Comparative study of the evolution of stock returns for listed Romanian companies which received non-repayable structural and cohesion European funds

Iulian Panait[1]
George-Daniel Stoian[2]

Our paper investigates the particularities of the evolution of stock returns for the Romanian listed companies that were beneficiaries of non-repayable structural and cohesion European funds during Jan.2010 – Mar.2012. We use data mining techniques to analyze daily prices for 18 such companies and compare their characteristics with those of another 20 listed companies that didn't receive such free financial resources for investments and development. We take into account the distribution form, mean, variance, skewness, kurtosis and we also compute the rolling window beta coefficient for all the studied companies. We simulate multiple theoretical portfolios with different combinations of companies which benefited and which didn't benefited of the non-repayable European funds to see how the Markowitz efficient frontier behaves. The only significant difference that we found in daily returns behavior between companies which benefited from non-repayable

[1]**Iulian Panait,** Hyperion University, Faculty of Economics, Bucharest, Romania, e-mail iulian.panait@gmail.com
[2]**George-Daniel Stoian**, PhD candidate, The Bucharest Academy of Economic Studies, Bucharest, Romania, e-mail: george.stoian@gmail.com

funds and the other companies is that the first ones seem to have lower value for beta and as result they offer much more efficiency for portfolio diversification

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JEL Classifications: G01, G11, G12, G15

1. Introduction

This paper is dedicated to the study of the particularities in stock returns for Romanian companies listed on the Bucharest Stock Exchange that benefited from non-repayable European funds (structural and cohesion funds).

The integration in the European Union has brought Romania numerous non-refundable financing opportunities for small and medium-sized enterprises (SMEs) that were not available before. These European non-repayable funds which Romania has to access until 2013, can be classified in 5 financial categories, 3 of them being known as "structural funds and cohesion" and the last 2 being known as "complementary actions" needed in agriculture and rural development:

1) The European Fund of regional development;
2) The social European fund;
3) The cohesion fund;
4) The European fund for agriculture and rural development;
5) The European fund for fishing;

According with the study "EU Funds in Central and Eastern Europe - Progress Report 2007-2008", made by KPMG, the entire amount of funds which corresponds to those 5 structural funds allocated to Romania is about 27,47 billion euro, corresponding to a value of 1280 euro per inhabitant. If we are to take into account also the national

contribution to the structural funds value allocated to Romania, we arrive to a value of 33.53 billion euro. The funds division is shown in the Table 4 attached at the end of this article.
In corporate finance and valuation theory it is often mentioned that companies that can access free and non-repayable sources of financing can often develop faster and more efficient, even when faced with adverse economic climate. Both academics and practitioners consider that when the investment projects that were financed from such sources are finalized, these companies can improve their net profit margin (because the cost of capital is lower) and can generate more economic added value for shareholders.
Having that in mind, we were interested to see if stock exchange investors are more interested in such companies, particularly if they exhibit higher stock exchange returns or any other kind of particular behavior of the daily returns. We think that the importance and utility of our research objective comes especially from the fact that related studies are rather rare in the international community and in particular for Romania we couldn't find many similar relevant scientific investigations.
In order begin our study we have identified 22 Romanian companies listed on the Bucharest Stock Exchange that during 2010-2011 managed to win project calls organized by the Romanian Management Authority for Sectorial Operational Program – Increasing of the Economic Competitiveness (AMPOSCCE). Such calls are dedicated for medium and large companies who need financing for production related investment projects. Our research practically consists in comparing the behavior of different characteristics of daily stock returns for those companies with the ones of other companies from the Bucharest Stock Exchange which didn't receive non-repayable European funds. Those characteristics that we were particularly interested in are: the form of the distribution of the daily returns, mean, variance, skewness, kurtosis, rolling correlation with the market

index (using the Capital Asset Pricing Model's beta coefficient). Also, we were interested to see how a diversified portfolio behaves and how the Markowitz's efficient frontier is shaped if such companies are or aren't included.

To cast some light on these issues, the rest of the paper is organized as follows: section 2 presents the most relevant Romanian and international related studies; section 3 describes the data that we worked with and the data mining methodology that we have used; section 4 presents the results that we have obtained; finally section 5 summarizes the most important conclusions and proposes further studies in this field.

