Examining the relationship between investor sentiment and investment in R&D of the listed companies in Tehran stock exchange

Hamid Reza Razavi[1], Ramazan Ali Royaie[2], Mohammad Hassan Janani[3]

[1]Department of Accounting, Science and research branch, Islamic Azad University, Tehran, Iran.
[2]Department of Management, Science and research branch, Islamic Azad University, Tehran, Iran.
[2]Department of Financial Management, Borujerd branch, Islamic Azad University, Borujerd, Iran.

Corresponding author E-mail: hr.razavi69@gmail.com

Abstract: This research aims to examine the relationship between investor sentiment and investment in Research and Development (R&D) expenditures of the listed companies in Tehran stock exchange. This investigation is a kind of library study and analytical-causative, and is performed based on Panel data analysis. In this research, finance information of 134 listed companies in Tehran stock exchange dring 2008 to 2014. According to confirming the first hypothesis, the research indicates that there is a significant and reverse relationship between investor sentiments and investment in R&D expenditure of the listed companies in Tehran stock exchange.

Keywords: Investor sentiments; Investment in R&D expenditure; Tehran stock exchange.

Introduction

Behavioral finance issues is one of studies spread widely in this field and deals with decision-making process of investors and their reaction to various condition of finance market. They have also more emphasized on the impact of emotions, persnality, culture and judgments of investors on investment decision-making. Behavioral finance issues indicate that there is no fundamental reason for changes in Tehran stock exchange, and investors sentiments play an important role in price determination (Khodaei et al, 2012). In fact, dynamic interaction between noise traders and arbitrage is formed, and if a stock has more noise tradees or less logical traders, its price volatility would be significant. Behavioral finance issue suggesting two basic assumptions: The first assumption is that investors are influenced by their sentiments. Here, sentiments is defined as "future cash flows and investment risks which has not been created by available facts. The second assumption is that arbitrage is risky and expensive than behavioral investors (Shahr abadi & Yousefi, 2010). it has been provided in many researches that firms with strong corporate governance which have higher R&D expenditure, would have higher stock return (Chan et al, 2014). Today, the extent of efforts in R&D impacts on price of firms' stock markets. As it can be seen in recent investigations, discontinuation of some parts of R&D practices of a firm has negative mental impact on firms' stock market prices which is harmful for firms having growing stock market, small firms as well as firms with low operational cash flows (Pascal et al, 2010). According to researches of some researchers such as Lee in 2011, if firms want to invest in R&D projects, growth opportunities of firms would be increased and would face with higher stock return. Various investigations have showed that firms having significant increase in their capital expenditure would face with less stock return risk. This negative relationship is also intensified in firms with increased big investments (Titman et al, 2004). The goal of this study is to examine the relationship between investor sentiments and investment in R&D expenditure of the listed companies in Tehran stock exchange.

2. Research background

Based on a sectional analysis, Graboscky & Muller (2015) showed that investment of agencies in R&D has lead to increasing firms' profitability. They also showed, then, agencies have obtained more return in R&D studies, using modified accounting income based on a regression model.

In their researches on the relationship between CEO duality, investor sentiments and investment in R&D, Xho & Howang (2015) found that losing stock price due to investor sentiment and CEO duality positively impact investment R&D of firms.

Chen (2013) investigated the relationship between investor sentiment, corporate governance and investment decisions. The samples used in this research include Taiwanese during 2003 to 2010. The empirical results show that investor sentiments has significant and positive relationship with number of new investments and overinvestments. Corporate governance has monitoring and motivating impact on decisions.

Grandy & Lee (2010) have examined the relationship between investor sentiments, managers reward and investment in firms. The results demonstrate that investors' optimization importantly and positively related to investment level, and insignificantly related to investment level. Managerial ownership has positive relationship with investment level and is conditional to optimization extent.

