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The Interpretative Ability of Coefficient R^2 to Calculate the Firm Value

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Abstract

Several studies have focused on the relationship between the R^2 and the firm value. They have tried to explain how different values of R^2 affect the firm value. In this paper we examine this relationship for the Greek companies listed on the Greek Stock Exchange, analyzing a sample of 135 listed companies for the 2004-2010 period. The results reveal that R^2 is inversely related to the firm value. This is consistent with the model of Dow and Gorton (1997). Moreover, we found that companies with high R^2 have significantly higher returns than those with low R^2, over a two year period time, which is inconsistent with the findings of Stowe and Xing (2011). Moreover, this research shows that the investment decisions are likely to be based more on investor psychology rather than an analysis of firm-specific information.

JEL Classification: G11, G12, G14.

Keywords: R^2; firm value; Tobin's Q; long run performance.

1. Introduction

The coefficient of determination R^2 (also known as stock price synchronicity), which is derived from market model, has been several researchers' subject of studies (Dow and Gorton (1997), Stowe and Xing (2011), Chan et al. (2008), Chen et al. (2007)). A large number of these researches focused on the interpretation of causes of the presence of different R^2 in businesses and markets. Recently, however, researchers have directed their attention to the consequences derived by the existence of different R^2 in the firm value.

The aim of this study is to investigate the explanatory capacity of the coefficient R^2 concerning the value of Greek firms listed on the Athens Stock Exchange. For this reason, a suitable database of Greek firms was created and the methodology of the study of Stowe and Xing (2011) was followed. In this way, we were able to draw useful conclusions for both the Greek businesses and the Greek financial system.

There are two main prevailing theories concerning the R^2 and the firm value. According to the first theory (Dow and Gorton, 1997), R^2 is negatively related to firm value. And moreover, the shares of companies with a high R^2 do not contain enough firm- specific information. In contrast, the second theory (Chan et al. 2008) argues that R^2 is positively related to the firm value and therefore the shares of companies with high R^2 are closely linked to the market and, in many cases, overpriced.

The purpose of this paper is to explore the interpretive ability of R^2 on firm value. In order to achieve this, a sample of 135 companies listed on the ASE was used, for the 2004-2010 period. Accounting data are extracted from the Thomson Reuters database and stock data are drawn from the online platform 4trade were utilized. Furthermore Tobin's Q and the industry adjusted Q were recruited as a means of firm valuation.

The findings of the study are in agreement with the model developed by Dow and Gorton (1997) according to which the coefficient R^2 is inversely related to the firm value. As far as the empirical findings of Stowe and Xing (2011) are concerned, there is a significant difference in the main outcome about R^2. More specifically, Stowe and Xing used a sample of 90,111 U.S.A firm-year observations from 1970 to 2004 and they concluded that there is a positive relation between R^2 and the firm value. Furthermore, in long- term, it was observed that companies with high R^2 have lower returns, higher profits and higher stock turnover than companies with low R^2.

From our empirical findings, it became clear that R^2 is significantly and negatively related to the value of the business, and that there is no causality between the two. The long-term portfolio performance of companies with different R^2 was examined leading to the conclusion that companies with high R^2 have significantly higher returns over two years than companies with low R^2. In order to assess whether the difference in companies returns is affected by their management investment decisions, the long-term profitability (ROA) and the long-term liquidity were analyzed. It was found that companies with high R^2 have lower profitability and less liquidity than companies with low R^2 in two years period.

1.1 The statistic R^2

Every regression of this type $Y_i = b_0 + b_i X_i + \varepsilon_i$ was estimated in order to find a possible cause and effect relationship between two or more variables. But whether we can trust the results derived from the regression (ie, what is the predictive ability of the equation), depends on the coefficient of determination, which shows the percentage of the total variance of Y (dependent variable) which is due to the effects of X (independent variable). R^2 is given by the following relationship:

$$R^2 = \frac{SSR}{SST} = 1 - \frac{SSE}{SST} \tag{1}$$

where, $SSE = \Sigma Y^2 - b_0 \Sigma Y - b_1 \Sigma YX$,

$SSR = \Sigma(Y_i - \overline{Y})^2$ and $SST = \Sigma(Y_i - \overline{Y})^2$ =SSR+SSE

R^2 is a positive number which takes values from 0 to 1.

