

## Earning Quality and Investment Efficiency; Do Board Characteristics Matter? Evidence from Tehran Stock Exchange

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### Abstract

This study postulates the relationships between earning quality and investment efficiency among Tehran Stock Exchange-listed companies with an emphasis on the moderating role of board characteristics including independence, the duality of executives and the financial expertise of members. The research is applied in terms of purpose and takes a correlative-descriptive approach. The statistical population is comprised of TSE listed companies from 2008 to 2018 and, the final sample consisting of 78 companies was selected using systematic (purposeful) elimination. To test the hypotheses, two regression models were estimated using Ordinary Least Squares method through Eviews software. The empirical results revealed a positive and significant relationship between the quality of earning and investment efficiency in TSE publicly-traded companies. As well as, the board members' independence and financial background can significantly exaggerate such a relationship. Based on our findings, capital market legislators, regulators, and policymakers may reinforce the governance role of the board of directors in monitoring the behavior of firms, and as a result, increase the efficiency of allocating capital among companies listed in TSE and also in macroeconomic levels. The findings can persuade corporate shareholders to pay more attention to the degree of independence and expertise

of their board of directors to gain more return on their investment opportunities.

**Keywords:** Board Independence, Earning Quality, Executive Duality, Financial expertise, Investment Efficiency.

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## Introduction

Investing has always been one of the most important ways of developing companies. In the meantime, resource constraints have led to increased investment efficiency in addition to investment development (Saghafi et al., 2011). Investing is not in itself justified and the investing company must also consider the concept of efficiency. Investment efficiency means accepting projects having a positive net present value. Investment inefficiency is also approving projects with a negative net present value (overinvestment) or not taking profitable investment opportunities (underinvestment) (Saghafi & Motamedi, 2011).

In the wake of the financial crises and bankruptcies of the world's largest corporations in recent years, the attention of researchers and financial analysts has shifted from a mere emphasis on earning figures to its quality. There are different criteria for earning quality and since accounting profit may be manipulated by management and different from actual profit, so it may not be a good criterion for investment decisions. High-quality earnings through transparency in financial reporting can influence managers' identification and selection of appropriate investment opportunities; in other words, high earning quality reduces moral hazards, adverse selections and leads managers to be more precise and focused on their investment decisions (based on corporate financial information) (Hassas Yeganeh, et al., 2017). So we expect that earning quality has a positive effect on investment performance, but corporate board characteristics should not be overlooked. Empowerment managers may have a better understanding of industries, technology, forecasting demand for products, the internal and external environment of the organization and thus invest more effectively and efficiently in worthy projects (Baik, et. Al., 2009).

Businesses are always faced with many investment opportunities and need to make rational decisions about an optimal investment. The investment of a business unit should be limited by its resources and efficiency, but the key

issue is making decisions about investment opportunities by business managers that may sometimes be based on their interests. It has been observed that in the years of TSE operation, part of this capital, unlike the initial investment plans, was attracted to activities having not a positive net present value. Constant changes in the direction of corporate investments towards junk projects that lack net positive value have become an issue that also jeopardizes the efficiency of capital allocation in micro and macroeconomic levels. Some scholars have attempted to consider the efficiency of capital allocation from the perspective of enforcement of laws and regulations (Saghafi & Motamedi, 2011; Izadi, 2014; Vahedian, 2015), but the effect of governance features such as independence, Chief Executive Officers duality and financial expertise of board members on optimal allocation of capital has not been given serious consideration so far in scientific and research circles. Accordingly, the present study examines the governance role of board characteristics and seeks to show how high the quality of earnings can create a strong governance mechanism and guarantee path managers toward making efficient capital allocation decisions.

Improving the structure of the boards as one of the mechanisms of corporate governance, by helping to align the interests of managers and shareholders, helps investors and enhances the reliability of financial information and the convergence of the financial reporting process. Based on exploratory investigations surrounding the current situation of TSE, since there is little information on how the structure of the board affects the accounting information content of the earnings, the present study seeks to find a scientific answer to the following key question: Does the quality of earnings (in line with moderating role of board characteristics) act as a corporate governance mechanism and drive the investment decisions of firms? Answering the research question helps market capitalists and policymakers to become more familiar with the governance role of board characteristics and to make greater use of the quality of earnings to strengthen corporate governance and reduce agency costs.

## **Literature Review and Hypothesis Development**

Schipper & Vincent (2003) define earnings quality as the proximity of reported accounting profit to economic profit. Ball & Shivakumar (2005) define the concept of earnings quality as the usefulness of reported earnings information in financial statements for investors, creditors, managers, and all departments related to the company. Investment efficiency requires avoiding money spending in projects where investment is suboptimal (over-investment) as well

as directing of cash flows toward activities needing more financial resources (under-investment). An investment is named efficient as the business unit selects all projects that have a positive net present value. Therefore, in case of no friction, such as adverse selection or agency costs, inefficient investing is neglecting positive net present value opportunities (low investment); besides, selecting projects with negative net present value (Modares & Hesarzadeh, 2008). Information asymmetry between managers and shareholders leads to inefficiencies in investments because managers seek to maximize their interests and can choose investment opportunities that do not best serve the interests of shareholders (Berle & Means, 1932).

