized at the 66th percentile upward and from the 33rd percentile downward as low earnings management (EM-DOWN). They are used to determine the horizontal matrix game.

Trading volume variable

To calculate trading volume, Chordia and Swaminathan (2000) model is used as follows;

$$Vol_{i,t} = \frac{TSV_{i,day}}{TSV_{i,t-1}} \tag{2}$$

Where $Vol_{i,t}$ is trading volume of the company i in time t, $TSV_{i,day}$ is daily trading volume of company i, $TSV_{i,t-1}$ is the number of stock of company i in time t-1. Next, trading volume was reported as high stock acceptance per the 66th percentile upward (VOL-UP) and low stock acceptance per the 33rd percentile downward (VOL-DOWN). They are used to determine vertical the matrix game.

Developing a game

We put a manager in an earnings management position in the first place to offer a simultaneous game with imperfect information (information asymmetry). The manager-investor game is classified and played as elaborated above with two situations: cash flow holding (manager's behavior) and trading volume (investor's reaction). In this game, the matrix table's factors are the manager's utility (reduction of capital costs) and the owner's utility (stock return). The prototype of the manager-investor game is shown in the form below;

Game Matrix			
The game between Management Vs. Investor		**Investor**	
		VOL-UP(S_1)	VOL-DOWN(S_2)
Management	EM-UP(m_1)	$U^M_{m1,s1}, U^S_{m1,s1}$	$U^M_{m1,s2}, U^S_{m1,s2}$
	EM-DOWN(m_2)	$U^M_{m2,s1}, U^S_{m2,s1}$	$U^M_{m2,s2}, U^S_{m2,s2}$

Manager's utility

To derive manager's utility (the difference between the bank interest rate and average capital costs), the following model is used;

$$U^M = r_b - WACC = r_b - \left(w_e \times r_e + w_d \times r_d \right) \tag{3}$$

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where U^M is manager's utility, $WACC$ is the weighted average cost of capital, r_b is the rate of short-term facility interest, w_e is the capital ratio (capital to the sum of capital and debt), r_e is the rate of capital cost (dividend of the end of the period, divided by the price of the first quota of the period), w_d is debt ratio (debt to the sum of capital and debt), r_d is the rate of debt cost (interest expenses divided by the sum of debt, multiplied by one and subtracted from tax rate). In the end, using a mix of debt and capital, the manager can start saving for full financing of the company's demand for a bank loan, and the manager's utility lies in the difference between bank interest rate and the average cost of capital. Short-term bank interest rates are 21, 22, 21, 18, and 19, according to the announcement of Iran's Central Bank website from 2013 to 2017, respectively.

Investor's utility

To obtain investor's utility (stock return), the following model is used;

$$U^S = R = \frac{(P_1 - P_0) + D_1}{P_0} \tag{4}$$

Where U^S is investor's utility, R is stock return, P_1 is the stock price at the end of the period, P_0 is the stock price in the first period, D_1 is dividend at the end of the period. The stock price of the 8-month period in the current year and the 4-month period in the next year was used to calculate the stock return.

How to find Nash equilibrium

Generally speaking, if the player a^*'s action is the best response to the action of other players a^*_{-1}, in that all of them are happy with their performance, then Nash equilibrium is obtained. To find Nash equilibrium, Osborne's (2004) two-phase method is used. Phase 1: in each strategic game, the function of the best response (BR) of player i is the function that $(a_{-i} \in A_{-i})$ for the strategy of other players, which is formulated as equation 5;

$$BR_i(a_{-i}) = \left\{ a_i \in A_i : u_i(a_i, a_{-i}) \geq u_i(a_i', a_{-i}); \forall a_i' \in A_i \right\} \tag{5}$$

Phase 2: if players at each game output are happy with their utilities, i.e., having no incentive to commit the violation, then Nash equilibrium is held according to equation 6;

$$a_i^* \in BR_i\left(a_{-i}^*\right) \qquad for\ i = 1, 2, \ldots, N \qquad (6)$$