2. Literature review

Nowadays, the classic sources of business financing such as: bank loan or overdraft facilities (commonly known as senior debt), debt finance, asset finance, stock finance and private equity finance (to name just a few), are more and more replaced by more secure and less expensive – even free – sources of funding such as non-repayable grants offered by international financial institutions (such as the International Monetary Fund, World Bank) or the European funds.

Despite a substantial number of studies (in the theoretical literature) regarding the functional principles and the accessing criteria of these funds (Szora, Dobra, 2009; Varvorea, 2012), the empirical studies on the subject are rather scarce.

There are quite few studies treating the financial performance of companies having obtained non-repayable grants from a financial or public institution, and even fewer those investigating the stock performance of listed companies beneficiary of this type of financial support.

Most of the existing studies have focused mainly on showing that the majority of SMEs and microenterprises from the newest members of the European Union are not sufficiently prepared to be competitive on the unique European market (Achim, Dragolea, 2006; Droj, 2010), and less on analyzing the positive or negative impact of these funds on the SMEs financial or stock performances.

Also, in many pieces of research, we can observe that the non-reimbursable grants for companies research & development expenditures are among the variables used to explain the competitiveness of companies located in the OECD states or the most developed countries of the European Union (Guisán, Cancelo, and Díaz-Vázquez, 1998; Cancelo and Guisán, 1998).

In the same research area as the one mentioned before, some papers have demonstrated through econometric models the hypothesis that large firms with higher knowledge capabilities are more likely to access non-repayable funding schemes and firms who received funding in the past are more likely to be selected for this type of funding again. (Aschhoff, 2009)

On the other hand, there is an impressive literature regarding the positive impact of non-refundable or public research & development grants on the competitiveness of firms (Hagedoorn et al., 2000; Kamien and Zang, 2000; Cassiman and Veugelers, 2002; Link et al., 2002; Ebersberger, 2005).

Other studies focus on estimating whether public or institutional free grants and loans have a significant impact on the firm's economic and stock performance also based on econometric models and data mining techniques applied to a set of performance indicators of beneficiary firms (De Negri, Lemos, De Negri, 2006; Abdelaziz, Lahiani, Charfeddine, 2010).

Ali M. Kutan, and Taner M. Yigit (2007) use a stochastic endogenous growth model to investigate the impact of European Union integration on convergence and productivity growth. They conclude that, after accession, productivity growth rates across the EU new member states are improved and a high growth rate is recorded due to global accumulation of capital obtained from the implementation of projects with Structural and Cohesion funds. Following the analysis the authors consider that economic integration has positive effects on member countries from a long-run perspective and Structural and Cohesion funds help the new members to grow.

Sascha O. Becker, Peter H. Egger and Maximilian von Ehrlichm (2010) analyze the impact of grants offered by the EU on disadvantaged regions of the Union (GDP level per capita below 75% of the EU average) in order to reduce the economic gap between them. Following the analysis the authors conclude that the allocation of Structural and Cohesion funds has an effect on the growth of GDP level per capita but no employment growth effects.

Janos Varga and Jan in't Veld (2009) propose a model based analysis of the potential macro-economic impact of EU Structural and Cohesion Funds payments on the economies of the new member states. As a result of simulations performed with this model, the study shows that allocation of approximately 1.5% of GDP (the equivalent allocations of European Union financial assistance grants) for investment in infrastructure, human capital and R & D leads to significant economic growth both on short and long term. According to the authors, the Cohesion Policy promoted by the EU provides a legal framework for the transfer of wealth from older EU Member States to new EU Member States designed to decrease the gap especially concerning per capita income.

George Georgescu and Gheorghe Zaman (2009) note that structural funds are an opportunity to support economic growth and reduce development gaps in the existing conditions of global recession that may become a new challenge for Romania. According to the results obtained from the application of HEROM model, if structural funds are to be fully absorbed in the Romanian economy, the GDP for the year 2013 would be 15-20% higher than the GDP for the same year in a Romanian economy without this type of grants.