Beaver (1989) believed that accounting information has two basic applications: valuation and governance purposes. Accounting information primarily plays a valuation role by influencing the cost of capital and the stock price of companies. From this perspective, high-quality accounting information can alleviate the pain of information asymmetry and subsequently reduce the cost of external financing for investing firms (Zeng & Lu, 2006). From a governance point of view, the quality of earnings also reduces the information asymmetry between the parties to the contract (the implicit agreement between stockholders and managers) to cover the defects and shortcomings of the contract and supervise or restrict opportunistic behaviors of managers. In cases where the company seeks external funding, the governance role of earning quality helps firms to make reasonable decisions and efficiently allocate their capital (Ball & Shivakumar, 2005). Also, high-quality earnings continuously keep the investor aware of the executives and path of investment decisions, thereby enhances the oversight on executives' opportunistic behaviors. Biddle et al. (2009) indicated the high quality of earning information detracts managers from empire building, limits irrational investment, and enables investors to monitor performance. Investors are constantly worried about the quality of earnings because it helps them to understand the operating conditions of companies and enables to take necessary measures and monitor management behavior. If directors' actions are not in the best interests of shareholders, shareholder's blocks may exercise voting rights to change the board of directors or attend board meetings. Minority shareholders also can influence corporate stock prices through their buying and selling positions (Cheng, et al.,2013).

High quality of corporate earnings may increase investment efficiency and improve investment project selection through reducing information asymmetry between managers and shareholders, pacifying the costs of raising capital and alleviating shareholder costs to supervise managers (Healy &

Palepu, 2001). Biddle & Hilary (2006) indicated accounting quality information reduces information asymmetry between managers and foreign investors and thus leads to increased efficiency in capital allocation at the corporate as well as the macroeconomic level (Chen, et.al, 2011). Zhou & Chen, 2008) examined the impact of accounting information transparency on the optimal allocation of capital between firms operating in the Shanghai and Shenzhen capital markets between 1999 and 2004. They concluded that there is a positive and significant relationship between the quality of accounting information and efficiency in capital allocation, so that when the earnings management was lower, then the allocation of capital was more and more efficient. The higher degree of transparency of accounting information leads to lower profit management and higher quality of earning and finally a higher correlation between companies and industries growth rates (Li, 2009). Hence, in countries with a transparent environment for accounting information, profit management opportunities are constrained and resources flow more smoothly to more developed and productive industries. This optimizes thereby streamlining resource allocation at the industry level (Francis, et. Al., 2009). Cuvillas & Sanchez (2012) acknowledged that in firms with low short-term debt leverage, investment efficiency is more affected by the quality of earning. Chang, et.al., 2015 concluded that more profit management practices would increase the amount of inefficient Chinese investment. According to Chircop et al. (2018) when comparability of accounting information between peer companies is higher, it provides an area where better decisions can be made by learning howness of investing in peer companies.

Evidence from TSE shows a significant relationship between the quality of accounting information and the efficiency of corporate investment decisions. The higher the quality of corporate accounting information, the less the problem of overinvestment, and this relationship occurs more frequently in companies with high free cash flow (Khodai et al., 2010; Saghafi et al., 2011). There is a significant relationship between earnings quality and sensitivity of investment decisions to earnings accruals and the accrual part of earnings affect investors' decisions more than the cash part (Izadi, 2014; Vahedian, 2015). Hassa Yeganeh et al. (2017) considered a deviation from the expected investment level as a measure of investment efficiency and showed earnings prediction accuracy was positively correlated with underinvestment and negatively related to overinvestment. Therefore, the first hypothesis of the research can be developed as follows:

**H1:** There is a positive and significant relationship between earnings quality and corporate investment efficiency.

According to Fama and Jensen (1983), corporate boards play a central role in the governance system. It is widely believed that the board of directors exercises more effective oversight on executives when it is more independent (Peasnell, et.al., 2000). Beasley (1996) found that the presence of non-executive directors with financial and accounting expertise reduced the likelihood of fraud in presenting financial statements. Klein (2002) provided evidence regarding the independence and financial background of board members and the manipulation of earning. He showed companies having independent executives with financial expertise reported less abnormal accruals. From the perspective of agency theory, the presence of non-executive and independent members in corporate boards who possess the knowledge, independence, and legal power to oversee corporate performance can be a potentially powerful mechanism for corporate governance. Duality appears if the CEO of the company is also a member of the board, and in this case, the CEO potentially has more authority and empowerment. The duality structure also allows the CEO to effectively control the information available to other members of the board, thus hinders effective oversight (Jensen, 1993). Investors can apply their external oversight by adopting a sales position in cases where they consider the investment decisions of companies to be inefficient and unreasonable. This forces managers to reassess potential stock prices and optimize capital allocation. High-quality accounting information on corporate earnings enables shareholders interested in the participation of corporate management to enhance their understanding of how capital is allocated. This influences the financial performance of firms and ultimately corporate investment choices.