In the regression which links stock returns to market returns, when there is a high value of R^2 the share of the company is closely related to the market and that minimum corporate information is reflected in the price. Conversely, when it is low, the stock price is formed according to the information associated with the company.

1.2 The relationship of R^2 and firm value

Two main theories connecting the company's value to the coefficient R^2 have been developed.

According to the first theory, the lines of which we follow in this research, the R^2 is connected in a negative relation with the firm value. Previous studies (Dow and Gorton, 1997) have demonstrated that managers of companies who make investment decisions, base their decisions on stock market price of the company. This behavior is attributed to the fact that in a capitalist system characterized by regular function and efficient allocation of investment funds, stock prices are considered good value indicators. Stock prices, therefore, reflect both enterprise information (which administration already knows) and market information which is unknown to managers and is incorporated into the current levels of stock price, for instance stock market traders may have important information that managers do not have about the value of prospective investment opportunities. Hence, prices offer a two-way flow of information. Furthermore, the investors' opinion, formed according to the previous choices of the administration, is incorporated in the stock price. The view that investment management decisions are influenced by the stock price can actually be backed up by studies which observed across the board that corporate investment rates increase when there is an increase in the share price. Nevertheless, in many cases, stock prices do not contain the necessary information. In companies where R^2 is high, the information related to the stock price is minimal (Chen et al. 2007) leading the management to incorrect investment choices, which could eventually result in a reduction in liquidity. Decisions of this kind relate to the agency problem. The management makes these wrong investment decisions either due to ignorance (adverse selection) or with a view to preserving their own interests (moral hazard) instead of acting based on the shareholders interests (Jensen and Meckling, 1973). In businesses where these behaviors are observed and the investments are not effective, investors achieve low long-term returns, due the reduction of liquidity brought about by the administrative decisions (always referring to a capital market which assesses asset value rationally).

According to the second theory, as presented in the article by Stowe and Xing (2010), there is a positive relation between R^2 and firm value (Chan et al. 2008). In addition, it is argued that R^2 reflects the quantitative range of market information related to corporate information. When R^2 is high, and therefore the stock has a high correlation with the market, the market makers can base their decisions on information related to the purchase, so that the adaptability of prices is not directly related to the instruction stream. Moreover, a high R^2 decreases the risk of adverse selection faced by market makers when dealing with knowledgeable investors and this may lead to a widening gap in the market or the liquidity of the shares. It is also likely that high returns presented in companies with high R^2 could be due to underestimation of investors for the company. Companies with high R^2 closely follow the market, so in many cases investors base their decisions on information related to the market and not on corporate information. Therefore, the corporate information of these companies will be evaluated on a less regular basis. According to the theory of myopic loose aversion, companies that are evaluated less frequently are more likely to be regarded as more attractive, because the circumstances under which they perform poorly are negligible.Based on the foregoing, it is clear that companies with high R^2 tend to be overvalued as a result of risk aversion and reduced interest in corporate information.

2. Empirical research

2.1 Data

Both stock and accounting data has been used for the research. The accounting data has been extracted from the Thomson Reuters database, while the stock data from the online platform 4trader and have been processed with the help of Metastock. The period that was used for the analysis is 2004 - 2010. This period was chosen based on the fact that in 2004 Greek companies began using international accounting standards. Consequently, data that has been drawn from their balance sheets is considered more reliable.

In addition, the companies that have been chosen had to be listed on the Athens Stock Exchange before 1/1/2002 and continuously traded up to 31/12/2010. Moreover, the accounting data of the sample companies had to be in the aforementioned basis for the corresponding time period. Furthermore, because of the test at industry level the companies chosen should belong to an industry with at least two companies. Financial institutions have not been part of the sample because their balance sheets are different from other companies'.

The original sample consisted of 255 company shares. However, the final sample used in the analysis consists of 135. The difference lies in the fact that only these 135 companies met all the above criteria necessary for inclusion in the analysis.

Finally, the analysis of our data has been done using excel and the econometric package of e-views (Siriopoulos and Philippas , 2010).

2.2 Variables

Tobins' Q has been used as the main measure of firm value (Lang and Stulz, 1994). The advantage of Tobins' Q is that it manages to integrate the effects of factors directly related to the value into the capital value and in addition it includes risk regulation. Alternatively, another measure of firm performance is the share's returns. However, this measure has two main weaknesses. The first is that it is difficult to choose the benchmark for performance, and the second is that it is not clear how to interpret possible bad returns. This is why a large number of researchers choose the Tobins' Q to test the impact of corporate information and options on the firm value.