Taking into account the existing related literature, practically this is the first study linking the use of non-repayable funds with the stock performance of the Romanian companies listed on Bucharest Stock Exchange.

This is why we can consider that one of the innovative aspects of our research is given by the level chosen to prove the efficiency of non-reimbursable structural funds, more precisely, we have analyzed their influence at a business level, while most of the impact studies regarding EU non-payable grants are taking into consideration the regional or national levels.

3. Data and methodology

The list with the 22 Romanian companies listed on Bucharest Stock Exchange that won contracts for non-repayable European funds was obtained from the official web page of the Romanian Management Authority for Sectorial Operational Program – Improvement of the Economic Competitiveness (amposcce.minind.ro). This information was extracted from the website on the 11th of March 2012. We were forced to exclude from our analysis 3 companies that didn't have any transactions during Jan. 2010 – Mar 2012. The remaining 18 companies presented in Table 1, annexed at the end of this article represent our target group.

To the target group we have added another 18 companies, also traded on Bucharest Stock Exchange (the most liquid ones), which didn't receive non-repayable European funds, in order to represent our control group. The list of these 18 companies is presented in Table 2, at the end of this article. At the same time, we included in our analysis the Bucharest Stock Exchange main index, BET-C.

For all those 36 companies and for the BET-C index we have obtained official daily stock prices during the period Jan 1st 2010 – Mar 30th 2012. The data was provided by the Bucharest Stock Exchange itself, courtesy of the Trading Department.

We were very careful to adjust all the prices with the corporate events that took place during the investigated period for some of the companies included in our study (mainly dividends and share capital increases). The price time series for BET-C index was already adjusted with corporate events by the stock exchange as part of the official index calculation methods.

Also we were very careful to align the date in perfect chronologic order. For all the situations when an individual stock was not traded at all during any particular day but the stock exchange was open (so we had a price for the index at the end of that day), we filled the "blank" with the last available price from previous trading sessions.

After all this preparations were accomplished, in order to eliminate the obvious non-stationarity from our data we have transformed the price time series into return time series for all the 36 individual stocks and for the BET-C index.

Regarding the returns estimation, as Strong (1992, p.353) pointed out "there are both theoretical and empirical reasons for preferring logarithmic returns. Theoretically, logarithmic returns are analytically more tractable when linking together sub-period returns to form returns over long intervals. Empirically, logarithmic returns are more likely to be normally distributed and so conform to the assumptions of the standard statistical techniques." This is why we decided to use logarithmic returns in our study since one of our objectives was to test of whether the daily returns were normally distributed or, instead, showed signs of asymmetry (skewness). The computation formula of the daily returns is as follows:

$$R_{i,t} = \mathrm{Ln}\left(\frac{P_{i,t}}{P_{i,t-1}}\right)$$

where Ri,t is the return of asset i in period t; Pi,t is the price of asset i in period t and Pi,t-1 is the price of asset i in period t-1. As already mentioned above, according to this methodology of computing the returns, the prices of the assets must be adjusted for corporate events such as dividends, splits, consolidations and share capital increases (mainly in case of individual stocks because indices are already adjusted).

As a result of this initial data gathering we obtained 37 time series of log-returns, each with 571 daily observations.

For those 37 time series we have computed the mean, standard deviation, skewness and kurtosis and also we have applied the Jarque Bera test of the normality of distribution of the daily returns.

For a financial time series the mean represents the simple mathematical average of all the observations within the sample. It is obtained by adding up the series and dividing the result by the number of observations.

The standard deviation of a financial time series is a measure of dispersion or spread in the series. The standard deviation is computed by:

$$\sigma = \sqrt{\frac{\sum_{i=1}^{N}(R_i - \bar{R})^2}{N-1}}$$

Where N is the sample size, Ri represents the individual observations of daily returns, and $\bar{R}$ represents the sample mean computed as above.

Concerning the estimation of skewness, according to most authors a time series of financial asset returns is symmetric around it's mean (noted here with μ) if:

$$\forall k, f(\mu + k) = f(\mu - k)$$

where f is the density function of the returns. If this property is valid then the mean of the returns series coincides with its median.