In TSE listed companies, managers are typically elected by the board of directors. This creates a broad network of relationships with majority shareholders. Larger boards have greater oversight on their senior executives' performance. Also, non-executive members with financial and accounting expertise act as sensitive supervisors and monitor the behavior and performance of managers and other members (Nikbakht et al., 2010; Sedighi, 2013). The ambiguity of board members' independence and the complexity of the external environment impede corporate mechanisms and cause corporate governance to lose its effect in practice. Some individual investors may apply external oversight through adopting a selling position (Bonn, et.al., 2004) if they recognize the investment decisions inefficient and/or unreasonable. From this perspective, high-quality earnings help investors identify inefficient investments made by managers and guide management to focus on value-added projects, which ultimately enhances the efficiency of capital allocation. It can

be concluded that if the internal and external governance environment of a company is weak (for example small size of board, numerical domination of executive board members, board members with no accounting and finance background.. effect of earnings quality on corporate investment decisions will be modified. Therefore, the second hypothesis is developed as follows:

**H2:** The effect of earnings quality on corporate investment efficiency is moderated by board characteristics (CEO's duality, independence and financial expertise of board members).

The conceptual framework can be developed as in Figure 1:

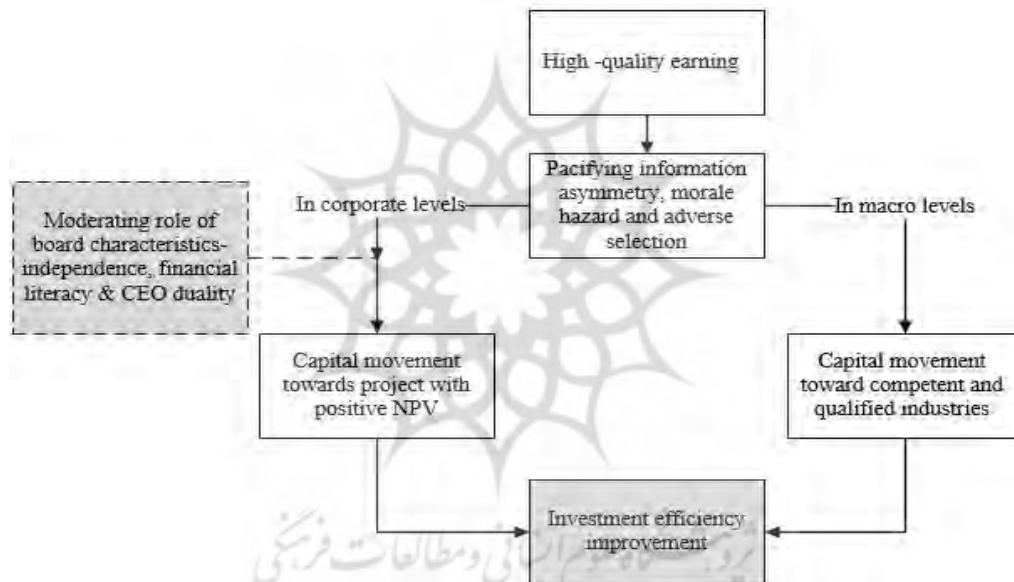


Figure 1. a conceptual framework of the study

## Methodology

**Earnings Quality:** The existing literature shows that earning quality can be measured by two approaches. In the first approach, earnings quality is measured through the company's profitability characteristics such as accruals quality, earnings sustainability, predictability and smoothness and loss avoidance, which are mainly based on financial statements. The second method is to use company stock prices, the relationship between earning and company value, earning timing, and earnings conservatism. This approach reflects

shareholders' perceptions of the quality of earning and is influenced by factors such as the level of capital market development and professional knowledge of participants (Francis, et.al., 2009; Zhai & Wang, 2016). In an efficient market, capital allocation is optimized and equity prices are determined fairly and equitably. Also, the securities' prices reveal economic facts surrounding the firms. In contrast, the inefficient market embeds bubbles likely to occur. In such markets, lack of information symmetry is the main cause of the bubble and the market prices deviate from the intrinsic prices. Therefore, the inefficient market-based signals can't reflect shareholders' perceptions of the quality of earning (Dechow & Dichev, 2002; Francis, et.al., 2009; Brogaard, et.al., 2017). Because of the weak or inefficient stock market of Iran (Montaghemi, 2013; Rahnamaye Roodposhti, et.al., 2017), the study inevitably uses the first method to operationalize earnings quality. For this purpose, the accruals quality criterion is used according to the model of Francis et al. (2009). Jones's original and modified model has been widely used to evaluate corporate earnings management. However, it is very difficult to accurately and completely measure normal and abnormal accruals. Dechow & Dichev (2002) therefore propose another method for measuring accrual quality that is based on the ability of accruals to be responsive to past, present and future operating cash flows. The more the past, present and future operating cash flow of an organization relate to accruals, the greater the quality of accruals. The sum of the company's accruals in the current period is equal to the change in current assets at time t after deducting the change in current liabilities, minus the change in cash and cash equivalent in year t, plus the change in the amount of current liabilities and interest in year t as shown in Equation 1:

$$\begin{aligned} \text{Sum of Accruals} = & \Delta \text{current assets} - \Delta \text{cash and cash equivalent} \\ & + \Delta \text{current liabilities} + \Delta \text{interest} \end{aligned} \quad (1)$$

