Accounting Information Quality, Free Cash Flow, and Over-Investment:

Evidence from an Emerging Market – a Study in Iran

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Abstract

This paper investigates the relationship between accounting information quality (AIQ) and over-investment based on data from 110 companies in the Tehran Stock Exchange from 2008 to 2014 and also compares the relationship between AIQ and over-investment in companies with low and high free cash flow. Principal-Agent Theory and Information economic theory suggest that an increase in accounting information quality can decrease over-investment. AIQ by Dechow and Dichev's Model (2002), over-investment by Richardson's Model (2006), and free cash flow by Yuan and Jiang's Method (2008) were measured and hypotheses were tested using Yuan and Jiang's Model (2008). Results of this investigation show that there is a reverse and meaningful relationship between AIQ and over-investment; which means that improvement of AIQ can decrease over-investment. Also, the effects of AIQ on over-investment in companies with high free cash flow is greater than in companies with low free cash flow.

Keywords: Accounting information quality, over investment, free cash flow, principal-agent theory, information economic theory.

1. Introduction

Financial statements are one of the data resources available in capital markets that are expected to have an effective role in investment development and performance increase. In this regard, academic researchers and accounting professionals are seeking to increase accounting information quality as a tool to fulfill their responsibility to meet their own society needs both in developed and emerging markets (Modarres and Hesarzadeh, 2008; Zarei et al. 2020, Nasseri et al., 2020, Alam et al., 2019).

Based on Thornton idea (2002), the concept that has been widely used in the literature, quality of accounting information and financial reporting are joint products of at least four factors: creativity and perception in management, audit quality, Audit Committee experience, and High-quality accounting standards. Weaknesses in each of the four loops could undermine the whole chain (Nasseri et al., 2017). Principal-Agent Theory (Agency Theory) and Information economic theory show different aspects of over-investment [1]formation. Principal-Agent Theory argues that over-investment mainly is due to conflicts of interest between shareholders and creditors and also creates conflicts of interest between shareholders and managers. Information economic theory states that over-investment is mainly created due to asymmetry between investors and managers (Yuan and Jing, 2008; Uddin et al., 2023).

Accounting information due to pricing and governing functions plays an important role in reducing information asymmetry and reduces conflicts of interest between managers and shareholders. This information helps investors to make correct asset pricing and investment

[1] Overinvestment refers to a situation in which a company or individual allocates an excessive amount of resources, such as money, time, or effort, into a particular project, asset, or area of business. This can occur when the investment made surpasses the potential returns or benefits that can be generated from it. In other words, overinvestment happens when the costs or risks associated with an investment outweigh the potential gains.

Overinvestment can lead to various negative outcomes, such as reduced profitability, financial strain, and decreased overall efficiency. It can also tie up resources that could be better utilized in other areas of the business or for alternative investments with better potential returns.

decisions and reduces losses that investors may endure due to pricing mistakes or wrong decisions in investing. The governing function of accounting information means financial and accounting data entry into corporate governance mechanism to enhance corporate governance efficiency and reduce agency cost of that corporation (Yuan and Jiang, 2008; Uddin et al., 2023).

Jensen's Free Cash Flow Theory states that managers have accumulated to increase assets under their control and then instead of maximizing shareholders' wealth, they follow their own purposes (Custodio et al. 2005). Managers' aim is to expand the size of companies; because this would increase their advantages, position and strength (Degryse and Jong, 2000). Many academic studies have shown that the financial and non-financial benefits of managers in large companies than small companies are more. So, aim of management instead of maximizing corporate values can be maximizing the size of corporation (Pawlina and Renneboog, 2005; Kuzey et al., 2023).

This article continues in eight parts. Next is the review of the literature review of the subject, and then innovation of the study, hypotheses, and research methods will be discussed. This will be followed by the discussion of steps to estimate models used in this study to test hypotheses and finally conclusions are presented in respect.