The skewness of a data population is defined as the third central moment. To be more precise, skewness is computed as the average cubic deviation of the individual observations from the sample mean, divided by the standard deviation raised to the third power. As a consequence of these considerations, we have calculated the sample skewness as follows:

$$\hat{S} = \frac{\frac{1}{N}\sum_{i=1}^{N}(R_i - \overline{R})}{\hat{\sigma}^3}$$

where $\hat{S}$ is the sample skewness; N is the total number of individual observations within the sample, Ri is the return of period t, $\overline{R}$ is the sample arithmetic mean and $\hat{\sigma}$ is an estimator for the standard deviation that is based on the biased estimator for variance ($\hat{\sigma} = \sigma\sqrt{(N-1)/N}$)

The skewness of a symmetric distribution, such as the normal distribution, is zero. Positive skewness means that the distribution has a long right tail and negative skewness implies that the distribution has a long left tail.

According to Peiro (1999), under normality hypothesis, the asymptotic distribution of $\hat{S}$ is given by $\hat{S} \rightarrow N(0, \frac{6}{T})$.

Kurtosis is a measure of how outlier-prone a distribution is. The kurtosis of the normal distribution is 3. Distributions that are more outlier-prone than the normal distribution have kurtosis greater than 3; distributions that are less outlier-prone have kurtosis less than 3.

The kurtosis of a distribution is defined as

$$K = \frac{1}{N}\sum_{i=1}^{N}(\frac{R_i - \overline{R}}{\hat{\sigma}})^4$$

where $\overline{R}$ is the mean of Ri, $\hat{\sigma}$ is the standard deviation of Ri, and N is the sample size. The kurtosis of the normal distribution is 3. If the kurtosis exceeds 3, the distribution is peaked (leptokurtic) relative to the normal. If the kurtosis is less than 3, the distribution is flat (platykurtic) relative to the normal.

The Jarque-Bera test is a two-sided goodness-of-fit test suitable when a fully-specified null distribution is unknown and its parameters must be estimated. The test statistic is

$$JB = \frac{N}{6}(s^2 + \frac{(k-3)^2}{4}$$

where N is the sample size, s is the sample skewness, and k is the sample kurtosis. For large sample sizes, the test statistic has a chi-square distribution with two degrees of freedom. The reported probability (p-value) is the probability that a Jarque Bera statistic exceeds (in absolute value) the observed value under the null hypothesis. A small probability value leads to the rejection of the null hypothesis of a normal distribution.

Also, for all the 37 individual stock time series we have calculated the beta coefficient of correlation between the particular individual stock and the BET-C index. The beta (β) of a stock or portfolio is a number describing the correlation of its returns with those of the financial market as a whole (Levinson and Mark, 2006).

An asset has a Beta of zero if its returns change independently of changes in the market's returns. A positive beta means that the asset's returns generally follow the market's returns, in the sense that they both tend to be above their respective averages together, or both tend to be below their respective averages together. A negative beta means that the asset's returns generally move opposite the market's returns: one will tend to be above its average when the other is below its average.

Beta coefficient measures the part of the asset's statistical variance that cannot be removed by the diversification provided by the portfolio of many risky assets, because of the correlation of its returns with the returns of the other assets that are in the portfolio.

$$\beta = \frac{cov(R_I, R_M)}{var(R_M)}$$

where RI measures the rate of return of the individual stock I, RM measures the rate of return of the market portfolio, and cov(RI,RM), var(RM) are the covariance between the rates of return of the two assets and the variance of the market portfolio.
There are multiple documented methods for estimating beta. We have chosen to compute beta by calibrating a simple linear regression between the individual stocks time series (as explained or dependent variables) and the BET-C index time series (as explanatory or independent variable). Our preference for this method is justified by the fact that this way we also obtain t-statistic and R2 values that help us to better understand the importance of the correlation between the market index and the individual stock.

