

The impact of the percentage of institutional stockholders and the changes in net operating cash flows on the research and development expenditures: Tehran Stock Exchange

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Abstract: The aim of the present research is to study the impact of the percentage of institutional stockholders and the changes in net operating cash flows on the research and development expenditures. The research is a correlation type and it is applied, regarding the goal. 102 firms were selected from Tehran Stock Exchange and among the statistical population between the years 2008 and 2013. The data were tested by using a panel data method statistically. It has been predicted that the percentage of institutional stockholders affects research and development expenditures and the results have shown that there has been a direct and meaningful effect. On the other hand, it has been expenditures and our research results have approved it, too. Thus, regarding the results it can be suggested to the investors to consider factors such as the ratio of institutional stockholders and changes in net operating cashes along with using the figures presented by the firms and capital market when doing analysis to purchase stocks because the increase of these variables results in increasing the development and thus increasing firm value in long-term.

Key words: Research and development expenditures, Institutional stockholders; Net operating cashes; Corporate governance; Firm size

1. Introduction

Research and development (R and D) includes any organized and creative activity in order to increase knowledge level related to human beings, culture, society, and the use of this knowledge for new applications (Love and Roper, 2001). In other words, research and development is the process of transforming thoughts into new products and making the products more qualified (Belloce, 2012). These productions are related to profitability for the final consumer or related to production process technologies. The fundamental role of research and development is so tremendous in economic growth that it is called as an important variable in economics (Ghosh and et al., 2007). The importance of research and development is so much that firms are divided into two types of developed and not-developed ones based on the ratio of research budgets extracted from national gross income (Wu and Tu, 2007). Research and development expenditures are not only incentives for growth and economic development in a society, but also they increase a business unit's earnings (Kor, 2006).

Regarding the importance of R and D, it has been questioned that why some firms and organizations deal with such issues more than the others. Some believe that, the answer lies in financial limitations or the appropriateness of R and D with information

symmetry. The present information asymmetry results from the improvement of managers' information unlike those in board and the stockholders and they are able to exaggerate about any agency problem that usually results from long-term decision-making. If there is a strong information asymmetry among managers and investors in issues such as decision making in R and D expenditures, the investors tend to have a strong support that guarantees the good performance of a company. Thus, considering the financial adjustment theory, through which the investors pay attention to major ownership index, is important. On the other hand, a business unit may decide on short-term programs to assure the investors and this hurts long-term R and D projects and it requires a close control and involvement of the stockholders. Meanwhile, some others believe that financing is more trustable on the part of the institutional stockholders and results in guaranteeing liquidity and its outflow for the other stockholders. This discussion has been carried out in institutional working market, while on the one hand there is risk-ability and there would be control discussions and the concept of 'corporate governance' will realize. It has been argued that regarding agency theory, the increase of institutional ownership will result in increasing R and D because the investors are assured that managers do not have opportunistic behaviors. Since R and D has usually a long return period, it would be imagined along with lack of assurance conditions and high risk. Thus, the

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need for managers' predictions has always been thought of being accompanying controls. This is specifically true where managers are very interested or where earnings management is done. In the present research we have dealt with the effect of ownership on R and D, but corporate governance is somehow different. The concentration of investors is a sign of dealing with who is more appropriate to alter managers. Major ownership has made the achievement of this goal possible and similarly, considering institutional ownership can be considered correct to achieve this goal. Then, the probability of the effect of the net operating cashes' changes (financial limitation) on R and D will be investigated.