2. Literature review

Since 1986 when Jensen showed that managers invest free cash flow on non-profitable projects (in other words, they over-invest), some researchers have sought to present methods to limit over-investment. Jensen (1986) has presented two ways to limit over-investment. One was the distribution of stock dividends and the other was the company incurred debts. Shleifer and Vishny (1997) found out that investment institutions have a strong motivation to monitor management and control over investment in their own companies. Chung et al. (2003) and Gugler (2003) suggest that independent directors play an important role in the company's investment decision-making and are able to use their professional expertise and strong sense of responsibility to constrain blind investment behavior of senior management of the company. In recent years, some of the researchers stated that accounting information has effects on improving investment efficiency (Yuan and Jiang, 2008; Biddle et al, 2009; Li and Wang, 2010; Modarres and Hesarzadeh, 2008; Alam et al., 2020).

Yuan and Jiang (2008) showed that improving the accounting information quality decreases over investment. Further, they found out that accounting information quality is more strongly associated with over-investment for firms with more free cash flow. Biddle et al (2009) found out that in companies with higher financial reporting quality, the level of real investment is closer to the level of expected investment (optimal investment). Li and Wang (2010) finds proxies for financial reporting quality, namely self-constructed composite measures, are negatively associated with both under and over-investment of the listed corporations (Abdou et al., 2020).

Two studies that review the relationship between financial reporting quality and investment efficiency in Iran have inverse results. Modarres and Hesarzadeh (2008) showed that there is a negative and significant relation between under and over-investment and financial reporting quality. Thaqafī and ArabMazarYazdi (2010) found out there isn't any significant correlation between financial reporting quality and investment efficiency (including under and over-investment).

3. Innovation of the study and hypotheses for testing

In previous studies the relation between financial reporting quality and over-investment was reviewed (Modarres and Hesarzadeh, 2008; Thaqafī and Arab MazarYazdi, 2010); but so far there hasn’t been any research in Iran to review the relationship between accounting information quality and over investment, this relationship is reviewed in this study.

This paper aimed to develop research literature on factors affecting the decrease of over-investment in Iran. The hypotheses of this study are defined as:

First hypothesis: There is a significant and inverse correlation between accounting information quality and over investment.

Second hypothesis: Correlation between accounting information quality and over investment in companies with high free cash flow is stronger than companies with low free cash flow (If the first hypothesis is rejected, the second hypothesis is rejected on its own and there is no need to review).

4. Research method

This research is a quasi-experimental research in the field of Positive Accounting Research that will be done during steps of the scientific method of research including problem statement, assumptions, collection and classification of data, analysis and testing of hypotheses and the research report and it is based on real and historical stock market data and financial statements of companies. Also, this research aimed to be developmental and it is in the field of descriptive-regression research. This study is performed based on financial data related to non-financial companies (Manufacturing and service companies) that were accepted in the Tehran Stock Exchange from 2008 until 2014 (1386 until 1392 in the Solar Hijri calendar).

In order to review the hypotheses of the study, at first, over-investment by Richardson's Model (2006), accounting information quality by Dechow and Dichev's Model (2002) and free cash flow by Yuan and Jiang's Method (2008) measured and then the hypotheses were tested by Yuan and Jiang's Model (2008). This model is widely used in the literature and hence the adoption of this in this paper.

In this study to measure over investment, data of 274 companies that are accepted in Tehran stock exchange over 7 years was given to EViews software and because of Missing data, the software deleted about 1 company and estimated the model based on 273 companies over 7 years (and with 1580 observations). To measure accounting information quality, data from 274 mentioned companies was given to EViews software, and the model was estimated based on 274 companies over 7 years (and with 1433 observations). Then the companies that didn’t have over-investment were deleted. Finally, hypotheses were tested using data of 110 companies over 7 years (with 652 observations).