4. ANALYSIS

A. Description of data

The descriptive data for hypothesis 1 through 4 are presented in Table 1:

Hypotheses	Strategy	Position	Variables	Obs.	Mean	Median	Minimum	Maximum	Std. Dev.
First	(m_1, s_1)	EM-UP, VOL-UP	Investor's interest	115	0.1314	0.0124	-0.7928	1.9746	0.5876
	(m_1, s_2)	EM-UP, VOL-DOWN	Investor's interest	112	0.1141	-0.0171	-0.7385	3.6160	0.6216
Second	(m_2, s_1)	EM-DOWN, VOL-UP	Investor's interest	112	0.3320	0.1806	-0.8141	4.7219	0.7829
	(m_2, s_2)	EM-DOWN, VOL-DOWN	Investor's interest	109	-0.0304	-0.1322	-0.7338	2.3347	0.5421
Third	(m_1, s_1)	VOL-UP, EM-UP	Manager's interest	115	0.0471	0.0409	0.0000	0.2926	0.0393
	(m_2, s_1)	VOL-UP, EM-DOWN	Manager's interest	112	0.0700	0.0654	0.0005	0.2594	0.0433
Fourth	(m_1, s_2)	VOL-DOWN, EM-UP	Manager's interest	112	0.0729	0.0560	0.0000	0.1982	0.0458
	(m_2, s_2)	VOL-DOWN, EM-DOWN	Manager's interest	109	0.0818	0.0723	0.0000	0.2409	0.0513

An investor's interest in the game theory lies in selecting a manager's strategy, so selecting high earnings management (hypothesis 1) and low (hypothesis 2) by a manager can lead to selecting two strategies, acceptance or non-acceptance stock by the investor. Hence, when a manager opts for a high earnings management strategy, if an investor chooses a stock acceptance strategy, his mean of stock return is 13.14%. This is a utility that accrues to a few investors about the median of 1.24%. This is experienced within the range between -79.28% and 197.46%, with a risk of 58.76%. But if the investor chooses a stock non-acceptance strategy,

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his average utility of stock return is 11.41%, which is a utility that accrues to a few investors regarding the median -1.71%.

When the manager picks up a low earnings management strategy, if the investor chooses a stock acceptance strategy, his mean of stock return is 33.20%, which is a utility that accrues to a few investors about the median of 18.06. This is experienced within the range between -81.41% and 472.19%, with a risk of 78.29%. Still, if the investor chooses a stock non-acceptance strategy, the mean of stock return implies a loss of -3.04%, which is a loss sustained by larger numbers of shareholders to the median -13.22%. This is experienced within the range between -73.38% and 233.47%, with a risk of 54.21%.

Manager's utility in the game theory lies in selecting a strategy by the investor, so the selection of acceptance (hypothesis 3) and non-acceptance (hypothesis 4) of stock by the investor can lead to selecting two strategies, high and low earnings management by the manager. Hence, when an investor opts for a stock acceptance strategy, if the manager chooses high earnings management, his average utility of capital cost is 4.71%, which is a utility that roughly fairly accrues among managers about the median 4.09%. This is experienced within the range between 0 and 29.26%, with a risk of 3.93%. But suppose investor chooses low earnings management strategy. In that case, his average utility of capital cost is 7%, which is a utility that roughly fairly accrues among all managers about the median 6.54%. This is experienced within the range between 0.05% and 25.94%, with a risk of 4.33%. When an investor picks up a stock non-acceptance strategy, if a manager chooses a high earnings management strategy, his average utility of capital cost is 7.29%, which is a utility that accrues a few managers about the median of a few managers 5.60%. This is experienced within the range between 0 and 19.82%, with a risk of 4.58%. Still, suppose the manager chooses a low earnings management strategy. In that case, his average utility of capital cash is 8.18% which is a utility that accrues almost reasonably among all managers for the median of 7.23%. This is experienced within the range between 0 and 24.09%, with a risk of 5.13%. On the contrary, the difference in the standard deviation between 78,29% and 53,21% for investors and the range between 3,93% and 5,13% indicates investors' additional risk versus manager.