Heidarpour et al, (2013) examined the impact of investor sentiments on stock return. Traditional perspective on stock return believes that changes of stock prices are related to systematic changes in a firm's fundamental values. The recent researches, nevertheless, show that investor sentiments plays an essential role in determining price and describing time series returns, especially for stocks with higher mental evaluation and have many limitations in arbitrage.

Nazari & Mobarak (2012) investigated the impact of investment in R&D on productivity in Iran's industry during 1995 to 2008. During the research, the reults showed that expert human resource, capital to production ratio, profitability, share of foreign consuming materials, openness of economy, private ownership, exchange rate with two irruptions and R&D expenditure with three irruptions positively impact total production factors in various industries which private ownership has the most impact among them.

3. Research methodology
3.1. Research hypthesis
- There is a significant relationship between investor sentiments and investment in R&D expenditure of the listed companies in Tehran stock exchange.

3.2. Statistical population and sample
The statistical population of current research includes all listed companies in Tehran stock exchange. Regarding the announcement of formal website of Tehran stock exchange, all listed companies include 520 firms in 37 industry groups until the end of 2014. Therefore, all listed companies in Tehran stock exchange during a seven year period during 2008 to 2014 form the research's statistical population. In this research, the elimination method is used to consider a suitable representative for the statistical population.

Table 1.1: The process of selecting the research's statistical sample

Description	Number of firms
The number of listed firms during 2008	514 firms
The number of listed firms during 2014	681 firms
The number of listed firms during 2008 to 2014	465 firms
The firms which their fiscal year would not end in 19/3/ and the firms	172 firms
Holding firms, financial intermediaries, insurance and banks, …	34 firms
Firms with defective financial information	125 firms
The firms which their data are collected (final sample)	134 firms

3.3. Research method
In this research, since we try to find the significant relationship between variables of the research and deal with the limits of variable changes with regard to the extent of changes of independent variable, the method is a kind of correlation research in terms of nature abd content of research which is performed to discover correlation between variables through post-event method. The current study is a of research-based one in terms of the kind of the research and is a practical research in terms of the goal of the study which is used for rejecting or confirming the hypotheses via real data and different statistical methods.

3.4. Variables' definition and the way of measuring
3.4.1. Investor sentiments
To measure investor sentiments, in this research, Equity Market Sentiment Index (EMSI) has been used. This index has been modified by Jones (2005) and developed by Persawd (1996). Hence, investor sentiments can be calculate using the equation 4:

$$SENT_{pt} = \frac{\sum (R_{it} - \overline{R}_r)(R_{iv} - \overline{R}_v)}{\left[\sum (R_{it} - \overline{R}_r)^2 \sum (R_{iv} - \overline{R}_v)^2 \right]^{\frac{1}{2}}} \times 100 \quad , \quad -100 \leq EMSI \leq +100$$

In which:
Rit: Rate of monthly stock return of firm i in month t
Riv: Historical volatility rate of firm i in month t which is used for measuring historical volatility based on standard deviation of recent five stock return.
Rr: Mean rate of monthly stock return of portfolio companies.
Rv: Mean rate of historical volatility of stocks of portfolio companies (Heidari, 2012).

2.4.3. Investment in R&D
R&D expenditure to total sale ratio (Nazari & Mobarak, 2012; Thomas et al, 2012; Ardov et al, 2013).

3.4.3. Firm size
Natural logarithm of book value of total assets (Ekrami et al, 2010).

4.3.3. Growth rate
Current year sale minus previous year sale divided by previous year sale (Ekrami et al, 2010).

5.3. Data analysis method
In this research, we use descriptive statistics at the first part to deal with minimum, maximum, mean and standard deviation of the variables. At the second part, heteroskedasticity test, F-Limer test, homoscedasticity test, Jaque-Bra test and Lin-Levene test as pre-test and regression test as post-test is used to confirm/reject the variables.