5. Analytical Models

5.1. Measuring over investment

To measure over investment two models were introduced in previous studies, the first model was Morgado and Pindado’s Model (2003) and the second model was Richardson’s Model (2006). Based on Morgado and Pindado’s model (2003) optimal level of investment is where the value of the company becomes maximum and the greater the difference between the investment and the optimal level of investment becomes, the value of the company will be less. Based on Richardson’s Model (2006), whole the investments in the company over a year is divided in two parts. The first part is the optimal level of investment and the second part is the difference between optimal level of investment and the investment. The investment more than the optimal level of investment is called “Over-Investment”. Based on this model optimal level of investment depends on growth opportunities, past stock returns, level of cash, leverage, firm size, firm age, prior firm-level investment, and company industry index.

In Morgado and Pindado’s model (2003) there is a variable of replacement value of assets which its measurement is very difficult; so in this study over investment is measured using model no.1 (suggested by Richardson (2006)).

$$I_{i,t} = \beta_0 + \beta_1 \times Grow_{i,t-1} + \beta_2 \times EPS_{i,t-1} + \beta_3 \times Cash_{i,t-1} + \beta_4 \times Lev_{i,t-1} + \beta_5 \times Size_{i,t-1} + \beta_6 \times Age_{i,t-1} + \beta_7 \times I_{i,t-1} + \beta_8 \times \sum IndustryIndicator_{i,t-1} + \beta_9 \times \sum YearIndicator_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

In model 1, $I_{i,t}$ is the investment of company i in year t, $Grow_{i,t-1}$ is growth opportunities of company i in year t-1, $EPS_{i,t-1}$ is the profit of each share of company i in year t-1, $cash_{i,t-1}$ is cash of company i in year t-1, $lev_{i,t-1}$ is leverage of company i in year t-1, $size_{i,t-1}$ is size of company i in year t-1, $Age_{i,t-1}$ is age of company i in year t-1, $I_{i,t-1}$ in the investment of company i in year t-1 and $\varepsilon_{i,t}$ is error term of company i in year t and includes factors that are not described by independent variables. $I_{i,t}$ equals to increase in fixed assets minus increase in other assets of the company, $Grow_{i,t-1}$ equals to ratio of market value to book value of stocks,$EPS_{i,t-1}$ equals profits of common shareholders divided by the number of ordinary shares, $Lev_{i,t-1}$ equals ratio of debts to assets, $Size_{i,t-1}$ equals logarithm of total assets of company and $\sum IndustryIndicator_{i,t-1}$ is a vector of indicator variables to capture annual fixed effects and $\sum YearIndicator_{i,t-1}$ is a vector of indicator variables to capture industry fixed effects of the company i in year t-1.

If error term is positive, it shows that company i in year t has an over-investment, if it is negative, this company has an under investments and if it is zero, the company has investments in the level of investment that is expected. Those companies that have over investments at least in 3 years over the five-year period of this study are known as companies with over investment and other companies are deleted.

5.2. Measuring of Accounting Information Quality

The accounting system resolves the mismatching in cash flows by adding accruals. Essentially, accruals are temporary adjustments that shift cash flows to the period where they are recognized in earnings (Dechow and Dichev, 2002). The main benefit of this shift is that the adjusted figures offer more accurate picture of the economic performance of companies. The main objective of accruals is to reduce non-adaptive and scheduling problems in underlying cash flows. Accruals quality in investors' opinion means close relation of accounting profits to cash. So weak accruals quality caused ambiguity in information and follow up increase in investment risk (Francis et al, 2005; quoted in Thaqafī and Ebrahimi, 2009). In this study as Yaun and Jiang (2008), Chan et al. (2009), Lee and Masulis (2009) and Cascino et al. (2010), accruals quality is considered as an index for accounting information quality and to measure accruals, Dechow and Dichev's Model is used.