2. Research literature

2.1. Institutional stockholders and R and D expenditures

The presence of institutional stockholders is one of the most important criteria of corporate governance. Some scholars believe that the existence of major stockholders in a firm reinforces the incentives of controlling managers' performance on the one hand, and on the other hand, sometimes increases the controversies due to lack of benefits' convergence and the difference between goals of big stockholders and the expectations of minor stockholders, control costs and wants and benefits of major stockholders and the others. Charkham introduced two active institutional stockholders, 'a' and 'b', respectively. These two types of investment are placed at the two ends of the possible investment continuum. Type 'a' investment manager tends long-term performance and a portfolio limited to a few companies and type 'b' investment manager emphasizes on short-term performance and a relatively big portfolio. On the whole, there are two viewpoints regarding the role of institutional stockholders in corporate governance and its effect on R and D expenditures:

A) Short-term institutional stockholders and R and D expenditures: the performance assessment and performance ranking of institutional stockholders create some incentives to make short term decisions and short-term perspectives prevents institutional stockholders from supervision costs because it is improbable for them to get benefits from supervision in short term (Porter, 1992). Also Olper and Sokobin (1995) have stated that institutional stockholders are mainly focused on current incomes and avoid being involved in control issues and the acceptance of an active role in firm's corporate governance. Bushi (2001) concluded in his research that institutional stockholders highly tend to get short-term earnings. Titleman (1993) and Jacobs (1991) claimed that institutional stockholders exert pressures on firms' managers to get profit able short-term goals, although this may harm the value of equity in long-term. In fact, it can be observed that over-concentration on current earnings by this

group of institutional stockholders may result in a reduction in investment activities in R and D expenditures.

B) Long-term institutional stockholders and R and D expenditures: this intellectual school of thought states that when stock ownership is concentrated among a few numbers of institutional stockholders, the problems of isolation and control reduce. Barto and et al. (2000) stated that institutional ownership paves the way for control. They believed that institutional owners are professional investors with long-term concentration. Regarding the high volume of investment and the professional nature of institutional stockholders, their presence results in controlling management. This, instead of focusing on short term profitability, results in considering the maximization of firm value in long term. Monks and Mino (1995) and Dubrezinsky (1993) believe that the major ownership of institutional stockholders allows them to control firm managers' activities. This results in assuring managers to choose a level of investment whose achievement is the maximization of long-term firm value instead of short-term profitability goals. Regarding what was pointed out, this group of institutional stockholders have long-term perspectives and thus support R and D expenditures.

2.2. Cash flows and R and D expenditures

In knowledge based management, management should predict future cash flows of the company by having enough knowledge about firm's conditions and invest and finance based on these predictions to guarantee firm's future growth (Bond and et al., 2003). Changes in operating cash flows, as the source of cash for a business entity, has a tremendous effect on asset structure and capital such as held cash, investment, and external financing in a way that increasing firms' cash in short-time will lead to an increase in deposits and a reduction in external financing and in long-term the investment and external financing will increase. Also surplus cash investment in R and D expenditures can lead to enhance qualitative and quantitative development of firms (Casper, 2009). Surely liquidity management or the ability to increase cash and in time delivery of the commitments is the requirement for firm's survival. Thus, paying attention to management type based on increasing investment in R and D expenditures is important. Meanwhile, an appropriate liquidity management can reduce the probability of serious problems for the company; thus, liquidity management is one of the most important issues due to the corporate governance carried out by managers (Demiraj and Du, 2007). A number of experimental studies have proved that cash flow is a determinative factor in investment (such as investment in R and D expenditures) for firms with weak leadership standards or many agency problems. For example Love (2003) showed that a superior legal environment can comfort investment sensitivity to cash flows of the company.

Investment sensitivity to cash flows of the companies change due to the level of agency problems. There are many experimental evidences that emphasize manager-owner problem is not the most important controversy that firms suffer. For example Classens and et al. (2000) showed that the most important controversy is the controversy among major and minor stockholders. If external investors expect that controlling stockholders own firm's resources without any restriction, external financing expenditures will be greater and this increases the reliance of a firm on domestic cash and therefore investment sensitivity to cash flow will increase.

2.3. Research history

Vigland (2011) claimed that in America the expenditures carried out on R and D (instead of changing into capital) carried out based on SFAS no. has resulted in reducing information content and therefore it would be difficult for active entities in the market to realize intangible earnings not changed into capital.