B. Testing the research hypotheses

As explained in the research methodology section, the first phase of Osborne's method in a strategic game is finding the best response (BR) (interest difference in an assumption) of players to opposing players' behavior. Table 2 shows the results of hypotheses 1 through 4;

Table 2.

INFERENTIAL STATISTICS OF THE FIRST TO FOURTH HYPOTHESES IN IRAN CAPITAL MARKET

Hypo-theses	Strat-egy	Position	Variables	Obs.	Mean	Mean Differ-ence	t-test	Prob.	Result	Game Result
First	(m_1, s_1)	EM-UP, VOL-UP	Investor's interest	115	0.1314	0.017	0.2152	0.8298	Reject	1
	(m_1, s_2)	EM-UP, VOL-DOWN	Investor's interest	112	0.1141					1
Second	(m_2, s_1)	EM-DOWN, VOL-UP	Investor's interest	112	0.3320	0.362	3.9903	0.0001	Accept	2
	(m_2, s_2)	EM-DOWN, VOL-DOWN	Investor's interest	109	-0.0304					1
Third	(m_1, s_1)	VOL-UP, EM-UP	Manager's interest	115	0.0471	-0.023	-4.1902	0.0000	Accept	1
	(m_2, s_1)	VOL-UP, EM-DOWN	Manager's interest	112	0.0700					2
Fourth	(m_1, s_2)	VOL-DOWN, EM-UP	Manager's interest	112	0.0729	-0.009	-1.3575	0.1760	Reject	1
	(m_2, s_2)	VOL-DOWN, EM-DOWN	Manager's interest	109	0.0818					1

Significant at 0.05 level using two-tailed tests

Testing hypothesis 1: if a manager chooses high earnings management, stock acceptance or non-acceptance will have no special outcome for the investor because the t statistic of the Independent Samples *t*-Test is 0.2151, which entails 82.98% probability. Since this probability is greater than a 5 percent significance level, the null hypothesis cannot be rejected. Therefore, the first hypothesis can be rejected. In this case, there will be no conflict between the manager and investor.

Testing hypothesis 2: if a manager chooses low earnings management, stock acceptance or non-acceptance will have a special outcome for the investor because the t statistic of the Independent Samples *t*-Test is 3.9903, which entails a 0.01% probability. Since this probability is lower than the 5 percent significance level, the null hypothesis can be rejected. Therefore, the second hypothesis is confirmed. In this case, there will be a conflict between the manager and the investor, and the selection of stock acceptance is more beneficial for investors because its utility increases by 36.2%.

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Testing hypothesis 3: if an investor chooses a stock acceptance strategy, high and low earnings management will have a special outcome for the manager because the t statistic of the Independent Samples t-Test is -4.1902, which entails 0% probability. Since this probability is lower than the 5 percent significance level, the null hypothesis can be rejected. Therefore, the third hypothesis is confirmed. There will be a conflict between manager and investor, and the selection of low earnings management is more beneficial for the manager because his utilities increase by 2.3%.

Testing hypothesis 4: if an investor chooses a stock non-acceptance strategy, high and low earnings management will have no special outcome for the manager because the t statistic of the Independent Samples t-Test is -1.3575 entails a 17.60% probability. Since this probability is greater than a 5 percent significance level, the null hypothesis cannot be rejected. Therefore, the fourth hypothesis can be rejected. In this case, there will be no conflict between the manager and investor.

The profile of the game is given in Table 3;

Table 3.