Dechow and Dichev (2002) presented model 2 to measure accruals quality. Based on this model cash flow related to working capital accruals in the last year or in the current year or in the year after the recognition of accruals, enters the company or exits it. The difference between the amount of accruals and cash that enter or exit the company over these three years because of accruals are considered as error in anticipating accruals. If the absolute value of this difference is less, accruals quality will be more which measured using model 2.

$$Accrual_{i,t} = \beta_0 + \beta_1 \times CFO_{i,t-1} + \beta_2 \times CFO_{i,t} + \beta_3 \times CFO_{i,t+1} + \varepsilon_{i,t} \quad (2)$$

In model 2, $Accrual_{i,t}$ is the working capital accruals in company i in year t and it equals to change in non-cash current assets minus change in current debts. $CFO_{i,t-1}$, $CFO_{i,t}$, $CFO_{i,t+1}$ are operating cash flow of company i in years t-1, t, t+1. Residual is represented by $\varepsilon_{i,t}$, a unexpected part of total accrual. This paper adopts its absolute value to represent accounting information quality. The bigger its value, the lower the quality of accounting information quality.

5.3. Measuring of free cash flow

This paper adopts the following method presented by Yuan and Jiang's (2008) to measure the free cash flow and its model is as follow:

$$FCF_{i,t} = CFO_{i,t} - INT_{i,t} - DIV_{i,t} \quad (3)$$

The meanings of the variables in Model 3 are as follows: $FCF_{i,t}$ is the free cash flow of the company, $CFO_{i,t}$ is the net cash flow from operating activities, $INT_{i,t}$ is the interest on debt, and $DIV_{i,t}$ is cash dividend for the company i in year t. This paper will set the $FCF_{i,t}$ calculated according to Model 3 as a dummy variable. It takes its value as follows: Free cash flow of sample firms is calculated according to Model 3, and the free cash flow of sample companies divided into three equal parts. When the $FCF_{i,t}$ of listed companies is in the biggest group, the value of its dummy variable is 1; otherwise, it is 0.

5.4. Model of hypotheses testing

This paper use Yuan and Jiang's Model (2008) [model no. 4] to hypotheses testing:

$$OverInv_{i,t} = \beta_0 + \beta_1 \times AIQ_{i,t-1} + \beta_2 \times FCF_{i,t-1} + \beta_3 \times AIQ_{i,t-1} \times FCF_{i,t-1} + \beta_4 \times Controls_{i,t} + \varepsilon_{i,t} \quad (4)$$

The meanings of the variables in Model 4 are as follows: $OverInv_{i,t}$ is the positive residual from the regression of Model 1, and represents the over-investment of company i in the year t. The bigger the value, the more severe the over-investment. $AIQ_{i,t-1}$ is the absolute value of residual from regression of Model 2, and represents the accounting information quality of company i in the year t-1. The bigger the value, the worse the quality of the accounting information. We expect $OverInv_{i,t}$ and $AIQ_{i,t-1}$ to have a positive correlation; that is, along with the improvement of accounting information quality, the over-investment will gradually reduce. $FCF_{i,t-1}$ is the dummy variable of free cash flow of company i in the year t-1 which is calculated according to Model 3. We expect $FCF_{i,t-1,}$ and $OverInv_{i,t}$ to have a positive correlation; $AIQ_{i,t-1}$*$FCF_{i,t-1}$ is the product item of accounting information quality and free cash flow of listed companies, we expect their correlation coefficient is positive, that is accounting information quality has a stronger correlation with over-investment in sample companies with high free cash flow. $controls_{i,t}$ is control variables; control variables elected are $\Delta LD_{i,t}$, $EQ_{i,t}$, $CD_{i,t}$,$ORECTA_{i,t}$. Among which, $\Delta LD_{i,t}$ is the newly increased long-term loan and bond payable of company i in the year t and is used for controlling the influence of debt financing of current year on the investment; $EQ_{i,t}$ is the newly increased amount of equity financing of the company i in the year t, and is used for controlling the influence of equity financing on investment; $CD_{i,t}$ is the newly increased current debt of company i in the year t; $ORECTA_{i,t}$ is the newly increased other receivable in the year t of company i.