$$R_{Ii} = \alpha_I + \beta_I R_{Mi} + \varepsilon_{Ii}$$

In order to have a better understanding of who the values of beta change with time and to see if the whole period beta that we obtain is consistent with the behavior of this indicator during smaller time periods, we have also calculated beta in with a rolling window of 250 daily observations of returns. For this analysis we created the following Matlab code:

```
function betaTS = movBeta(rand, wSize)
[N,M] = size(rand);
betaTS = nan(N, M-1);
for t = wSize+1:N
for z= 2:M
betaTS(t, z-1) = rand(t-wSize:t, 1)\rand(t-wSize:t, z);
end
end
```

where rand is a matrix of 37 columns and 571 rows and wSize represents the size of the rolling window (250 in our case). Each column from 2 to 19 of the rand matrix contents the 571 daily observations of returns for a particular stock stock included in the target group, and each column from 20 to 37 contents the 571 daily observations of returns for a particular stock stock included in the control group. The first column represents the 571 daily observations for BET-C index.

We conclude our study with a simulation in MatLab of over 300.000 theoretical portfolios by randomly combining the 18 individual stocks of the companies that benefited from non-repayable European funds with the 18 individual stocks of the companies that didn't. We have generated the portfolio using the following Matlab code that we have created:

```
covariances1 = corr2cov(STDs , correlations);
rand('state' , 0);
weights = rand(300000 , 36);
total   =  sum(weights , 2);
total   =  total(:,ones(36,1));
weights =  weights./total;
[portRisk , portReturn] = portstats(rets , covariances , weights);
hold on
plot(portRisk , portReturn , '.r')
hold off
[PortRisk, PortReturn, PortWts]= portopt(rets , covariances , 300000);
```

where STDs is a vector matrix of 36 columns containing the previously computed standard deviations of the stocks included in our analysis, correlations is a symmetrical matrix of 36 columns and 36 rows containing the previously calculated correlation coefficients between each pair of stocks and rets is a matrix of 36 columns and 571 lines containing the daily returns of the 36 stocks included in our analysis during the period previously mentioned.

From those portfolios we were interested to visualize how the Markowitz efficient frontier is behaving and also to determine the risk (measured by the standard deviation) of the minimum variance portfolio in three types of combinations: (1) without any of the companies that benefited from the European funds; (2) with only the most liquid 8 companies that benefited from the European funds; (3) with all the 18 companies that benefited from the European funds.

4. Results and interpretations

One of the first things that we did when we started to analyse the data was to make sure that all the 18 companies which benefited from non-repayable European funds made public announcements (inclusively on their website and on the website of the Bucharest Stock Exchange) regarding those grants. So the investors should have been fully aware of this information.

The results from our calculations of the statistic characteristics of the 37 assets under investigation are presented in Table 3 attached at the end of this article and will be commented in detail bellow.

A very rough analysis shows us that from a total of 18 companies which benefited from non-repayable European funds, only 5 (or 28%) presented a positive net excess return (computed as difference between the actual nominal return of the individual stock and the nominal return of the BET-C index) for the whole period under investigation. For the control group of the companies that didn't benefit from non-repayable European funds there were 8 with positive excess return for the whole period (or 44%).

The first thing that we observe analysing the time series is that for all the 31 out of 37 of assets investigated we cannot reject the null hypothesis of zero mean of the sample daily returns over the Jan 1st 2010 – March 30th 2012 period. All the 7 assets for which the mean of the daily returns can't be statistically proven equal to zero are the ones that were very illiquid (they were effectively traded only during 4-26 days out of a total of 571 trading days in the mentioned period).

We noticed that on average the standard deviation of the daily returns for the target group is larger (0.0469) than the one for the control group (0.0270). Still on a more detailed analysis we see that this plus of volatility comes especially from the most illiquid members of the target group, because the liquid ones don't present standard deviations much different from the ones in the control group. So we conclude that higher volatility is not a characteristic of the companies that benefited from the non-repayable European funds, but rather coming from the fact that of those companies are illiquid.

Another finding is that both the companies from the target group and the companies from the control group present mainly positive skewness (16 and respectively 15 out of 18) and consistent excess kurtosis.