Grabosky and Moller (2012) carried out a cross sectional study and showed that the entity's investment on R and D will lead to its profitability increase. Then, they used adjusted accounting earnings' rate in the model of a regression to show that entities have gained more returns as a result of severe researches by investing on R and D.

Drawer and et al. (2014) did a research on R and D expenditures, cash flows, and institutional investors in a sample of English companies during the years between 2000 and 2005 and investigated about R and D expenditures. They studied the effect of ownership and corporate governance on R and D expenditures based on panel data. Their research data prepared some evidences showing that corporate governance mostly is based on reducing activities related with R and D expenditures. The innovation in their research is studying agency behavior and interactional financial effects.

Asgari (2007) carried out a comparative analysis about R and D expenditures in Iran. This research focused on a research by Shrer (1965) dealing with manufacturing unit's size and R and D expenditures. According to results of this research, the government can create the required incentive to do R and D activities in manufacturing units by using tax rules.

3. Research methodology

3.1. Research method

The present research is correlation type regarding method and it is applied regarding goal. Also the present research is considered to be among descriptive accounting researches. Additionally, regarding that historical data has been used in testing the hypotheses, it can be categorized as quasi-experimental. Also the present study is

practical based, its inference is inferential and it is a field-library study by using historical information in a post-incident (using previous information).

3.2. Research hypotheses

In this research the effect of the percentage of institutional stockholders and changes in net operating cash flows on R and D expenditures have been investigated. Therefore, R and D expenditures have been considered as the dependent variable and the variables of the percentage of institutional stockholders and changes in net operating cash flows have been utilized as independent variables. Also some control variables (such as firm size and corporate governance) have been effective to identify the appropriate relationship between dependent and independent variables that have affected the relationship between independent and dependent variables. By thinking deeply on researches carried out till now, to find answers for the questions posed and to achieve research goal, the following hypotheses have been devised:

1. First hypothesis: the percentage of institutional stockholders affects R and D expenditures.
2. Second hypothesis: net changes of operating cash affect R and D expenditures.

3.3. Population and statistical sample of the research

The population for the present research was all firms enlisted in Tehran Stock Exchange including all categories of bourse (37 categories) and to identify our statistical sample, we have used a deletion method. In other words, those firms that have had the following conditions were selected as our statistical sample and the others were deleted. The conditions to select as a sample member were as follows:

- 1- To observe comparability, the end of fiscal year should have been at the end of Esfand (21st March) of each year.
- 2- During research period, they should not have stopped activity and should not have changed their fiscal year.
- 3- All information required about the firms should be accessible.
- 4- They should not be from among banks and financial entities (investing firms, financial intermediaries, holding, and leasing).

3.4. Time range and data resources

The time range for the present research was from the start of the year 1387 (22nd March 2008) until the end of the year 1392 (21st March 2013). The present study was a library based one and library resources were used through books, journals, articles, and dissertations, both local and foreign ones. The information and data required for investigation and test research hypotheses were

extracted from financial statements and reports presented to Stock Exchange and also Tadbirpardaz software and CDs of financial information of firms. And Excel, SPSS20, and Eviews7 software were used to do calculations and prepare the data and information needed and also to analyze them.

3.5. Variables and research model

$$\Delta RD_{i,t} = \beta_0 + \beta_1 INS_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 BRDSZE_{i,t} + \beta_4 DUAL_{i,t} + \beta_5 BRDIND_{i,t} + e_{i,t}$$

And to study about the effects of changes in net operating cash flows on research and development expenditures we have used a development of a regression model in which the changes in research

$$\Delta RD_{i,t} = \beta_0 + \beta_1 \Delta CF_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 BRDSZE_{i,t} + \beta_4 DUAL_{i,t} + \beta_5 BRDIND_{i,t} + e_{i,t}$$