In the second hypothesis, the effects of accounting information quality on over-investment in companies with high and low free cash flow will be compared. So, we can classify companies into two groups, companies with high and low free cash flow and estimate for them two models of no.5 (first model for companies with high free cash flow and second model for companies with low free cash flow):

$$\begin{cases} OverInv_{i,t} = \alpha_0 + \alpha_1 \times AIQ_{i,t-1} + \varepsilon_{i,t} \quad \Rightarrow \quad High \ \ Free \ \ Cash \ \ Flow \\ OverInv_{i,t} = \alpha_2 + \alpha_3 \times AIQ_{i,t-1} + \varepsilon_{i,t} \quad \Rightarrow \quad Low \ \ Free \ \ Cash \ \ Flow \end{cases} \quad (5)$$

If α_1 is greater than α_3, the effects of accounting information quality on over investment is higher in companies with high free cash flow and if α_3 is greater than α_1, the reverse is true. But in this study to test the second hypothesis, we will use model no.4. In model no.4, coefficient β_1 will be the difference between y-intercepts (α_2-α_0) in two models of no.5, coefficient β_2, coefficient $AIQ_{i,t-1}$ for companies with low free cash flow (α_3) in two models of no.5 and coefficient β_3, difference between two coefficients $AIQ_{i,t-1}$(α_3-α_1) in two models of no.5. Thus, by to estimating model 4 comparisons necessary information will be provided to compare effects of accounting information quality on over investment in companies with high and low free cash flow. Furthermore, the model 4 has been created according to dummy variable technique which has several advantages in respect to the estimation of two models of no.5. Among these advantages, because combining data causes an increase in degrees of freedom, the accuracy of the estimated parameters of the method increases, etc (Gujarati, 2008; Kuzey et al., 2023).

6. Steps to estimate models

Steps to estimate models by panel data econometrics method are as follows:

6.1. Unit root test on panel data

As with the time series data, in a condition that non-stationary variables are used in the model, there is a chance of generating a spurious regression, these conditions are also associated with panel data. There are so many different tests to determine the stationary of variables. However, based on these tests if we determined that these variables are non-stationary we should do the cointegration test (Rahmani et al, 2011). In the cointegration method, long-term economic relationships will be estimated and analyzed. Cointegration analysis can help us to discover the long-run equilibrium relationship (MehrAra and Fazaeli, 2009).

In this study four tests including "Levin, Lin & chu t*", "Im, Pesaran and Shin W-stat", "ADF-Fisher Chi-square", "PP-Fisher Chi-square" is used to review the stationarity of variables. Unit root test results show that all variables in a level of 95 percent, are stationary.

6.2. Types of panel analytic models

There are three main models to estimate models based on panel data as followed (Izadiet al., 2008):

1. Constant Coefficients (Pooled Regression) Model in which y-intercept is constant for all cross-sectional observations and its estimation model is $Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it}$.

2. Fixed Effects (Least-Squares Dummy Variable) Model in which y-intercept is different among cross-sectional observations (i.e. y-intercept is constant for each firm) and its estimation model is $Y_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}$.

3. Random Effects Model in which y-intercept is random for cross-sectional observations and its estimation model is $Y_{it} = \alpha + \beta X_{it} + \mu_i + \varepsilon_{it}$.

To determine the method used in combined data different tests were conducted. The most common model is F test for using fixed effects model against the constant coefficients model, Hausman test is for using the fixed effects model against the random effects model and LM test is for using the random effects model against the constant coefficients model (ZaraNejad and Anvari, 2006).

F test hypotheses are as follows:

$$\begin{cases} H_0: \quad Pooled \quad Model \\ H_1: \quad Fixed \quad Effect \quad Model \end{cases} \tag{6}$$

F test statistic is presented in the following formula (Fotros et al., 2010):

$$F = \frac{(R^2_{fem} - R^2_{Pooled})/(N-1)}{(1-R^2_{fem})/(NT-N-K)} \tag{7}$$

In which, R^2_{fem} and R^2_{pooled} in respect are coefficient of determination regression with fixed effects model and constant coefficients model; N is the number of cross-sectional observations; NT is the total number of observations and K is the number of regressors in the model. The degree of freedom of F test statistic for the numerator is (N-1) and for the denominator is (NT-N-K).