The first and most important significant difference of behaviour between the target group and the control group is that the values for the beta coefficient are mostly below 1 for the companies which benefited from non-repayable European funds. From a total of 18 such companies in our target group, 15 (or 83) presented beta coefficient bellow 1 and 3 (or 17%) of them even presented negative beta. Inside the control group of companies which didn't benefited from non-repayable European funds only 3 out of 18 (or 17%) presented beta coefficient bellow 1 and none presented negative beta coefficient. This finding is very important because being less correlated with the main market (or the market composite index) they are more suited to be used for portfolio diversification.

This particular finding presented above made us interested to understand more about the evolution in time of the beta coefficient, both for the target group and for the control group. We have computed individual series of beta calculated with a rolling window of 250 trading days (approximately year of trading). The Figure 1 presented at the end of the article shows the results for the target group and the conclusions that can be drown from there is that with all the volatility and regime change in beta values that occurs during April – July 2011 the value of the beta coefficient for most companies that benefited from the non-repayable European funds remained below 1 for most part of the investigated period. The beta coefficient for the companies inside the control group, also computed with a rolling window of 250 trading days, shows that in this case beta remained above 1 for most of the companies and during the most part of the period under investigation, as shown in Figure 2 presented at the end of the article.

After this finding and its implications for portfolio diversification, it was logical to try and investigate how different combinations of companies from the target group and the control group will behave inside a diversified portfolio. So, going further with our analysis, we used MatLab to simulated 3 types of portfolios: (1) the first type portfolio was generated only with companies from the control group, which didn't benefited from non-repayable European funds; (2) the second type portfolio was generated with companies from the control group, which didn't benefited from non-repayable European funds and also with the most liquid 7 companies from the target group which benefited from non-repayable European funds: ALT, ALU, ARAX, ALR, ARS, ATB, VNC, all of these 7 companies having at least 384 trading days from a total of 571 trading days during the investigated period; (3) the third type of portfolio was generated with all the 36 individual companies from the both groups. For each type of portfolio we have generated 100,000 random combinations of assets and weights. The results are plotted in Figures 3, 4 and 5 attached at the end of this article. We can easily observe that as the portfolios include more companies from the target group, which benefited from non-repayable European funds, the Markowitz's efficient frontier is moving to the left, which means that we can find portfolios with less standard deviation and implicitly less risk.

Also using MatLab we were able to identify the minimum variance portfolio for each of the three types. For the type (1) the standard deviation of the minimum variance portfolio was 0.0145; for the type (2) the standard deviation of the minimum variance portfolio was 0.0140; and for the (3) the standard deviation of the minimum variance portfolio was 0.0061. This finding also supports our earlier results and interpretations that the companies that benefited from the non-repayable European funds are less correlated with the main market and as a result they are more suited to be used for portfolio diversification. From the 300,000 hypothetical portfolios that we generated, the ones that included such companies tented to have lower standard deviations (lower risk).

5. Conclusions

This study made a comparison between the evolution and characteristics of the daily returns of the Romanian companies listed on Bucharest Stock Exchange which benefited from the non-repayable European funds and those of the companies which didn't access non-repayable European funds. We have collected daily prices for 18 companies in the target group (which received non-repayable European funds) and for other 18 companies which didn't access non-repayable European funds and were included in our control (or observation) group. The period for our study was Jan 1st 2010 – March 30th 2012.

We didn't find any clear evidence of different behavior regarding the characteristics of distribution, mean, standard deviation, skewness and kurtosis between the two groups. Also the whole period nominal returns and excess returns were not much different between the two groups. We propose two possible explanations for this lack of differentiation. First, we consider that because most of the investment projects implemented by the companies which received non-repayable European funds are were not yet finished, and as a result the investors didn't sow a clear surplus of profitability in the quarterly financial reports of those companies. Still, they could have anticipated such an outcome but from our data and analysis it seems that they didn't. Secondary, we think that because the Romanian stock market was still in a period of high volatility following the 2007-2009 global stock market crisis, perhaps the increase in co-movement of the local stocks was still very high. Often during a stock market crisis (and for consistent period following the crisis) the contagion effect increases the correlations between most of the listed stocks. Investors take less interest in the particularities of each company and tend to be more preoccupied about the global tendencies. This could explain why the group of companies which benefited from non-repayable European funds and have the potential to be more profitable in the future didn't attract more of the investor's interest.