After regressing all accruals on operating cash flow, the absolute value of the necessary calculations. The lower the standard deviation of the model residual values, the higher the accruals quality and thus the higher the earning quality. Therefore, the standard deviation of the residuals of the accruals regression model on the operating cash flow over 10 years will be considered as a measure of earnings quality. This model is used to describe Equation 2:

$$CFO_{t-1} \rho_1 + CFO_t \rho_2 + CFO_{t+1} \rho_3 + \varepsilon_t \quad (2)$$



**Investment Efficiency:** Investment will be efficient when it comes to projects with a positive NPV. Conceptually, investment efficiency means accepting projects with a positive NPV, while investment inefficiency relates to skipping such investment opportunities (underinvestment) or choosing projects with a negative NPV (overinvestment). We used Soleimani & Farshi (2012), Hashemi et al. (2014) and Chen et al. (2017) models to measure investment efficiency. This is shown in Equation 3:

$$\text{Investment}_t = \alpha_0 + \alpha_1 \text{sales growth}_{t-1} + \varepsilon_t \quad (3)$$

Where; investment represents a net increase in the Company's tangible and intangible assets divided by total assets in the previous period, and sales growth also reflects a change in firm's sales from the period t-2 to t-1 (Qarebiglu et al., 2016). According to this approach, investment is a function of growth opportunities that are measured by sales. The model argues that in an efficient market, the firm's sales volume reflects the company's expectation of investment. After estimating the figure for the total investment in the above regression model, the residuals are calculated. If the next year's investment exceeds sales growth, the residuals of the above model will be positive. A positive residual indicates a positive deviation from expected investment opportunities, which means that over-investing is taking place. If next year's investment is less than sales growth, it indicates that some projects with positive NPV have been rejected; so the residuals are negative, which implicates underinvestment. Therefore, the residuals of the above regression model are used as an indicator of investment efficiency. The lower figures for residuals is interpreted as the higher efficiency of the investment.

**Board Independence:** The board is considered one of the key mechanisms of corporate governance and plays an important role in improving the quality of financial reporting and enhancing accountability. Independent members can better understand their supervisory and leadership roles, contribute to the financial health of the firm and prevent conflicts of interest between actors in the corporate governance system. Accordingly, most of the studies emphasize the increasing importance of non-executive members in improving the reporting process, and the corporate governance position as a guiding body responsible for supervising and monitoring manager behaviors. From the agency theory point of view, it can be assumed that non-executive directors on the board are in charge of overseeing other board members. Some scientific research has shown that the task of supervising non-executive managers has been effectively implemented. As measured by Nikbakht et al. (2010), Dalton & Dalton (2005) and Seddiqi (2013) we measure board

independence by dividing the number of non-executive directors by the total number of director's board.

**CEO Duality:** If the CEO is also a board member, this situation is called the CEO's duality and in this case, the CEO has more authority. Shareholders believe that when the chairman, vice president, and member boards are someone other than the CEO, the supervisory capacity of the board increases. Failure to separate the duties of CEO from board members, chairman, and vice president, can reduce the effectiveness of supervisory role and may lead to the undermining of stakeholder rights. Chang & Sun (2008) concluded that the dichotomy of CEO roles may jeopardize the effectiveness of the supervisory board on financial reporting. They showed connectivity between the duality of CEO duties and low quality of earnings. Following Aghaei et al. (2009) and Mat Nor & Sulong (2010) If the CEO was a board member, chairman and/or vice president of the board of directors, the dummy variable took number one and vice versa if was someone other than CEO, zero. Whether or not the CEO duality is in place, has been determined using the board reports to the shareholder's regular/extraordinary annual meetings.

**Financial Expertise:** Board members need diverse skills such as accounting, finance, banking, and law to oversee management and make decisions to be effective in enhancing company value (Hillman & Patzoul, 2000). The underlying premise is that members with no background in accounting or finance have a lower ability to discover financial reporting misstatements. An experienced financial member can also make other members sensitive. Kaplan & Minton (1994) argued that when companies have poor performance and profitability, use financial managers in their board composition. They revealed board members with financial expertise (measured in terms of academic degrees in accounting or finance), exercise more effective supervision and increase the company value (measured based on Tobin's Q). Therefore, to capture the financial expertise of the board of directors, the number of board members with accounting and/or finance academic degrees is obtained for each company/year from board reports and/or annual meeting agenda. Following, Grace Jr, H. S., & Hauptert, J. E. (2003) as well as Volpe, R., & Woodlock, P. (2008), we operationalized financial expertise of board members using several board members with financial and/or accounting academic degrees and certificates as an approximation for the variable.