GAME PROFILE

Game Manager VS. investor		Investor	
		VOL-UP	VOL-DOWN
Manager	EM-UP	(1,1)	(1,1)
	EM-DOWN	(2,2)	(1,1)

Significant at 0.05 level using two-tailed tests

Considering the game profile, Nash's dominant equilibrium holds concerning high purchase volume strategy on the part of the investor and low earnings management on the part of the manager.

C. Analysis of sensitivity

Hypothesis testing based on Tehran Stock Exchange and Iran OTC market

In this section, for further investigation into the conflict in Iran's capital market, the research hypotheses will be tested according to Tehran Stock Exchange and Iran Over-the-counter market separately:

Examining the research hypotheses in the Tehran Stock Exchange market:

According to Table 4:

Table 4.

INFERENTIAL STATISTICS OF THE FIRST TO FOURTH HYPOTHESES IN TEHRAN STOCK EXCHANGE

Hypo-theses	Stra-tegy	Position	Variables	Obs.	Mean	Mean Diffe-rence	t-test	Prob.	Result	Game Result
First	(m_1, s_1)	EM-UP, VOL-UP	Investor's interest	101	0.1229	-0.013	-0.1476	0.8828	Reject	1
	(m_1, s_2)	EM-UP, VOL-DOWN	Investor's interest	98	0.1099					1
Second	(m_2, s_1)	EM-DOWN, VOL-UP	Investor's interest	98	0.3682	-0.391	-3.9205	0.0001	Accept	2
	(m_2, s_2)	EM-DOWN, VOL-DOWN	Investor's interest	96	-0.0232					1
Third	(m_1, s_1)	VOL-UP, EM-UP	Manager's interest	101	0.0425	0.028	5.1440	0.0000	Accept	1
	(m_2, s_1)	VOL-UP, EM-DOWN	Manager's interest	98	0.0704					2
Fourth	(m_1, s_2)	VOL-DOWN, EM-UP	Manager's interest	98	0.0715	0.011	1.6431	0.1020	Reject	1
	(m_2, s_2)	VOL-DOWN, EM-DOWN	Manager's interest	96	0.0822					1

Significant at 0.05 level using two-tailed tests

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Testing hypothesis 1: if a manager chooses high earnings management, stock acceptance or non-acceptance will have no special outcome for the investor because the t statistic of the independent samples t-Test is 0.1476, which entails 88.28% probability. Since this probability is greater than a 5 percent significance level, the null hypothesis can not be rejected. Therefore, the first hypothesis can be rejected. In this case, there will be no conflict between the manager and investor.

Testing hypothesis 2: if a manager chooses low earnings management, stock acceptance or non-acceptance will have a special outcome for the investor because the t statistic of the Independent Samples t-Test is -3.9205, which entails 0.01% probability at a 95% confidence level. Since this probability is lower than the 5 percent significance level, the null hypothesis can be rejected. Therefore, the second hypothesis is confirmed. In this case, there will be a conflict between the manager and the investor, and the selection of stock acceptance is more beneficial for investors because its utility increases by 39.1%.

Testing hypothesis 3: if an investor chooses a stock acceptance strategy, high and low earnings management will have a special outcome for the manager because the t statistic of the Independent Samples t-Test is 5.1440, which entails 0% probability. Since this probability is lower than the 5 percent significance level, the null hypothesis can be rejected. Therefore, the third hypothesis is confirmed. There will be a conflict between manager and investor, and the selection of low earnings management is more beneficial for the manager because his utilities increase by 2.8%.

Testing hypothesis 4: if an investor chooses a stock non-acceptance strategy, high and low earnings management will have no special outcome for the manager because the t statistic of the Independent Samples t-Test is 1.6431, which entails a 10.20% probability. Since this probability is greater than a 5 percent significance level, the null hypothesis can not be rejected. Therefore, the fourth hypothesis can be rejected. In this case, there will be no conflict between the manager and investor.

The profile of the game is given in Table 5;

Table 5.