The most common test to determine kind of panel data model is Hausman test. Hausman test based on the presence or absence of relationships between the error term and regressors in the model are stable. If this relation exists, the model is random effects and if this relation doesn't exist, the model is fixed effects. Hypothesis H_0 shows the absence of a relationship between regressors and error term and hypothesis H_1 shows the presence of a relationship (ZaraNejad and Anvari, 2006; Kuzey et al., 2023).

The Hausman Test is a kind of Wald χ^2 test. These statistics are defined as follows (Fotros et al. 2010):

$$\chi^2 = (b_F - b_R)'(M_F - M_R)^{-1}(b_F - b_R) \tag{8}$$

In which, b_F and b_R in respect are vector of fixed-effect and random-effect coefficients. Also, M_F and M_R show in respect variance-covariance matrix for the fixed effects and random effects.

Degrees of freedom of Hausman test equal to number of regressors in model. Finally, after determining the method, we will estimate the models. In this study, there is no need to use LM test.

7. Results of estimating the models

7.1. Estimation of over-investment model

At first model 1 is estimated for years 2008 until 2014. The results of F test and Hausman test (presented in Table no.1) show that to estimate the over-investment model, we should use the fixed effects model.

Table no.1- results of F test and Hausman test for model 1

Kind of Test	Statistic	P-Value	Result
F Test	1.87	0.000	Constant Coefficients is rejected
Hausman Test	383.07	0.000	Fixed Effects is accepted

Table no.2- results of estimating model 1 based on fixed effects

No. of Observations	Durbin-Watson St.	F -St.	Prob (F -St.)	Adj -R^2	R^2
1580	2.11	3.66	0.000	0.32	0.44

With respect to estimation results of model 1 in Table No. 2, generally, the model is significant at level 95%. After estimating model 1 by using the fixed effects model, error terms are calculated by software EViews.

7.2. Estimation of accounting information quality model

Results of F test and Hausman test (presented in Table no. 3) show that to estimate model 2, we should use fixed effects model.

Table no.3- results of F test and Hausman test for model no.2

Kind of Test	Statistic	P-Value	Result
F Test	2.36	0.000	Constant Coefficients is rejected
Hausman Test	30.59	0.000	Fixed Effects is accepted

Table no.4- Results of model 2 estimation based on fixed effects

No. of Observations	Durbin-Watson St.	F -St.	Prob (F -St.)	Adj -R^2	R^2
1433	2.31	3.73	0.000	0.35	0.47

With respect to the estimation results of the accounting information quality model in Table No. 4, generally, the model is significant at level 95%. After estimating model 2 by using the fixed effects model, error terms which measure measuring index of accounting information quality, are calculated by the software EViews.

8. Hypotheses tests

Results of F test and Hausman test (presented in Table 5) show that to estimate model 4, we should use the fixed effects model.

Table no.5- results of F test and Hausman test for model no.4

Kind of Test	Statistic	P-Value	Result
F Test	8.08	0.000	Constant Coefficients is rejected
Hausman Test	877.16	0.000	Fixed Effects is accepted

Table no.6- Results of model 4 estimation based on fixed effects

No. of Observations	Durbin-Watson St.	F -St.	Prob (F -St.)	Adj -R^2	R^2
652	2.35	18.17	0.000	0.75	0.80

Table no.7- Regression coefficients of model 4 estimation based on fixed effects

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-393454.8	27105.60	-14.51563	0.0000
$AIQ_{i,t-1}$	0.403861	0.131011	3.082656	0.0022
$FCF_{i,t-1}$	193932.9	43626.61	4.445289	0.0000
$AIQ_{i,t-1}*FCF_{i,t-1}$	0.470676	0.112197	4.195069	0.0000
$\Delta LD_{i,t}$	0.644308	0.024531	26.26490	0.0000
$EQ_{i,t}$	-0.188955	0.028250	-6.688640	0.0000
$CD_{i,t}$	-0.998830	0.050925	-19.61356	0.0000
$ORECTA_{i,t}$	-0.713063	0.031649	-22.53007	0.0000