Where,

$\Delta RD_{i,t}$: changes in research and development expenditures of firm i in the year t

$INS_{i,t}$: the percentage of institutional stockholders of firm i in the year t

$\Delta CF_{i,t}$: the changes in net operating cash flows of firm i in the year t

$SIZE_{i,t}$: the size of firm i in the year t

$BRDSZE_{i,t}$: board size of firm i in the year t

$DUAL_{i,t}$: the duality of CEO duties of firm i in the year t

$BRDIND_{i,t}$: board independence of firm i in the year t

3.5.1. The dependent variable

To calculate the variable research and development expenditures, we have followed the method used in a research by Belloce (2012) and the calculation method was as follows:

$$RD_{i,t} = \frac{\text{Research \& development expenditures}}{\text{size}}$$

$$\Delta RD_{i,t} = \frac{RD_{i,t} - RD_{i,t-1}}{RD_{i,t-1}}$$

To calculate the changes in research and development expenditures we calculated the difference of research and development expenditures of the current year and the previous year divided by research and development expenditures of the previous year and in fact the rate of its changes.

3.5.2. The independent variables

The percentage of institutional stockholders: to calculate the variable of the ratio of institutional stockholders, we have used a research by Pavit (2005) and its calculation was as follows:

$$INS_{i,t} = \frac{\text{The stock belonging to institutional stockholders}}{\text{The stock belonging to total stockholders}}$$

To study the effect of the percentage of institutional stockholders on research and development expenditures we have used a development of a regression model in which the changes in research and development expenditures was considered as a function of the percentage of institutional stockholders. The model is as follows:

Model 1:

and development expenditures was considered as a function of the changes in net operating cash flows:

Model 2:

The stock belonging to institutional stockholders in this research was the total firm stocks belonging to banks, insurance companies, financial institutions, holding companies, organizations, foundations, and governmental companies.

Net changes of operating cash flows: to calculate the variable of net changes of operating cash, we have a research by Mourn and et al (2010) and its calculation was as follows:

$$CF_{i,t} = \frac{\text{the net changes of operating cash flows}}{\text{the book value of total assets}}$$

To calculate the net changes of operating cash, we calculated the difference of cash flows of the current year and the previous year divided by cash flows of the previous year and in fact the rate of its changes.

$$\Delta CF_{i,t} = \frac{CF_{i,t} - CF_{i,t-1}}{CF_{i,t-1}}$$

3.5.3. Control variables

Firm size: to calculate the variable of firm size, we have used a research by Wu and Tidd (2007) and it was equal to natural logarithm of book value of total assets.

Corporate governance: corporate governance was calculated regarding 3 factors as follows:

- 1- Board size: it was equal to all members in board of directors.
- 2- Duality of CEO duties: if CEO was also the chairperson of board it was equal to 1, or else, it was supposed to be equal to 0.
- 3- Board independence: it was the ratio of members not in charge to all board members.

4. Findings' analysis

4.1. The statistics of descriptive data

The descriptive statistics of the research variables for 612 year-firms have been represented in Table 1.

Table 1: The descriptive statistics of the research variables in sample firms

Symbol	Mean	median	maximum	Minimum	Standard deviation
ΔRD	-0.010	0.040	10.460	-9.920	2.680
INS	0.764	0.824	1.000	0.045	0.224
ΔCF	0.409	-0.003	5.781	-4.525	3.144
SIZE	13.578	13.498	18.610	10.251	1.460
BRDSZE	5.094	5.000	7.000	4.000	0.458
BRDIND	0.612	0.600	1.000	0.200	0.211
DUAL	The number of firms including of:17			The number of firms not including of :595	

4.2. The test of data normality

To test the hypotheses above, we have used Kolmogorov-Smirnov's test and the results have been shown in Table 2. Regarding that the

dependent research variable (changes in R and D expenditures) has been normal we have used parametric statistical methods to test research hypotheses.