4: Results
1.4. Jarque-Bra test

Table 2.1: Normality test of the variables (Jaque-Bra)

Parameter	Variable						
	RD	INVESTMENT	INVESTOR	SENTIMENT	CEODUALITY	SIZE	GROWTH
Number	937	937	937	937	937	937	937
Test criteria	0.781457	0.714914	0.434962	0.563579	0.725008	0.781457	0.714914
Significance level	0.062741	0.069531	0.081442	0.071935	0.065425	0.062741	0.069531

In table 2.1, the dependent variable distribution is normal, due to the significance level of this test is higher than 0.05.

2.4. Examination of heteroskedasticity

Table 3.1: The results of White heteroskedasticity test

Hypotheses	Description	Statistics amount	Probability	P-VALUE	Result	Regression method
Hypothesis	F-statistics	5.078635	0.0000	P<0.05	heteroskedasticity	GLS

1	Obs*R-squared	11.27968	0.0000			
Hypothesis 2	F-statistics	6.015861	0.0000	P<0.05	heteroskedasticity	GLS
	Obs*R-squared	18.14426	0.0000			

In all hypotheses, homoscedasticity assumption is rejected and heteroskedasticity of error terms are confirmed, due to the statistics are significant in higher 5% level.

3.4. F-Limer and Hausman test

Table 4.1: F-Limer and Hausman test

Hypotheses	F-Limer statistics	Probability	P-value	Result	Hausman test	Probability	P-value	Result
Hypothesis 1	4.141658	0.0476	P<0.05	Panel data	107.669186	0.0000	P<0.05	Fixed effects
Hypothesis 2	4.143080	0.0454	P<0.05	Panel data	108.477612	0.0000	P<0.05	Fixed efects

In all hypotheses, H0 (p-value<0.05) is rejected and panel data are confirmed due to the obtained p-value from F-Limer is less than 0.05. Due to the obtianed p-value from Hausman is less than 0.05, H0 is rejected and fixed effects method is confirmed.

4.4. The research hypothesis test

Table 5.1: The results of data analysis for the first hypothesis test

Independent variable: investment in R&D expenditure (RDINVESTMENT)				
Variable	Coefficient	Standard deviation	t-statistics	p-value
C	-0.913024	0.220924	-4.132759	0.0000
INVESTORSENTIMENT	-0.001001	0.000275	-3.642185	0.0003
SIZE	0.314207	0.039124	8.031065	0.0000
GROWTH	-0.001761	0.002195	-0.802299	0.4226
Durbin-Watson statistics		2.162392	Adjusted R-squared	
Prob(F-statistics)		0.000	0.176162	

According to the obtained results from the regression model. it can be seen that P-Value indicating the significance of total regression (prob(f-statistic)) is 0.000 and suggests that this model is significant in 95% confidence level. The adjusted coefficient of determination R^2 is 0.176162, indicating almost 18% of dependent variable changes can be described with independent variables. Since Durbin-Watson statistics is among between 1.5 to 2.5 (2.162392), there is lack of auto correlation between the variables. As it can be seen in table 5.1, the coefficient of investor sentiment is -0.407351 and significance number 0.0003. Regarding t-statistics and p-value, the results suggest the significance of this coefficient is in 5% error level. The findings show that there is a significant relationship between investor sentiment and investment in R&D expenditure of the listed companies in Tehran stock exchange.

5. Conclusion and recommendations

The obtained results show that the amount of probability statistics is less than 5%, therefore, H1 is confirmed and H0 is rejected with 95% probability. It can be concluded, therefore, there is a significant relationship between investor sentiment and investment in R&D expenditure of the listed companies in Tehran stock exchange. Regarding the obtained coefficient from investor sentiments has negative amount, it can be concluded that there is a negative and significant relationship between investor sentiments and investment in R&D expenditure of the listed companies in Tehran stock exchange. The results of first hypothesis is inconsistent with the researches of Chen et al, (2012) and Kang et al, (2011) and consistent with the investigations of Chen & Tswang (2009). Tehran stock exchange can issue more comperehsive information on investment in R&D expenditures for shareholders. It is better for financial analysist who active in capital market, investment consultants in stock exchange along with normal analyses and techniques should make special analyses based on investment condition about investment in R&D expenditure and its effective factors, and connect investors' sentiments and CEO duality with the relationship between investors' sentiments and accounting standards.