With respect to estimation results of model 4 in table no.7, variable coefficient $AIQ_{i,t-1}$ (β_1) is significant in level 95% and it is positive. Therefore, the first hypothesis of this study (Accounting Information Quality has a negative and significant relation with over-investment) will be confirmed. Variable coefficient $FCF_{i,t-1}$ (β_2) is significant in level 95% and it is positive that this confirmed our expectation; and variable coefficient $FCF_{i,t-1} \times AIQ_{i,t-1}$ (β_3) is significant at level 95% and it is positive. Therefore, the second hypothesis of this study (the correlation between accounting information quality and over-investment in companies with high free cash flow is more stronger than companies with low free cash flow) will be accepted. Appendix 1 provides further test about the data used in this study.

9. Conclusions

This paper is aimed to review the relation between accounting information quality, over investment and free cash flow. This study by using financial data of 110 companies which are accepted in Tehran Stock Exchange during 2008 till 2014 showed that improving accounting information quality can decrease over investment. Also in companies with high free cash flow by improving accounting information quality, over-investment will be reduced more than companies with low free cash flow. In other words, in the high free cash flow group, the accounting information quality and the enterprises' over-investment have a stronger correlation.

The results of this study show the role of accounting information on decreasing information asymmetry in the Tehran Stock Exchange and also they show the importance of accounting information in supervising and controlling management performance. Indeed, the results of this study confirm the effectiveness of two performances, accounting information pricing and controlling, in decreasing information asymmetry and reducing agency costs in Tehran Stock Exchange (see also Wasiuzzaman et al., 2022a,b for the discussion on CSR and further analysis of firm performance).

Similar researches were conducted in Iran and other countries and most of them have almost similar results to the results of this study. Also, the hypotheses of this study were tested in Yuan and Jiang's research (2008) in China but these hypotheses were not reviewed in Iran till now.

In one hand, these findings could encourage accounting information producers to improve the quality of accounting information in order to meet the needs of their community and on the other hand, they could motivate accounting information consumers to pay attention and focus on the importance of accounting information. Furthermore, the equation and information presented in this study could help researchers in future studies in the field of effective factors on investment efficiency and economic consequences that improve information quality. Indeed, this study is conducted in order to improve the accounting information role to specify founds.

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Appendix: Stationary test of all variables

1) Stationary test of the variable of new investments (t):

Panel unit root test: Summary
Series: I
Date: 05/08/11 Time: 16:35
Sample: 1383 1387
Exogenous variables: Individual effects
User specified lags at: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-193.807	0.0000	173	649
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-28.2095	0.0000	130	520
ADF - Fisher Chi-square	551.347	0.0000	173	649
PP - Fisher Chi-square	671.702	0.0000	173	649

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

2) Variable stationarity test of growth opportunities

Panel unit root test: Summary
Series: GROW
Date: 05/08/11 Time: 16:37
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	16.3390	1.0000	190	716
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	7.11296	1.0000	146	584
ADF - Fisher Chi-square	419.730	0.0781	190	716
PP - Fisher Chi-square	526.116	0.0000	190	716

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

3) Stationary test of profit per share

Panel unit root test: Summary
Series: EPS
Date: 05/08/11 Time: 16:39
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-36.2280	0.0000	190	716
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.75133	0.0000	146	584
ADF - Fisher Chi-square	406.401	0.1684	190	716
PP - Fisher Chi-square	499.063	0.0000	190	716

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

4) Cash variable stationarity test

Panel unit root test: Summary
Series: CASH
Date: 05/08/11 Time: 16:40
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-32.6640	0.0000	226	835
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-19.7457	0.0000	157	628
ADF - Fisher Chi-square	676.955	0.0000	226	835
PP - Fisher Chi-square	774.143	0.0000	226	835

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

5) Financial leverage variable stationarity:

Panel unit root test: Summary
Series: LEV
Date: 05/08/11 Time: 16:41
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.32565	0.0000	173	657
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-10.4413	0.0000	138	552
ADF - Fisher Chi-square	432.122	0.0011	173	657
PP - Fisher Chi-square	525.997	0.0000	173	657