Table 2: The test of data normality

Symbol	Z statistic	Asymp(sig)
ΔRD	1.133	0.178
INS	4.171	0.000
ΔCF	5.499	0.000
SIZE	1.148	0.161
BRDSZE	13.101	0.000
BRDIND	6.165	0.000

4.3. The correlation between variables

To study the correlation between quantitative variables we have used Pearson's correlation

coefficient (due to normality of dependent variables) and the results have been represented in Table 3.

Table 3: Pearson's correlation coefficient matrix for quantitative variables of the research

Correlation	ΔRD	INS	ΔCF	SIZE	BRDSZE	BRDIND
Probability						
ΔRD	1.000000					

INS	0.286382	1.000000				
	0.0000	-----				
ΔCF	0.329413	0.102848	1.000000			
	0.0000	0.0109	-----			
SIZE	0.154365	0.135744	0.069038	1.000000		
	0.0001	0.0008	0.0879	-----		
BRDSZE	0.016848	0.056167	-0.039348	-0.043088	1.000000	
	0.6774	0.1652	0.3311	0.2872	-----	
BRDIND	0.119159	-0.023829	0.026798	0.015969	0.055925	1.000000
	0.0032	0.5563	0.5082	0.6934	0.1670	-----

According to Table 3 and the devised hypotheses, there has been a positive and meaningful relationship between R and D expenditures' changes and the percentage of institutional stockholders in an assurance level of %95. This relationship with a correlation coefficient of 0.286 has been calculated through Pearson's correlation coefficient and it shows that there has been a positive relationship between R and D expenditures' changes and the percentage of institutional stockholders amounting

to %28.6. Also there has been a positive and meaningful relationship between R and D expenditures' changes and net operating cash changes. This relationship with a correlation coefficient of 0.329 has been calculated through Pearson's correlation coefficient and it shows that there has been a positive relationship between R and D expenditures' changes and net operating cash changes amounting to %32.9.

4.4. Testing unique square root (consistency) of research variables

In the present research and to test the consistency, we have used adjusted Dikki Fuller test

(ADF). The results of this test have been represented in Table 4. Regarding the results shown in Table 4, all research variables have had consistency in an assurance level of %95.

Table 4: Testing unique square root (consistency) of research variables

Symbol	Number of interrupts	t statistic	Prob.
ΔRD	0	-28.188	0.000
INS	0	-25.638	0.000
ΔCF	0	-23.966	0.000
SIZE	0	-12.236	0.000
BRDSZE	0	-11.517	0.000
BRDIND	0	-27.293	0.000

4.5. Results of testing research hypotheses

Table5: Results of testing first hypothesis

Symbol	Coefficient	t-Statistic	Prob.
σ	-4.261	-3.173	0.001
INS	2.383	5.687	0.000
SIZE	0.116	1.984	0.044
BRDSZE	-0.058	-0.299	0.764
DUAL	-0.119	-0.187	0.851
BRDIND	1.425	3.465	0.000
R Squar		0.125	
Adjusted R Square		0.118	
Durbin-Watson		2.113	
F statistic	9.956	Prob. 0.000	
statistic Godfrey	1.004	Prob. 0.366	
statistic F-white	3.200	Prob. 0.000	
statistic H-hausman	19.153	Prob. 0.001	
statistic F-limer	8.576	Prob. 0.000	

Regarding the results of testing the first research hypothesis represented in Table 5, the meaningfulness level of F-Limer statistic (0.000) has been less than acceptable error level (%5), and to adjust the regression model we have used a panel data method. Also since the meaningfulness of Hausmann statistic (0.001) has been less than acceptable error level (%5), the regression method with fixed effects has had a priority over regression method with random effects. Also due to the fact that the meaningfulness level of F-White statistic has been 0.000, the regression has had a variance divergence. Thus, after the removal of variance divergence problem (by using adjusted least square method) the meaningfulness level of Godfrey statistic has been equal to 0.366 and therefore the regression did not have serial self-correlation problem. Then, regarding that F statistic (0.000) has had a meaningfulness level below %5, the regression has had identification power and since the meaningfulness level of the percentage of institutional stockholders (independent variable) has been below %5, it can be stated that the percentage of institutional stockholders has had a positive and meaningful effect on R and D expenditures. Durbin-Watson statistic was between 1.5 and 2.5. Thus, we can conclude that there has not been self-correlation problem. Finally the amount of