The Tobins' Q is defined as the ratio of market value of assets to book value of assets.

$$\text{Tobin'sQ} = \frac{MV}{BV} \qquad (2)$$

The market value of assets (MV) is calculated by multiplying the number of shares outstanding on 31/12 and the closing price on 31/12.

The book value of assets (BV) is in the balance sheet and equals total shareholders' equity.

It was considered appropriate to test and evaluate possible differences of the firm value in industries. For this purpose, the industry adjusted Q was used as a measure of corporate value and was determined by the following procedure. Initially, Tobins' Q for each company has been calculated for each year (in the way that we have already analyzed). Then, the industry Q of each company is calculated for each year as the median annual Tobins' Q. Finally, annual industry adjusted Q is given by the difference of firm Tobins' Q and industry Q.

To calculate the coefficient of determination (R^2) for each year and for each firm the following equation is used:

$$R_{i,t} = \alpha + \beta R_{m,t} + \gamma R_{l,t} + e_{i,t} \tag{3}$$

where R_i is the monthly returns of company i at year t,
R_m is the monthly market returns in the year t,
$R_{l,t}$ is the monthly returns of the industry in the year t.

Monthly returns were used in order to avoid the influence of the daily variation in supply and demand (a problem that would have occurred if daily returns had been used for the analysis).

The above is a regression model for valuing assets. It is known from references (Stowe and Xing, 2011) that the performance of each business reflects both corporate information and information related to the market and industry. The industry and the market information is also reflected in the performance of the sector and the market respectively, so the coefficient of determination of regression gives us information about whether the corporate performance can be influenced by market and industry returns. The higher the R^2, the more market and industry information is reflected in the stock price (the more closely linked is the value of ownership of the company to market and industry), and correspondingly, less corporate information is reflected in the price.

The R^2 coefficient takes values from 0 to 1. In order to avoid this limitation and allow coefficient of determination to take values both <0 and> 1, we define R^2 by the following relationship which has been used in many studies (see Piotroski and Roulstone, 2004). This log transformation creates an unbounded continuous variable out of a variable originally bounded by 0 and 1, yielding a dependent variable with a more normal distribution.

$$R^2 = \text{Log}\ \left(\frac{R^2}{1 - R^2}\right) \tag{4}$$

Moreover, control variables have been included in the analysis which according to the references are related to the company's value and can be drawn from the accounting data of each company. These variables are:

$$ROA = \frac{EBTDA}{S} \tag{5}$$

where ROA is the annual profitability, EBTDA is annual earnings before interest, tax, depreciation and S is total sales.

$$\text{Firm size} = \log\ (\text{Total assets}) \tag{6}$$

$$\text{Leverage} = \frac{\text{long term dept}}{\text{total assets}} \tag{7}$$

$$\frac{D}{BV} \tag{8}$$

where D is the annual dividend and BV is the book value of equity[1]

$$\frac{\text{Cap. Exp.}}{S} \tag{9}$$

where Cap. Exp is the capital expenditure and S the total sales

Log (firm age), where the age of the firm is the difference between the year of study and the year in which the company was listed on the ASE, incrementing the result of this operation in 1[2]. Eg studied the year 2005 for the company X which began trading in the stock market in 1990, hence log (firm age) = (2005 - 1990) + 1.

2.3 Methodology and Results

Initially the daily returns for each stock and for the general index from 2002 to 2010 were calculated using the following equation:

$$r_{\text{it daily}} = \ln\left(\frac{\text{daily price close}_t}{\text{daily price close}_{t-1}}\right) \tag{10}$$

Then, the monthly returns were calculated based on daily returns as their average.

Then, the industry monthly returns were calculated as the average of monthly returns of companies that constitute the industry.

To calculate the R^2 of each firm we used the equation 3 and 4.

For every firm, the ratio 3 has been used for each year. For the results of each year, we carried out regression of returns (company, market and industry) of the previous 28 months. For example, for the 2004 results, returns of 2002 and 2003 were regressed, for 2005, returns of 2003 and 2004 were regressed etc. The above procedure was followed for each year from 2004 to 2010 for each of the 135 firm sample.

Then, using the R^2 which was given as a result of the above regressions, the new R^2 for each year was estimated using equation 4.