Still, we found a significant difference in values for the beta coefficient between the two groups. Our research revealed that companies which benefited from non-repayable European funds tented to present beta values bellow 1 (15 out of 18) while companies which didn't mainly had beta values above 1 (also 15 out of 18). We think this finding is not affected by the low liquidity of most of the companies from the target group because inside the subgroup of liquid companies who benefited from non-repayable European funds (ALR, ALT, ALU, ARAX, ARS, ATB, and VNC) the values of beta is also mainly bellow 1 or very close to 1.

Going further with our analysis, we have found that the set of randomly generated portfolios which don't include companies from the target group (who benefited from non-repayable European funds) have higher standard deviation than the set of randomly generated portfolios which included the most liquid 7 companies from the target group. For an investment manager our finding leads to the conclusion that the efficiency of the diversification is higher when companies who (who benefited from non-repayable European funds) are included in the portfolio, and this is a practical and applicable result of our research.

We consider it would be interesting, as a piece of further research, to re-run this study in the future (after 2012), when all the investment projects of the companies who benefited from non-repayable

European funds will be already finalized and the investors will clearly see the hypothetical surplus of profitability already reflected in those companies' quarterly results. This will allow verifying if the differentiations between the two groups are more evident.

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Table 1
The financial time series for the target group

Series symbol	Company name	Number of daily observations during Jan 1st 2010 – March 30th 2012
ACIS	Sc A.C.I. Bistrita Sa	4
ALR	Sc Alro Sa	428
ALT	Sc Altur Sa Slatina	473
ALU	Sc Alumil Rom Industry Sa	461
AMCP	Sc Ecopack Sa	136
ARAX	Sc Armax Gaz Sa	490
ARS	Sc Aerostar Sa	384
ATB	Sc Antibiotice Sa	482
IAMU	Sc I.A.M.U Sa	19
MATA	Sc Matrita Sa Odorheiu Secuiesc	26
MCAB	Sc Romcab Sa	105
MTCR	Sc Mat Sa	67
NEPT	Sc Neptun Sa	61
PTRC	Sc Petrocart Sa	5
RMRA	Sc Ramira Sa	4
ROCE	Sc Romcarbon Sa Buzau	242
UZC	Sc Uzuc Sa	5
VNC	Sc Vrancart Sa Adjud	429

Source of data: Bucharest Stock Exchange and AMPOSCCE; calculations by the authors

Table 2
The financial time series for the control group

Series symbol	Company name	Number of daily observations during Jan 1st 2010 – March 30th 2012
AZO	Sc Azomures Sa Tg. Mures	505
BCC	Sc Banca Comerciala Carpatica Sa Sibiu	476
BETC	Bucharest Stock Exchange Composite Index	571
BIO	Sc Biofarm Sa Bucuresti	503
BRD	BRD – GSG	478
BRK	SSIF Broker Cluj SA	527
COMI	Sc Condmag Sa	482
DAFR	Sc Dafora Sa	479
OLT	Sc Oltchim Sa Rm. Valcea	508
RRC	Sc Rompetrol Rafinare Sa	463
SIF1	SIF1 Banat-Crisana	508
SIF2	SIF2 Moldova	514
SIF3	SIF3 Transilvania	510
SIF4	SIF4 Muntenia	513
SIF5	SIF5 Oltenia	517
SNP	Petrom – OMV	510
TEL	Sc Transelectrica Sa	482
TGN	Sc Transgaz Sa	523
TLV	Banca Transilvania Sa Cluj-Napoca	495

