The Influence of R&D Policy on Performance of the Companies Listed with Bucharest Stock Exchange (through Intangible Assets)

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Abstract. *In the new economy, R&D potential of the companies (reflected by intangible assets) tends to make the difference between competing enterprises. Although investing in tangible assets is still viewed as important, the researchers have discovered that investors on capital market tend to buy stocks of the high-tech companies promoting a policy of increasing R&D expenditures.*

The results of the present study on the Romanian economy reveals the correlation between the variation of intangible assets of the chemicals and pharmaceuticals companies (high-tech) and their performance – reflected by EPS and PER coefficients.

Key words: financial markets; investing policy of the firm; firm's assets evaluation; statistic and econometric methods: assessments, tests; simple linear regression.

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1. Defining performance

Measuring company's performance is considered to be a very attractive research area taking into account the results acquired by investing shareholders' or creditors' equity into companies assets.

Performance is viewed three different ways:

- first, it is given by return on invested capitals in firm's assets;
- secondly, it is a reflection of the risks undertaken by shareholders;
- thirdly, performance is given by the value of the whole business vs. the advantage/disadvantage of placing the capital in other market opportunities.

Recent international studies (Jensen, 2001, pp. 8-21) revealed that firm's management should proceed according to a basic criterion which stands for the major objective in finance: maximizing the value of the invested capital.

The above mentioned research concluded that companies that didn't succeed in adding value for their shareholders also failed in accomplishing the needs of the other stakeholders (Wallace, 2003, pp. 120-127).

In his paper published in 2001, Jensen states that a company maximizes its value provided that it takes into account the needs of all stakeholders (stakeholder theory). Therefore, reconciliation between shareholders and other stakeholders is required and companies' managers should adopt a more responsible behavior in order to increase the welfare of all stakeholders.

In relation to firm's performance a range of indexes have been promoted recently measuring the value created for shareholders (Stern, 1999, pp. 1-8). It's all about the value of capital the shareholders have invested, represented by the return they hope to gain, mandatory covering and exceeding the costs of other opportunities.

Researchers state that value exists when company rewards investors for their choice (also taking into account the supplementary risk) (Christopher, Ryals, 1999, pp. 1-10).

The same theory – the maximization of invested capitals – is developed by other researchers (Simms, 2001, pp. 34-35, Jensen, 2001, pp. 8-21).

They also have adopted the management of value and have considered that the main objective in finance should be represented by a measurement of the value created, as well as the economic value added EVA and cash flow return on investment – CFROI.

Economic value added (EVA) is given by the surplus value created by an investment of an investment portfolio: (return on capital minus cost of capital) multiplied to the capital invested.

Cash flow return on investment (CFROI) represents the internal rate of return (IRR) on an investment, meaning the discount rate making the future cash flows discounted back to the present, including the residual value, equal to the value of investment.

Romanian researchers reckon that net present value (NPV) is an adequate measurement of performance. Considering

company as an investment placed by firms' shareholders it can be asserted that it is performant provided that usage of assets leads to a maximum NPV (Stancu, 2006, pp. 8-12).

A recent research on a group of Romanian companies using financial and non-financial indexes has revealed that performance of national companies is rather reflected by the standard value of the financial indexes than their absolute value (Ciobanu, 2006, pp. 181-184). Building up an unitary system of management value based on indexes reflecting the enterprise performance in relation to the capital invested by the shareholders has proven to be difficult at this stage of research.

2. Creating value through R&D (intangible assets)

At world economy level, one of the most important changes in the past decades is represented by the replacement of equipment with intangible assets. R&D expenditures – viewed through intangible assets have grown quickly in the new knowledge economy. Intangible assets of a company include: development expenditure, claims, patents, licenses, trade marks and other similar values.

Many international studies have brought into light the liaisons between R&D expenditures and market performance of the companies. In the United States the researchers have discovered that capital market rewards companies investing in R&D (Chan, et al., 1992, pp. 59-66, Narayan et al., 2000, pp. 707-722).

Looking at the UK capital market, an assessment over the London Stock Exchange divided listed companies into three categories: (1) high-tech companies, (2) food manufacturers, building materials, textile, print, paper and packaging and (3) health care and conglomerates (Stern, 1999, pp. 3-14). While for companies in the first category an increase in R&D expenditures determines higher market price for their stocks, for the firms in the second and third categories increase in R&D expenditures apparently causes decrease of the market price.

The few studies carried out for the Romanian capital market reveal the need for continuous investigations on the influence of change in intangible assets/ R&D expenditures over companies' performance.

In the present research we've focused upon a group of representative companies listed with Bucharest Stock Exchange (BSE), from various operating areas. In order to asses their performance, we considered: annual average market price (AAMP), coefficients PER (price/earnings ratio) and EPS (earnings per share).

3. Assumptions of the model designed for BSE

With the intend of determining the existence/non-existence of the relationship between change in intangible assets and variation of AAMP, EPS and PER, we made usage of econometrics models and a soft of statistic analysis – E-views.