2.3.1 Building a cross sectional model

After having calculated the R^2 with the procedure described in the preceding paragraph as well as the Tobin's Q and the accounting data using the procedure described in the section variables, the following multivariate model was constructed using cross- sectional:

[1] Dividends were used to control the dividend policy followed by their managers which is a means of mitigating the problems that arise between management and shareholders

[2] The variables cap exp / s and log (firm age) were used to test the opportunities that the company can have and that are directly linked to the company value.

$$\text{Firm value} = \alpha_0 + a_1 \times R^2 + \beta_i \text{Control variables} + \beta_j \text{Industry dummy variables} + \varepsilon \quad (11)$$

where the dependent variable is defined as the firm value for which, as already mentioned, we used Tobin's Q or the industry adjusted Q. R^2 has already been calculated using equation 4. The control variables consist of the accounting data, namely: profitability, firm size, leverage, the ratio of dividends to the book value, the logarithm of l time series data the company age and the ratio of capital expenditures to total sales. Furthermore, the industry dummy variable was included in the regression[3]

2.3.2 Testing the relation between R^2 and firm value

To test the relationship between R^2 and the firm value, the Fama – Macbeth method was used (Fama and Macbeth, 1973). So, for each year from 2004 to 2010, a cross - sectional regression of the firm's value in R^2 was carried out based on equation 11. Both were checked using the Tobin's Q and the industry adjusted Q.

Following the results of the cross-section regressions, the average estimators of time series were calculated and their statistical significance was tested using t-student.

In the next two tables, the averages of the time series and their significance level are presented. Table 1 shows the results when Tobin's Q was used as a dependent variable, whereas in Table 2 the industry adjusted Q was used as a dependent variable.

Table 1
Results of the regression firm value in R^2
(Tobin's Q is determined as firm value)

Tobin's Q		t	a= 0.05	a= 0.1
R –SQUARE	-0.44892	-1.831661322	***	
PROFITABILITY	-0.22399757	-2.959630422	***	
LOG(TOTAL ASSETS)	-0.609232	-1.11821569		
LEVERAGE	2.626519	1.954142971	***	
D/BE	16.221977	6.034145	***	
LOG(FIRM AGE)	-0.07904543	-0.28635		
CAP/S	0.19580571	0.485289		

Table 2
Results of regression of the firm value in R^2
(Industry adjusted Q is determined as firm value)

Tobin's Q		t	a= 0.05	a= 0.1
R –SQUARE	-0.2943496	-1.399531709		**
PROFITABILITY	-0.14210285	-1.360057284		**
LOG(TOTAL ASSETS)	-0.593746	-1.1283467		
LEVERAGE	1.47748757	1.10071502		
D/BE	3.99945543	1.580953		**
LOG(FIRM AGE)	-0.1776493	-0.67167		
CAP/S	0.185342429	0.817894		

[3] The number of dummy variables in a function should not exceed the number of variables for the model to be run and for the results to be reliable (Siriopoulos and Philippas , 2010)

From Tables 1 and 2, a statistically significant negative relation between R^2 and the firm's value emerges (whether Tobin's Q or the Industry adjusted Q is defined as firm value). This result is consistent with the first theory (Dow and Gorton, 1997), which prevailed for that relation. Therefore, it appears that Greek managers base their investment decisions in stock prices, regardless of whether the price is fictitious or in connection with the fundamentals of the business. Specifically, for companies with high R^2, stock prices contain minimum firm information, which probably lead to wrong investment decisions. Because of these wrong decisions, the company will be presenting a long term decline in cash flow, and this is expected to lead investors to predict lower returns for these companies, in a capital market which assesses asset value rationally.

It was considered important to check whether there is a causal relation and what its direction is, between R^2 and the firm value. To this end, we used the Granger method (Siriopoulos and Philippas, 2010). The causality was tested with lagged of 1 and 2 years for Tobin's Q and industry adjusted Q. For asserting that there is a causal relation, the F statistic should have a rate higher than 6.64834571 for one year lag and higher than 6.648360 for 2 years lag, for v1 = 2 and v2 = 130 d.f. However, in none of the cases was a causal relation between R^2 and the firm value found.

Compared to the empirical findings of Stowe and Xing (2011) our results are opposite to the sign of the relation between the R^2 and firm value, but also as to the causal relation between them.