GAME PROFILE

Game Manager VS. investor		Investor	
		VOL-UP	VOL-DOWN
Manager	EM-UP	(1,1)	(1,1)
	EM-DOWN	(2,2)	(1,1)

Significant at 0.05 level using two-tailed tests

Considering the game profile, Nash's dominant equilibrium holds concerning high purchase volume strategy on the part of the investor and low earnings management on the part of the manager.

Examining the research hypotheses in Iran Over-the-counter market:

Table 6.

INFERENTIAL STATISTICS OF THE FIRST TO FOURTH HYPOTHESES
IN IRAN OVER-THE-COUNTER MARKET

Hypo-theses	Stra-tegy	Position	Variables	Obs.	Mean	Mean Rank	Z-test	Prob.	Result	Game Result
First	(m_1, s_1)	EM-UP, VOL-UP	Investor's interest	14	0.1927	14.786	-0.1838	0.8542	Reject	1
	(m_1, s_2)	EM-UP, VOL-DOWN	Investor's interest	14	0.1434	14.214				1
Second	(m_2, s_1)	EM-DOWN, VOL-UP	Investor's interest	14	0.0788	14.786	-0.5338	0.5935	Reject	1
	(m_2, s_2)	EM-DOWN, VOL-DOWN	Investor's interest	13	-0.0840	13.154				1
Third	(m_1, s_1)	VOL-UP, EM-UP	Manager's interest	14	0.0798	14.214	-0.1838	0.8542	Reject	1
	(m_2, s_1)	VOL-UP, EM-DOWN	Manager's interest	14	0.0676	14.786				1
Fourth	(m_1, s_2)	VOL-DOWN, EM-UP	Manager's interest	14	0.0824	15.000	-0.6794	0.4969	Reject	1
	(m_2, s_2)	VOL-DOWN, EM-DOWN	Manager's interest	13	0.0785	12.923				1

Significant at 0.05 level using two-tailed tests

Testing hypothesis 1: if a manager chooses high earnings management, stock acceptance or non-acceptance will have no special outcome for the investor. The z statistic of the Independent Samples *z* Test is -0.1838, which entails 85.42% probability. Since this probability is greater than a 5 percent significance level, the null hypothesis can not be rejected. Therefore, the first hypothesis can be rejected. In this case, there will be no conflict between the manager and investor.

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Testing hypothesis 2: if a manager chooses low earnings management, stock acceptance or non-acceptance will have a special outcome for the investor. The z statistic of the Independent Samples *z* Test is -0.5338, which entails 59.35% probability. Since this probability is greater than a 5 percent significance level, the null hypothesis can not be rejected. Therefore, the second hypothesis can be rejected. In this case, there will be no conflict between the manager and investor.

Testing hypothesis 3: if an investor chooses a stock acceptance strategy, high and low earnings management will have a special outcome for the manager. The z statistic of the Independent Samples *z* Test is -0.1838, which entails 85.42% probability. Since this probability is greater than a 5 percent significance level, the null hypothesis can not be rejected. Therefore, the third hypothesis can be rejected. In this case, there will be no conflict between the manager and investor.

Testing hypothesis 4: if an investor chooses a stock non-acceptance strategy, high and low earnings management will have no special outcome for the manager because the z statistic of the Independent Samples *z* Test is -0.6794, which entails 49.69% probability. Since this probability is greater than a 5 percent significance level, the null hypothesis can not be rejected. Therefore, the fourth hypothesis can be rejected. In this case, there will be no conflict between the manager and investor.

The profile of the game is given in Table 7;

Table 7.