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

6) Stationary test of new investment variable (t-1):

Panel unit root test: Summary
Series: I1
Date: 05/08/11 Time: 16:42
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-17.0899	0.0000	190	716
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-19.8223	0.0000	146	584
ADF - Fisher Chi-square	500.350	0.0000	190	716
PP - Fisher Chi-square	677.360	0.0000	190	716

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

7) Stationary test of company size variable:

Panel unit root test: Summary
Series: SIZE
Date: 05/08/11 Time: 16:44
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-160.518	0.0000	190	716
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-40.3552	0.0000	146	584
ADF - Fisher Chi-square	554.642	0.0000	190	716
PP - Fisher Chi-square	774.214	0.0000	190	716

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

8) The static test of the company's lifetime variable:

Panel unit root test: Summary
Series: AGE
Date: 05/08/11 Time: 16:45
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-49.5789	0.0000	190	716
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-7.50500	0.0000	146	584
ADF - Fisher Chi-square	330.685	0.9677	190	716
PP - Fisher Chi-square	404.968	0.1812	190	716

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

9) Stationary test of industry index variable:

Panel unit root test: Summary
Series: INDX
Date: 05/08/11 Time: 16:45
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	12.5314	1.0000	190	716
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	7.19107	1.0000	146	584
ADF - Fisher Chi-square	349.709	0.8654	190	716
PP - Fisher Chi-square	448.892	0.0085	190	716

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

10) Variable stationarity test of total accrual items:

Panel unit root test: Summary
Series: ACCRUAL
Date: 05/08/11 Time: 16:48
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-38.3637	0.0000	81	302
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-11.6333	0.0000	59	236
ADF - Fisher Chi-square	240.557	0.0001	81	302
PP - Fisher Chi-square	284.449	0.0000	81	302

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

11) Stationarity test of operating cash flow variable (t-1):

Panel unit root test: Summary
Series: CFO1
Date: 05/08/11 Time: 16:49
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-13.7479	0.0000	73	279
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-5.07760	0.0000	60	240
ADF - Fisher Chi-square	185.927	0.0142	73	279
PP - Fisher Chi-square	227.724	0.0000	73	279

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

12) Stationarity test of operating cash flow variable (t):

Panel unit root test: Summary
Series: CFO2
Date: 05/08/11 Time: 16:50
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-32.7539	0.0000	90	338
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-11.4841	0.0000	68	272
ADF - Fisher Chi-square	281.571	0.0000	90	338
PP - Fisher Chi-square	331.972	0.0000	90	338

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

13) Stationarity test of operating cash flow variable (t+1):

Panel unit root test: Summary
Series: CFO3
Date: 05/08/11 Time: 16:50
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-22.5008	0.0000	100	372
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-15.7272	0.0000	72	288
ADF - Fisher Chi-square	349.572	0.0000	100	372
PP - Fisher Chi-square	401.004	0.0000	100	372

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

14) Stationary test of overinvestment variable:

Panel unit root test: Summary
Series: OVERINV
Date: 05/10/11 Time: 17:45
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-35.4227	0.0000	100	372
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-8.60994	0.0000	72	288
ADF - Fisher Chi-square	240.391	0.0268	100	372
PP - Fisher Chi-square	266.473	0.0012	100	372

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

15) Stationary test of accounting information quality variable:

Panel unit root test: Summary
Series: AIQ
Date: 05/08/11 Time: 16:52
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-8.78973	0.0000	68	253
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-8.15669	0.0000	49	196
ADF - Fisher Chi-square	214.280	0.0000	68	253
PP - Fisher Chi-square	257.027	0.0000	68	253

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

16) Free cash flow variable stationarity test:

Panel unit root test: Summary
Series: FCF
Date: 05/08/11 Time: 16:53
Sample: 1383 1387
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-9.08142	0.0000	33	132
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.47367	0.0067	33	132
ADF - Fisher Chi-square	81.2626	0.0977	33	132
PP - Fisher Chi-square	67.9237	0.1750	29	116

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.