The statistical sample of the research is comprised of a range of manufacturing companies with relatively different characteristics. In correlation studies, one of the conditions for the reliability of the coefficient is

to ensure that other influencing variables are kept constant (controlled). When the research sample is homogeneous and the effects of stereotype variables are controlled, one can confidently describe the relationship between the independent and dependent variables Petersen, M. A. (2009). Since the statistical sample of research consists of a wide range of listed companies that belong to different industries and are homogeneous in terms of size, market value, profitability ratios, revenue generation power, leverage ratios, and shareholding combinations, we have to eliminate any differences. To do this, we instituted some control variables into regression models. These variables include:

- **Firm size:** measured as a natural logarithm of the total assets of the firm (Moradzadeh, 2016; Sorkel et al., 2016; Brogaard, et.al., 2017).
- **MTB ratio:** indicates the company's growth capacity, which is derived from the ratio of market value to book value of the company's net assets in year t.
- **ROA:** it represents the profitability of a company, which is derived from the ratio of the profit to the total assets of the company in year t (return on assets).
- **σ(sale):** revenue fluctuation in year t which is derived from the standard deviation of monthly revenues for each year.
- **Leverage:** the control variable obtained by dividing the company's debt into the company's assets. It reflexes the firm's capital structures.
- **Governance:** a dummy variable that will take the number one if there is strong corporate governance and zero if there is no corporate governance structure or is weak. If the total ownership of institutional shareholders is more than 50 percent, corporate governance will be strong and otherwise weak (Zhai & Wang, 2016).

We estimated the following regressions models through Eviews9 software to test hypotheses (Equation 4 & Equation 5):

$$\text{Investmen-efficiency}_t = \alpha_0 + \alpha_1 \text{earning-quality}_t + \alpha_2 \text{Size}_t + \alpha_3 \text{MTB}_t + \alpha_4 \text{ROA}_t + \alpha_5 \sigma(\text{sale})_t + \alpha_6 \text{leverage}_t + \alpha_7 \text{Institution Ownership}_t + \varepsilon_t \quad (4)$$

$$\begin{aligned} \text{Investmen-efficiency}_t = & \alpha_0 + \alpha_1 \text{earning-quality}_t \\ & + \alpha_2 \text{DUAL}_t + \alpha_3 \text{board-indep}_t + \alpha_4 \text{BOND}_t + \\ & \alpha_5 \text{earning-quality}_t \times \text{DUAL}_t + \alpha_6 \text{earning-quality}_t \times \\ & \text{board-indep}_t + \alpha_7 \text{earning-quality}_t \times \text{BOND}_t + \\ & \alpha_8 \text{size}_t + \alpha_9 \text{MTB}_t + \alpha_{10} \text{ROA}_t + \alpha_{11} \sigma(\text{sale})_t + \\ & \alpha_{12} \text{leverage}_t + \alpha_{13} \text{Institution Ownership}_t + \varepsilon_t \quad (5) \end{aligned}$$

Where, moderating variables including Dual, board-indep and BOND stand for duality of CEO, number of non-executive to total board members and members having financial and/or accounting academic degrees or certificates, respectively.

The time scope of this study is 10 years from 2008 to 2018. The statistical population is comprised of all companies listed in TSE publicly-traded firms during the research period. The final sample was purposively selected by the systematic removal method. All firms meeting the following criteria were drawn:

1. To be comparable, its financial year's end on 20 March (29 Esfand Persian dates).
2. To be homogeneous is operating in manufacturing fields. Service firms such as investment firms, banks, and insurance companies were eliminated because they differ in the nature and classification of financial statement items.
3. To capture variables, information is available during the years under review.

Exercising the above restrictions resulted in 78 TSE listed companies as the final sample and the required information on the quality of accruals, earning earnings, investment efficiency as well as performance data extracted from financial statements and annual reports at TSE publisher's website<sup>1</sup>, TSE Management & Technology Department and Rahavard Novin database software.

## Empirical Findings and Results

We used mean, median, maximum and minimum indices and standard deviation to explain descriptive statistics of variables. To reduce the outlier observations, we replaced the 5 percent of the smallest and largest continuous data with the nearest figures. The average of investment efficiency is -0.206. It shows that companies perform optimally only for averaging 20 percent of investments. This is similar to Richardson (2006) and Nhandi & Taghizadeh (2013). Also, on average companies report earnings with 10 percent quality and the median (0.078) proximity to the average indicates that the quality of earnings may take a normal distribution. The results are in line with

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<sup>1</sup>. <https://codal.ir/>

Nikoomaram & Amini (2011) and Khajavi & Ghadirian (2015). Besides, the average of Board-independence (non-executive members concerning all members) is 61 percent. This figure indicates that 61 percent of board members are non-executive, which leads to better supervision of corporate operation as well as a restriction of management misconduct and opportunistic behaviors, which is in line with Shams et al. (2016).