GAME PROFILE

Game Manager VS. investor		Investor	
		VOL-UP	VOL-DOWN
Manager	EM-UP	(1,1)	(1,1)
	EM-DOWN	(1,1)	(1,1)

Significant at 0.05 level using two-tailed tests

5. DISCUSSION AND CONCLUSION

Dealing with the subject of earnings management and factors affecting or affected by it has traditionally intrigued researchers, as fewer studies dealt with earnings management and investors' reaction. In this paper, managers' and inves-

tors' behavior was studied. As said earlier, the selection of high and low earnings management strategies can spark investors' reactions, which was studied in this paper under the subject of equity buying or non-buying. The results show that the conflict between managers and investors can lead to a Nash equilibrium between them. Suppose the manager's strategy is low earnings management. In that case, the investor will have a different utility when choosing between stock acceptance or non-acceptance, and the selection of stock acceptance on the part of investors can produce utility. Similarly, suppose an investor's strategy is stock acceptance. In that case, the manager will have different utilities when managing high or low earnings. This difference would lead the manager to low earnings management because his utility will increase by this choice. This situation suggests that if financial statements become transparent and investors detect this transparency, this will help equity be taken, letting both parties remain in an equilibrium situation. This finding is consistent with the information utility paradigm for decision-making, implying the reduction of information asymmetry. Alternatively, this finding reveals that earnings management encompasses information content, and investors do not have an incentive to buy stocks in terms of high earnings management. On the whole, Iran's capital market has a dominant equilibrium to present transparent financial statements on the part of the manager and stock acceptance by the investor. It is worth noting that the investor has the maximum stock return with the highest rate of risk, and the manager's average utility and risk entail average rate. In other words, according to table 1, the manager will not lose in the game. Thus it has high motivation in executing the interest management. Hence, investor's and financial analysts' specialty in detecting earnings management is very crucial. By separating data of Tehran Stock Exchange from Iran Over-the-counter market, it was made evident that the conflict in the selection of strategy by managers and investors has been typically provoked in the information transparency of Tehran Stock Exchange, as financial statements make little contribution to investors' decision-making in Iran Over-the-counter. Shareholders' information resources are not merely financial statements, as Iran Over-the-counter is much operable. This finding can help Tehran Stock Exchange policymakers legislate laws according to Iran's Over-the-counter market's arranged pattern. This research's limitation was the number of study years and low quantity of observations of Iran's Over-the-counter market. Perhaps, more observations report the circumstances otherwise. We recommend other researchers to research this with other factors of managers' utilities.

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UPRAVLJANJE ZARADOM I REAKCIJA INVESTITORA: SLUČAJ IRANSKOG TRŽIŠTA KAPITALA NA TEMELJU TEORIJE IGARA

Sažetak

Svrha rada je istražiti interakciju između ponašanja menadžera i investitora na iranskom tržištu kapitala, s fokusom na teoriji agencija koja predviđa sukob između korisnosti menadžera i investitora. Naime, sukob interesa je prilika za oportunističko ponašanje. U trenutnoj studiji, korist od smanjenja troškova kapitala (korist za menadžera) i povrat na imovinu (korist za investitora) smatraju se varijablama od interesa za bilo koju stranu, pri čemu je Osborneova teorija igara korištena u dva koraka. Ispitivanu populaciju činile su tvrtke koje su navedene na Teheranskoj burzi i iranskom OTC (*over-the-counter*) tržištu. Poduzeća su klasificirane u tablici igre prema ponašanju menadžera na visoke i niske zarade i ponašanju investitora prema prihvaćanju i neprihvaćanju cijena dionica. Eksperimentalni rezultati predstavljeni u ovom radu podržavaju teoriju agencije, ukazujući na sukob između menadžera i investitora na iranskom tržištu kapitala, posebice na Teheranskoj burzi. Prema teoriji igara, Nashova dominantna ravnoteža dolazi do izražaja kada se radi o upravljanju niskim zaradama menadžera i odabiru strategije investitora za kupnju dionica na iranskom tržištu kapitala i Teheranskoj burzi. Alternativno, prezentacija transparentnih financijskih izvještaja i prihvaćanje takvih dionica tvrtke mogu maksimalno povećati korisnost obiju strana.

Ključne riječi: upravljanje zaradom, teorija igara, teorija agencija, volumen trgovanja