identification coefficient showed that %12.5 of changes in the dependent variable (R and D expenditures) could be explained by using other model variables.

Regarding the results of testing the second research hypothesis represented in Table 6, the meaningfulness level of F-Limer statistic (0.000) has been less than acceptable error level (%5), and to adjust the regression model we have used a panel data method. Also since the meaningfulness of Hausmann statistic (0.001) has been less than acceptable error level (%5), the regression method with fixed effects has had a priority over regression method with random effects. Also due to the fact that the meaningfulness level of F-White statistic has been 0.000, the regression has had a variance divergence. Thus, after the removal of variance divergence problem (by using adjusted least square method) the meaningfulness level of Godfrey statistic has been equal to 0.480 and therefore the regression did not have serial self-correlation problem. Then, regarding that F statistic (0.000) has had a meaningfulness level below %5, the regression has had identification power and since the meaningfulness level of the changes in net operating cash flows (independent variable) has been below %5, it can be stated that the changes in net operating

cash flows has had a positive and meaningful effect on R and D expenditures.

Table 6: Results of testing second hypothesis

Symbol	Coefficient	t-Statistic	Prob.
β_1	-2.835	-2.135	0.033
ΔCF	0.209	7.315	0.000
SIZE	0.133	2.128	0.033
BRDSZE	-0.040	-0.209	0.833
DUAL	-0.112	-0.178	0.858
BRDIND	1.477	3.602	0.000
R Squar		0.144	
Adjusted R Square		0.137	
Durbin-Watson		2.188	
F Statistic	14.196	Prob. 0.000	
Statistic Godfrey	0.734	Prob. 0.480	
Statistic F-white	2.961	Prob. 0.000	
Statistic H-hausman	19.074	Prob. 0.001	
Statistic F-limer	8.382	Prob. 0.000	

Durbin-Watson statistic was between 1.5 and 2.5. Thus, we can conclude that there has not been self-correlation problem. Finally the amount of identification coefficient showed that %14.4 of changes in the dependent variable (R and D expenditures) could be explained by using other model variables.

5. Conclusions

The goal of doing the present study was to determine the effect of the percentage of institutional stockholders and the changes in net operating cash flows on research and development expenditures. In addition to theoretical foundations mentioned above, the research findings have shown that the independent variables have had a positive and meaningful effect on the dependent variable. Regarding the results' analysis of the research, it can be stated that institutional stockholders consider long-term perspectives in their decision makings and try to reinforce their controlling roles. Thus, they support investing in research and development expenditures by having enough knowledge and consciousness. This result in increasing the earnings in long-term and thus owners' equity value is increased. In other words, regarding the viewpoint by Jensen (1986) about whether managers may use cash flows and utilize projects with current negative value (and thus inefficiency of investment) to increase their own profits, or regarding the efficient control viewpoint that states external control is a more efficient one on the firm and it can remove many of agency problems, the increase of the percentage of institutional stockholders affects the efficiency of investment positively and it results in increasing research and development expenditures. On the other hand, regarding a reverse perspective we can conclude that changes in operating cash flows as a resource for cash flows in a business unit has had a great effect on the structure of assets and capital such as held cashes, investment, and external financing in a way that increasing cash in companies in long-term leads to increase investment and

external financing, specifically increasing the percentage of institutional stockholders. This forms a suitable liquidity management and thus the amount of R and D expenditures enhances to achieve the intended qualitative and quantitative development.

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