The median of this variable is 60 percent, which is close to the mean indicating that this variable is distributed around this figure. Also, more than 88 percent of the company's CEOs are separated from the board chairman. This confirms Saqfzadeh's (2011) findings. The average number of board members with financial and/or accounting expertise is 1.288. This is in line with Nikbakht et al. (2011). The descriptive statistics of the companies surveyed indicate that these companies finance about 63 percent of their assets using debt financing methods, and given that its median is close to average, it can be said that most of companies have appetited high financial (default) risk.

This also approves Mohammadrezaie's (2015) findings on corporate financing in Iranian. Also, return on assets with an average of 8 percent indicates that businesses earn 8 percent on resources and assets. This may be the ultimate indicator for assessing the adequacy and efficiency of a company's management. The firm size variable, calculated through the natural logarithm of total assets, has a mean of 14.078, which means that data have accumulated around this value in the entire sample. The standard deviation for most of the variables is lower than one, meaning that data scatter is low and companies selected are homogeneous.

Spearman correlation matrix was used to investigate the correlation between variables. The results presented in Table 1 show that there is a positive significant relationship between earnings quality and investment efficiency of companies. By examining the degree of correlation between the independent variables, one can find out the absence of co-linearity as one of the validation criteria of OLS regressions. Since none of the coefficients of the explanatory variables exceed the critical threshold (0.80), the regression models will not suffer from the inter variable co-linearity problem (Gugarati, 1995). The correlation matrix results are shown in Table 1:

Table 1. Spearman correlation matrix

1	1	2	3	4	5	6	7	8	9	10	11
1	1.000										
2	0.14*	1.000									
3	0.20*	0.076	1.000								
4	0.067	-0.007	0.37*	1.000							
5	0.25*	0.005	0.28*	0.50*	1.000						
6	-0.021	-0.028	0.025	-0.044	0.003	1.000					
7	0.12*	-0.019	0.057	0.26*	0.086*	-0.022	1.000				
8	0.029	0.23*	0.070	0.031	0.058	0.040	-0.048	1.000			
9	-0.24*	-0.057	-0.071	-0.075	-0.072	0.024	-0.074	-0.076	1.000		
10	0.057	0.049	0.042	0.017	0.007	-0.059	0.043	0.005	-0.076	1.000	
11	0.062	0.690*	0.023	-0.032	-0.053	-0.030	0.035	0.160*	-0.057	-0.053	1.000

1) investment efficiency, 2) earning quality, 3) CEO duality, 4) Board independence, 5) Financial expertise, 6) Deviation of revenues, 7) Governance, 8) MTB, 9) Leverage, 10) Firm size, 11) ROA.  
\* Significant at 95 percent confidence level.

Co-linearity means that there is a strong relationship between the independent and control variables in the model. If there is a coincidence, the estimated coefficients of the model will have a high standard error and, as a result, reduce the number of significant variables in the equation. In addition to the co-linearity of explanatory variables, for the regression models to be adequate, the mean of the (residuals) must be equal to zero ( $E(\text{et.}) = 0$ ). Since the research model has a fixed intercept, this is not violated. When the sample size is large enough, the deviation from residuals normality assumption is usually insignificant and its consequences are negligible. According to the central limit theorem, Fama & MacBeth (1973) indicated that the normality of the distribution function is ineffective based on statistical inferences and if there are most of the observations, normality is not a problem; therefore, we do not consider normality as a necessity in testing hypotheses. Another classic assumption is the variance homogeneity of residuals. This assumption may not be in place for a variety of reasons, such as the incorrect form of the model function, existence of outliers, structural failure in the statistical population, and so on. Hence, to solve problems such as variance heterogeneity and autocorrelation, regression models were fitted using augmented standard error (Petersen, 2009).

To use regression in the panel data structure, it is necessary to control two influencing factors; year and industry to obtain reliable results because the data changes in panel structure are different across years and industries. Therefore, to control the effect of year and industry changes on the relationship between the main variables of the study, these two control variables are used in the regression model. One of the main reasons for incorporating year and industry in the regression model is to solve the possible problem of serial autocorrelation created in the model residuals for firms operating in the same industries and the same years (Niko Marmam & Bani Mahmed, 2013). In panel data, it is important to perform the F-Lerner test to determine the type of data (panel and pooling) and Hausman test to determine fixed and random effects. In the present study, since the effects of year and industry are controlled, it is not necessary to perform the F-limer and Hausman tests (Plato, 2016).