2.3.3 Testing of long term firm returns

In order to test the difference in firm returns with different R^2, the methodology (Stowe and Xing, 2011) described below was followed.

Initially, for each year from 2004 to 2010 companies were registered according to R^2 and the classification was from the largest to the smallest R^2. Then, for each year, two portfolios were created, the first one containing 25% of companies with the highest R^2 and the second one consisting of 25% of companies with the lowest (each portfolio consists of 34 companies). Then, a working hypothesis was formed, in which portfolios are bought and held for two years. The companies of each portfolio are purchased on the opening price 1/1 of year t and sold at the closing price on 31/12 of year t +2. Subsequently, the returns of each company in the portfolio were calculated using the following equation:

$$\frac{(P_{t+2} - P_t) + d_1 + d_2}{P_t} \tag{12}$$

where P_t is the market price at time t, P_{t+2} is the price at time t +2, d_1 is the dividend per share in the first year and d_2 is the dividend per share in the second year.

Then, the performance of each portfolio was assessed as an average of the firm returns of companies that were included in the portfolio. Moreover, the statistical significance of the difference of portfolios was tested for each year using the control t-student. Table 3 below shows the portfolio returns for each year and the results of statistical testing.

Table 3
Long term returns of portfolios with high and low R^2

Two-years average return						
Year	**TOP 25% firm with highest R^2**	**Bottom 25% firms with lowest R^2**	**Difference**	**t**	**a=0.05**	**a=0.1**
2004	0.127633	-0.20811	0.335742	1.533916		**
2005	0.948281	0.561616	0.386665	1.412462		**
2006	0.828851	0.433732	0.395119	1.298208		**
2007	-0.48272	-0.40643	-0.0763	-0.76049		
2008	-0.55431	-0.5159	-0.03841	-0.52563		
2009	-0.2088	-0.24931	0.040511	0.389176		

As it is evident from Table 3 in years 2004,2005 and 2006, the returns of a portfolio with a high R^2 are higher than the returns of a portfolio with low R^2 and their difference is statistically significant at a a=10%. In contrast, in years 2007, 2008 and 2009, the returns of portfolio with a high R^2 are lower than the returns of portfolio with low R^2, but in this case, there is no statistically significant difference at any level of significance. Therefore, as a general observation it is concluded that companies with higher R^2 have higher returns than firms with low R^2 in a two - year window. This result contradicts with the findings of Stowe and Xing 2011 and Dow and Gorton 1997 concerning the R^2 and the firm value and also the rational valuation of assets.

2.3.4 Testing of long-term firm profitability

Investment decisions taken by the management of each company significantly affect the way that the shareholders and the market evaluate an enterprise. Therefore, a company with low investment returns, will present in the long-term low operating performance and thus lower equity returns. On this basis, it is considered appropriate to test whether long-term variations of firm returns are due to investment decisions taken in the past by each company. For this purpose, ROA of firms is tested.

As already mentioned in the previous section, two portfolios have been created for each year. These portfolios are purchased in the year t and sold in the year t+2. To calculate the profitability of each portfolio, the average ROA for each firm was initially calculated as the average earnings in the year t and earnings in the year t+2. Then, the average of the average ROA of firms contained in each portfolio was defined as ROA of the portfolio. In order to test the statistical significance of the results, t-student (two control means) was used. Table 4 below demonstrates the ROA for each portfolio each year and the results of statistical control.

Table 4
Long-term average profitability

Two-years average ROA						
Year	**TOP 25% firm with highest R^2**	**Bottom 25% firms with the lowest R^2**	**Difference**	**t**	**a=0.05**	**a=0.1**
2004	0.139	0.046	0.093	0.794542		
2005	0.123	0.171	-0.047	-0.22257		
2006	0.146	0.294	-0.147	-0.99599		
2007	0.080	0.100	-0.020	-0.06527		
2008	0.109	0.225	-0.116	-0.62779		
2009	0.007	0.023	-0.015	-0.25191		

As shown in Table 4, by controlling the long-term business profitability (ROA) it was observed that companies with high R^2 have lower profitability than companies with low R^2 in a two - year window. However, this difference is not statistically significant in any year. Therefore, conclusions about the long-term performance of companies with different R^2 which rely solely on profitability could not be considered reliable. However, other studies have shown that a high R^2 binds with high profitability (Stowe and Xing, 2011).