The assumptions of the model are as follows:

1) A sample of 18 companies listed at BSE. The inconvenience in selecting these companies was due to the fact that many of companies on BSE have been listed recently and they are inobservant of regulations of the Romanian National Securities Commission;

2) Time of analysis: 2005 – 2006;

3) Independent variable: variation of intangible assets (IA)/R&D expenditures (2006 opposite 2005);

4) Dependant variables (consecutively): variation of AAMP, EPS and PER.

A) The first phase of research included 18 companies from various operating areas listed with BSE.

Using linear regression it has been noticed that the values of the coefficients (R-squared) and (Adjusted R-squared) for each regression using change in IA - as independent variable and AAMP, EPS and PER – as dependant variables for the period 2005-2006 are 0.019897; 0.025829; 0.027864 and, respectively, -0.041359; -0.035057; -0.032894.

The values below 0.6 lead to the conclusion that the models haven't been well specified. Therefore, no correlation between variation of IN and change in AAMP, EPS and PER has been discovered in the case of the 18 companies listed with the BSE.

The same conclusions are reached by using the exponential, logarithm and power regression analysis.

B) Considering these results, at the second phase of research, the 18 companies were divided into:

- equipments sector (7 companies);
- materials (3 companies);
- chemicals and pharmaceuticals (5 companies);
- others (3 companies).

In the equipments and materials sector as well as in the others, the assessment using E-viwes has reveled that no significant correlation exists between the variation of IA and the subsequent change in AAMP, EPS and PER (2006 opposite 2005).

In the case of the sample consisting in chemicals and pharmaceuticals companies, the results obtained using the linear, exponential, logarithm and power analysis led to three linear regressions (the most significant):

$$AAMPi = 0.16332 + 0.657703 \times IAi$$

$$EPSi = -0.633761 + 0.9418 \times IAi$$

$$PERi = 2.079332 - 2.32856 \times IAi$$

where:

$AAMP_i$ = annual average market price;

IA_i = variation of intangible assets (R&D expenditures);

EPS_i = variation of EPS coefficient/ earnings per share;

PER_i = variation of PER coefficient/ price – earnings ratio;

i = 2006/2005.

In the case of chemicals and pharmaceuticals companies, the analysis hasn't reached any conclusion regarding the specification of the model.

The simple linear regressions regarding variation of PER, EPS and IN are plotted as follows:

Correlation between variation of IA (X) and variation of PER (Y)
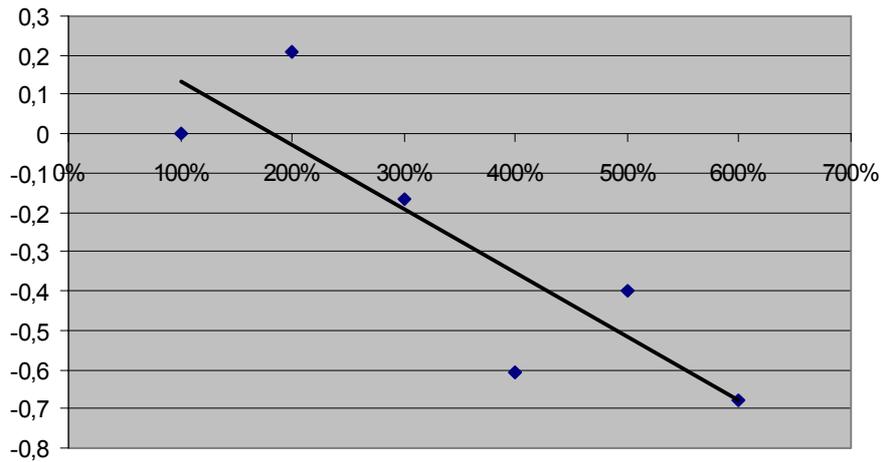
Correlation between variation of IA (X) and variation of EPS (Y)
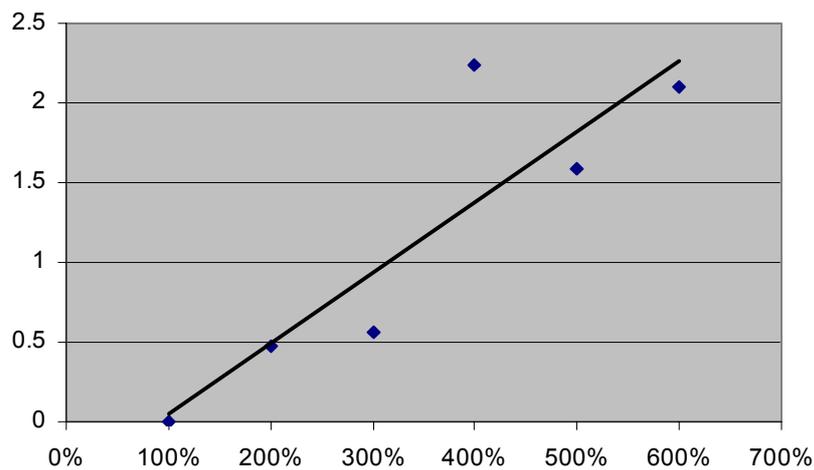
4. Econometric analysis for the linear regression between of EPS and PER and change of IA for the chemicals and pharmaceuticals companies