Table 2 presents the results of the H1 estimation. As can be seen in Table 2, the probability of F(statistic) is equal to zero and is less than 0.05 at 95 percent confidence, implicates that the estimated model is significant. The results of the adjusted coefficient of determination (R-squared) show 0.217. 21.7 percent of the variation of the dependent variable is explained by the independent and control variables (explanatory variables) in the model. Besides, since the Variance Inflation Factor figures for each variable are less than 10, it can be stated that there is no co-linearity problem in the model. Accordingly, the coefficient of the independent variable is 0.036 and also the corresponding probability of t-statistic shows that at a 95 percent confidence level the coefficient of earning quality is significant. Thus, it can be stated that earnings quality as one of the available sources of information in the capital markets can play an effective role in developing investment and increasing its efficiency. Therefore, the first hypothesis is confirmed.

Table 2. H1 test results

Explanatory variables	Coefficient	Standard error	t-statistics	VIF
Earning quality	0.036	0.013	2.75*	1.87
aaaa))	-0.004	0.009	-0.490	1.01
Governance	0.048	0.011	4.51*	1.08
MTB	0.014	0.009	1.550	1.11
Leverage	-0.030	0.009	-3.36*	1.09
Size	0.012	0.003	4.35*	1.11
ROA	0.050	0.038	1.32	1.85
Intercept	-0.240	0.058	-4.16*	--
Year & Industry	Controlled		Controlled	
R-squared	0.217			
F(statistics)	14.170			
Prob. (F)	0.000			

\* Significant at 95 percent confidence level.

The results of the second hypothesis test are presented in Table 3. As for hypothesis 1, since the probability of F(statistic) is equal to zero and is less than 0.05 at 95 percent confidence the estimated model is significant. The results of the adjusted coefficient of determination show that on average 33.6 percent of the variation of the dependent variable is explained by the independent and control variables of the model. Also, since the actual values of variance inflation for each variable are less than 10, the model does not suffer from co-linearity. Based on the results of the model presented in Table 3, the interactive coefficients of Earnings quality \* CEO duality, Earnings quality \* Board-Independence and Earnings quality \* Financial expertise are 0.043, 0.003 and 0.102, respectively. Also, the probability of t-statistics for variables of Earning quality \* Board-independence and Earning quality \* Financial expertise shows that at a 95 percent confidence level, the coefficients of interactive variables are significant. So it can be said that expert and independent board members with a good understanding of their supervisory role lead management to optimal investment decisions. Accordingly, the second hypothesis is confirmed.

Ball et al. (2012) argued that using fixed-effects regression models can control the effect of firm-specific omitted factors that are invalid over time, but it decreases the predictive power of estimators. Therefore, in an alternative solution, the principal models are fitted with a standard clustered error (cluster panel). The results of the cluster panel estimation model are presented in Table 4 and confirm the main OLS results.

Table 3. H2 test results

Explanatory variables	Coefficient	Standard error	t-statistics	VIF
Earning quality	0.040	0.013	3.05*	2.02
CEO duality	0.004	0.002	2.24*	1.21
Board-independence	-0.023	0.008	3.00*	1.54
Financial expertise	0.043	0.006	6.63*	1.55
Earning quality * CEO duality	0.043	0.024	1.80	1.48
Earning quality * Board-independence	0.003	0.002	1.98*	1.25
Earning quality * Financial expertise	0.102	0.018	5.83*	1.26
aaaa))	-0.007	0.008	-0.91	1.02
Governance	0.048	0.010	4.95*	1.17
MTB	0.002	0.008	0.23	1.21
Leverage	-0.023	0.009	-2.56*	1.11
Size	0.009	0.003	3.62*	1.14
ROA	0.057	0.035	1.66	2.01
Intercept	-0.086	0.101	-0.85	--
Year & Industry	Controlled		Controlled	
R-squared			0.336	
F(statistics)			12.600	
Prob. (F)			0.000	

\* Significant at 95 percent confidence level.



Table 4. cluster panel estimation results

Explanatory variables	H1		H2	
	Coefficient	t-statistics	Coefficient	t-statistics
Earning quality	0.025	2.20*	0.040	1.93*
CEO duality			0.004	1.75*
Board-independence			0.023	2.67*
Financial expertise			0.043	4.15*
Earning quality * CEO duality			0.017	1.47
Earning quality * Board-independence			0.011	1.96*
Earning quality * Financial expertise			0.102	3.87*
aaaa)))	-0.004	-0.61	-0.007	-1.12
Governance	0.048	2.43*	0.048	2.81*
MTB	0.014	0.89	0.002	0.15
Leverage	-0.030	-1.51	-0.023	-1.21
Size	0.012	2.02*	0.009	1.72*
ROA	0.050	0.85	0.057	1.11*
Intercept	-0.240	-1.95	-0.086	-0.51
Year & Industry	Controlled		Controlled	
R-squared	0.217		0.336	
F(statistics)	3.400		3.890	
Prob. (F)	0.000		0.000	

\* Significant at 95 percent confidence level.

Now we can sum up the empirical findings as follows:

- ✓ There is a positive and significant relationship between earnings quality and corporate investment efficiency in TSE listed companies.
- ✓ Board members' financial expertise and independence amplify the relationship between earning quality and investment efficiency.
- ✓ CEO duality does not affect the connectivity between earning quality and investment efficiency, significantly.