2.3.5 Testing of long-term corporate liquidity

As mentioned in the previous section, it is not possible to have a clear picture of the observed difference in firm returns with different R^2 using only profitability as a measure of explaining different outcomes. For this reason, it was examined whether the difference between firms with high and low R^2 is due to the company's stock turnover[4]. Initially, daily stock turnover for each company was calculated using the following (Amihud , 2002):

$$\text{Stock turnover} = \frac{|\text{Daily Return}|}{\text{Volume}} \tag{13}$$

Then, for each firm and each year from 2004 to 2010 the annual stock turnover was estimated as the average of the daily stock turnover. Then, the long-term stock turnover of each firm was calculated as the average stock turnover of year t and the stock turnover of year t +2. Finally, the average stock turnover for each portfolio was found with the use of the average of long-term stock turnover of the firm portfolio. In order to test the statistical significance of the results, the control t-student (two control means) was used. Table 5 below shows the average stock turnover of each portfolio for each year and the results of statistical control.

[4] The stock turnover is directly related to liquidity. Low turnover means less liquidity in the future (Amihud, 2002)

Table 5
Long-term stock turnover

Two-years average Turnover						
Year	**TOP 25% firm with highest R^2**	**Bottom 25% firms with the lowest R^2**	**Difference**	**t**	**a=0.05**	**a=0.1**
2004	0.0000071	0.0000137	-0.0000067	-1.5839		**
2005	0.0000091758	0.0000326315	-0.0000234	-2.7532	***	
2006	0.0000071879	0.0000674740	-0.0000602	-2.29486	***	
2007	0.0000175759	0.0002379226	-0.0002203	-2.64726	***	
2008	0.0000659714	0.0003605112	-0.00029	-2.58569	***	
2009	0.0001440676	0.0004879079	-0.0003438	-3.07137	***	

From the results presented in Table 5 it can be seen that companies with high R^2 have slightly lower stock turnover and liquidity in a two- year window than companies with low R^2. And the difference is statistically significant in all years. Therefore, the reduced liquidity observed in businesses with high R^2 in the long run, would have led the market to assume low long-term returns.

Our result contrasts with that of Stowe and Xing (2011), but agrees with that of Dow and Gorton (1997), which means that the trading volume of the shares is limited.

3. Conclusions

Our study demonstrated that R^2 is connected to the firm value in a negative relationship which is statistically significant. This result is associated with results of Dow and Gorton (1997) that were developed for the specific relationship. Therefore, managers of Greek companies will base their investment decisions in stock market prices of the company. Particularly, stock prices of companies with high R^2 contain minimum corporate information, which will probably lead to wrong investment decisions. Because of these decisions the company will be presenting long term decline in cash flow, and this is expected to lead investors to assume lower returns in a market where the valuation of assets is done rationally.

With the causality test which was used to determine the relation and direction of causality that may exist between R^2 and the firm value, it became clear that in none of the cases that was tested, was any causal relation found between R^2 and the firm's value .

Moreover, the test conducted for the long-term performance of firms suggests that companies with higher R^2 have higher returns in a two-year window than firms with low R^2. This conclusion contrasts with the results of the relationship between R^2 and the firm value, and also the rational valuation of capital assets.

The test conducted for the long-term firms profitability (ROA) suggests that companies with high R^2 have lower profitability than companies with low R^2, in a two - year window. The difference, however, is not significant. Therefore, drawing conclusions based solely on profitability would be wrong.

Moreover, because profitability cannot provide valid results on which a conclusion concerning corporate returns could be based, the long term liquidity test was also used. As can be seen from the results presented in Table 5 companies with high R^2 have a slightly lower stock turnover and therefore liquidity in a two - year window than companies with low R^2. This difference is statistically significant in all years. Therefore, the reduced liquidity observed for businesses with high R^2 in the long term should have led the market to give them low long term returns. But this is not the case in the Athens Stock Exchange.

Finally, a general conclusion from this research on the function of the Greek market, could be the fact that if the Greek Stock Market had functioned rationally low long-term returns for companies with high R^2 should had been observed (due to the negative relation between R^2 and firm value). However, the results are opposite, namely the investors predict high returns for companies with high R^2. This leads to the conclusion that in the Greek Stock Exchange capital assets were not priced rationally. Investment decisions were based more on investor psychology rather than on the analysis of information (both shareholders and that of the market), and as a result the market functioned less efficiently.

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