6. References

1. Aghion, P., Bloom, N., Griffith, R., Howitt, P., 2005. Competition and innovation: an inverted U relationship. Quarterly Journal of Economics 120, 701–728.

2. Al- Attar Ali and Simon Hussain (2004), "Corporate Data and Future Cash Flow", Journal of Business Finance and Accounting 31(7) & (8): 861-903.

3. Barth, M. E., D. Cram, and K. Nelson (2001)," Accruals and the Prediction of Future Cash Flows", The Accounting Review 76 (January): 27-58.

4. Becker, B., Hall, S.G., 2009. Foreign direct investment in R&D and exchange rate uncertainty. Open Economies Review 20 (2), 207–223.

5. Cheng C.S.A, Hollie D. (2007), "Do core and non-core cash flows from operations persist differentially in predicting future cash flows?", Rev Quant Finance Acc; pp. 29-53.

6. Clinch, G.; Sidhu, B. and Sin, S. (2000), "The Usefulness of Direct and Indirect Cash Flow Disclosures", Working Paper, University of New South Wales.

7. Dechow, Patricia M. and Ilia D. Dichev, 2002. The Quality of Accruals and Earnings:The Role of Accrual Estimation Errors. The Accounting Review 77 (Supplement): 35-59.

8. Dechow, Patricia M., S.P. Kothari, and Ross Watts (1998), "The Relation between Earnings and Cash Flows", Journal of Accounting and Economics 25:pp 133-168.

9. Emiliano,C & , S.(2007) Riccardo "Future Financial Distress and Ratios Informative Capability:Empirical Evidence from the Italian Food & Beveroge Industry."

10. Financial Accounting Standards Board (1978), "Objectives of Financial Reporting by Business Enterprises", Statement of Financial Accounting Concepts, No. 1, Stamford, CT: FASB.

11. Guellec, D., Van Pottelsberghe de la Potterie, B., 2003. The impact of public R&Dexpenditure on business R&D. Economics of Innovation and New Technology 12(3), 225–243, S.

12. Hollister J, Shoaf V, Tully G. (2008),"The Effect Of Accounting Regime Characteristics On The Prediction Of Future Cash Flows: An International Comparison", International Business & Economics Research Journal, Vol. 7, 5: pp.15-30.

13. Hall, B.H., 1990. The Impact of Corporate Restructuring on Industrial Research and Development. Brookings papers on economic activity: microeconomics, Washington,DC.

14. Pantagakis, E, Terzakis, D& Arvanitis, S.(2012). R&D investments and firm performance: an empirical investigation of the high technology sector (software and hardware) in E.U.available at www.ssrn.com

15. Tariqu Bhutta, N & AliShah, S. (2014). Investor's reaction to the implementation of corporate governance mechanisms. Journal of accounting. No 3, pp 3-8

16. Vo, D&Phan, T.(2013). Corporate governance and firm performance empirical evidence from Vietnam. Available at www.ssrn.com

17. Woo, H&Paik.Y. (2014). corporate governance in entrepreneurial firms: effects of corporate venture capital and founder incumbency on R&D investment strategy. Available at www.ssrn.com

18. Zhang, Q, Chen, L&Feng, T. (2014). Mediation or moderation? The role of R&D investment in the relationship between corporate governance and firm performance: empirical evidence from the Chinese IT industry. An international review.

19. Zhu, Z& Huang, F.(2012). The effect of R&D investment on firms' financial performance: evidence from the Chinese listed IT firms. School of accounting , Zhejiang gongshang university, pp 915-919

20. Zhu, Z, & Huang, W. (2015). Investor sentiment, chairman-CEO duality and R&D investment. Infrastructure and service integration.