## Conclusions and Suggestions

The study investigates the effect of financial reporting information efficiency (earning quality) on investment efficiency with an emphasis on the moderating role of corporate governance features (board characteristics) in TSE listed firms. These relationships were examined in the framework of two hypotheses. The dependent variable in both hypotheses was investment efficiency. The first one holds earning quality as the independent variable. The second hypothesis also incorporated board independence and financial expert as well as CEO's duality as moderating variables. The earning quality coefficients are 0.036 and 0.040, for H1 and H2, respectively, and since corresponding p-value statistics are less than 0.05, there is a positive and significant relationship between

earning quality and investment efficiency. The sizes of the estimated coefficients are also important, economically. These stand for a 1% increase in the earning quality results in a 3.6% improvement in investment efficiency. Simultaneously, firms having expertise and independent boards can experience a 4% increase (rather than 3.6%). We observed the positive relation holds consistent across both hypotheses, but the incorporation of interactive variables augmented such a relation; because the estimated coefficient raised in H2 concerning H1. Furthermore, when we included moderating variables, the determination coefficient of the model increased from 21.7% to 33.6% for H2. These provide evidence for favorable effects of board characteristics improving the predictive power of earning quality; because point estimates (0.003 for the interaction of board dependence and 0.102 for financial expertise) are also statistically significant. To account for the variability of the earning quality in both hypotheses, we also calculated the normalized coefficient (estimated coefficients  $\times$  standard deviation of earning quality). The interpretation is that a one standard deviation decrease in earning quality is connected to a 0.316% ( $0.036 \times 0.088$ ) and 0.352% ( $0.040 \times 0.088$ ) level drop in investment efficiency, respectively. This implies board independence and financial expertise increase the variability of earning quality impacts. According to H1 test results, earning quality can play as a governing mechanism and optimize business unit investment decisions. The results are consistent with Bushman & Smith (2001), Rasaiyan (2006), Lambert et al., (2005) and Zhai & Wang (2016). High quality of earning reduce information asymmetry and improve investor confidence. This improves economic decision-making and reduces agency costs. At the national level, it moves capitals in the market towards efficient industries and at the corporate level shifts cash flows towards investment opportunities with positive NPV. Conversely, the poor quality of earning reinforces information asymmetry between managers and shareholders, which results in maximizing management personal interests and choosing investment opportunities that best suit their expectations (inefficient investment). The results confirm the conceptual model of earnings quality suggested by Beaver (1989) and show that high-quality earnings play two pricing (reducing the cost of capital in external financing) and governance (supervising the opportunistic behaviors of managers) roles to affect investment efficiency.

Also, board characteristics influence the relationship between earnings quality and investment efficiency so that board members with financial and/or accounting backgrounds and independence as moderating variables can modify and exaggerate the effects of earnings quality on investment efficiency. Board independence and expertise have a positive and exacerbating effect on such a

relationship, whereas the CEO duality does not play a moderating role. These results support from Modares and Hesarzadeh (2008), Nikbakht et al., (2010), Beadel, 2009), Sedighi (2013), and Zhai & Wang, (2016) findings. Given that the primary responsibility of the board is to provide independent oversight on the performance of executives, require managers to be accountable to shareholders and also to balance the interests of the various stakeholders of the company while exercising greater independence, they exercise more effective oversights. It drives capital toward more efficient investment opportunities. Also, the presence of literate members in the board structure pacifies the likelihood of fraud, financial reporting misstatement and earning smoothness. The empirical evidence obtained (Klein, 2012) has also shown that independent and financial literate boards provide less anomalous accruals in financial reports. Therefore, the presence of non-executive (independent) literate directors in corporate boards, which have the legal power to oversee corporate performance is a potentially powerful mechanism for corporate governance. So, the independence and financial expertise of board members have positive effects on financial reporting quality, as well as investment efficiency.

It can be concluded that one of the ways to increase the efficiency of investment decisions strengthening internal mechanisms as well as increasing the quality of earning. It is recommended that corporate executives and financial policymakers take this financial policy and direct their policies in such a way that they will have the flexibility to face liquidity when unforeseen problems arise. The findings can persuade corporate shareholders to pay more attention to the degree of independence and expertise of their board of directors to gain more return on their investment opportunities. We advise shareholders to monitor the activities of the board of directors, continuously and prevent them from harming the interests of shareholders. The audit firm and other standardization bodies can also use the results of this study in their evaluations to develop future accounting and governance standards. In this regard, efforts should be made to provide guidelines for better and more accurate application of published standards. There are political, economic, regulatory and other factors that affect investment efficiency. Given the importance of the issue of investment efficiency for developing countries, it is recommended to identify these factors in future researches and examine their effects on corporate investment efficiency. Because of the investment opportunities facing companies vary across the lifecycle of companies, it would be useful if this research is conducted separately at different stages of the corporate life cycles.

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