Using the least square method incorporated in E-views, we got the following results:

Dependent Variable: EPSI
Method: Least Squares
Date: 10/23/07   Time: 12:48
Sample: 1 5
Included observations: 5

Variable	Coef.	Std. Error	t-Statistic	Prob.
C	-0.633761	0.090537	-7.000038	0.0060
INI	0.941800	0.198271	4.750057	0.0177
R-squared	0.882643	Mean dependent var		-0.329398
Adjusted R-squared	0.843524	S.D. dependent var		0.361566
S.E. of regression	0.143025	Akaike info criterion		-0.762421
Sum squared resid	0.061368	Schwarz criterion		-0.918646
Log likelihood	3.906052	F-statistic		22.56304
Durbin-Watson stat	1.639220	Prob(F-statistic)		0.017705

Dependent Variable: PERI
Method: Least Squares
Date: 10/23/07   Time: 12:48
Sample: 1 5
Included observations: 5

Variable	Coef.	Std. Error	t-Statistic	Prob.
C	2.079332	0.238098	8.733080	0.0032
INI	-2.132856	0.521424	-4.090443	0.0264
R-squared	0.847961	Mean dependent var		1.390054
Adjusted R-squared	0.797281	S.D. dependent var		0.835403
S.E. of regression	0.376135	Akaike info criterion		1.171435
Sum squared resid	0.424432	Schwarz criterion		1.015210
Log likelihood	-0.928588	F-statistic		16.73172
Durbin-Watson stat	1.753233	Prob(F-statistic)		0.026412

a) R – squared and *Adjusted R – squared* are 0.882643 and 0.843524 for the first regression and 0.847961 and 0.797281 for the second regression. Those values are above limit of 0.6 and therefore we tend to state that the models are adequate. Yet the values aren't too adjacent to 1 and for a better specification of the models we need to include more observations in the analysis. At the time of research this couldn't be performed as BSE has been established recently (1995) and the listed companies sheet has changed a lot since then.

b) t-statistic and the related probability
Using *t-Student* test for each coefficient of the models it came out that the probability is of no great size (0.0060 and 0.0177 for the first regression) and 0.0032 and 0.0032 for the second regression) which led to the rejection of the hypothesis regarding the zero value of the coefficients of the models. Their values are -0.633761 and 2.079332 (for the intercept – for the first and, respectively, second regression – and 0.941800 and -2.132856 for the slope for the first and, respectively, second regression).

c) F-statistic and Prob (F-statistic) provide essential information regarding the validation of the models as a whole. Important pieces of information are acquired related to *F-statistic* and the error of rejecting the models.

The validation rule for *F-statistic* and *Prob (F-statistic)* led to the conclusion of accepting the models.

5. Economic analysis of the two regressions

In the past decades growth, development and survival of the enterprises as well as human welfare are increasingly depending on technology an innovation. Investments in R&D, including human capital, are the prime sources of innovation, leading to progress.

The results of the studies on BSE stress the selectiveness of the stock exchange when it comes to R&D.

Using regression analysis for the sample of the 18 companies, no significant correlation between the variation of AAMP, EPS and PER (reflecting the companies' performance) and the change in IA (representing R&D policy of the companies) was discovered.

Taking the assessment to a deeper level, in the second phase the 18 companies were divided into operating areas/sectors.

The econometric tests have revealed that there is no significant correlation between the variables of the models.

For the chemicals and pharmaceuticals companies, the results of the investigation suggest that R&D led to a profit and market prestige (reflected also by increase of the market price).

6. Conclusions and recommendations

By carrying out this study, we've tried to answer some questions related to the way the variation of IA (reflected by R&D) in the case of companies listed with BSE influences companies' performance.

The conclusions haven't put things straight when it came to the Romanian capital market.

Nevertheless, for some operating areas – such as chemicals and pharmaceuticals, considered high-tech industries, the analysis on a two-year horizon identified the relation between the variation of IA and the subsequent change in EPS and PER – integrated in two linear regressions.

It can be asserted that the Romanian capital market tends to grow towards the market with semi-strong efficiency judging by the way the investors that bought stocks of the companies investing in R&D benefit from an increase of the earnings per share.

On the other hand, it's worth of note that an increase in IA for these companies led to a decrease of ratio price-earning. This is reflected by PER coefficient.

We can make use of these results when it comes to estimating the future evolution for a range of economic indexes – essential both to companies' managers as well as to investors.

The importance of the scientific results according to the real economic perspective is given by the fact that Romanian capital market is still developing and the need for information is sustained by the few national researches in this area, far from answering the questions related to the determination and validation of the companies' performance.

In future, we need to improve the analysis by including more observations for a better specification of the models.

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