Source of data: Bucharest Stock Exchange; calculations by the authors

Table 3
Statistical characteristics of returns both for target and control group

Asset simbol	Mean	Std. Dev.	Skew - ness	Kurto - sis	Jarque-Bera	p - value	Beta	Period return	Period excess return
ACIS	0.000448	0.013208	16.95	380.6	3418981	0	0.02	23.6%	11.4%
ALR	0.001013	0.025811	0.26	10.3	1285.591	0	1.08	47.5%	35.3%
ALT	0.000234	0.028123	0.32	4.8	84.79701	0	0.81	-8.7%	-20.9%
ALU	-0.000623	0.028964	-0.15	8.1	621.4951	0	1.02	-44.9%	-57.1%
AMCP	-0.000075	0.031417	1.17	25.9	12643.4	0	0.21	-27.4%	-39.6%
ARAX	-0.000034	0.02837	0.56	9.0	889.3998	0	1.19	-21.9%	-34.1%
ARS	0.002015	0.033646	0.73	8.7	824.3557	0	0.86	129.8%	117.5%
ATB	-0.000186	0.021926	-0.35	9.6	1060.8	0	0.96	-21.7%	-33.9%
IAMU	0.000693	0.039496	4.78	84.3	159547.6	0	-0.17	-1.7%	-13.9%
MATA	0.001367	0.06421	6.19	117.8	317316	0	-0.16	-23.4%	-35.6%
MCAB	0.005694	0.101444	3.91	52.2	59095.4	0	0.54	79.2%	67.0%
MTCR	0.001416	0.055636	4.01	57.3	71587.92	0	0.01	0.0%	-12.2%
NEPT	0.000033	0.037503	2.70	36.4	27186.45	0	0.19	-30.5%	-42.7%
PTRC	0.007942	0.184122	16.37	323.3	2467105	0	0.18	-50.0%	-62.2%
RMRA	0.000552	0.077565	13.76	345.0	2800526	0	0.22	-67.3%	-79.5%
ROCE	-0.000290	0.038279	0.33	7.8	563.6197	0	0.78	-44.1%	-56.3%
UZC	-0.000139	0.008974	9.01	254.1	1508154	0	-0.02	-9.6%	-21.8%
VNC	0.000521	0.024952	0.29	6.8	350.8118	0	0.77	12.8%	0.6%
BETC	0.000307	0.014482	-0.28	13.4	2592.415	0	1.00	12.2%	0.0%
AZO	0.003824	0.030323	4.50	54.4	64658.92	0	0.74	594.4%	582.2%
BCC	-0.000855	0.022021	0.90	13.2	2569.954	0	0.65	-46.5%	-58.7%
BIO	0.000213	0.021609	0.72	13.5	2678.452	0	1.12	-1.0%	-13.2%
BRD	-0.00016	0.018921	0.10	8.0	602.723	0	1.04	-17.6%	-29.8%
BRK	-0.000436	0.027292	0.35	8.1	628.3142	0	1.39	-36.9%	-49.1%
COMI	-0.001447	0.028094	0.67	10.4	1329.877	0	1.16	-65.0%	-77.2%
DAFR	-0.000622	0.027632	-0.01	6.9	356.1203	0	1.38	-43.7%	-55.9%

OLT	0.004147	0.056106	0.51	4.8	103.0356	0	1.47	341.0%	328.8%
RRC	-0.000435	0.030335	1.37	10.6	1557.632	0	0.66	-39.6%	-51.8%
SIF1	0.0005	0.028217	0.00	7.1	400.4328	0	1.41	6.0%	-6.3%
SIF2	0.000822	0.02733	0.12	9.1	894.2351	0	1.41	29.2%	17.0%
SIF3	0.0006	0.028209	0.10	7.1	410.5886	0	1.40	12.3%	0.1%
SIF4	0.000534	0.026243	0.30	9.8	1116.932	0	1.26	11.5%	-0.7%
SIF5	0.000851	0.02732	0.16	8.1	616.943	0	1.41	31.5%	19.2%
SNP	0.001243	0.021967	-0.16	10.1	1206.81	0	1.22	77.1%	64.9%
TEL	0.000623	0.022304	0.07	9.8	1086.673	0	1.08	23.8%	11.6%
TGN	0.00149	0.019989	0.29	11.7	1815.698	0	1.03	109.0%	96.8%
TLV	-0.000117	0.021803	0.14	9.3	953.4485	0	1.14	-18.3%	-30.5%

Source of data: Bucharest Stock Exchange; calculations by the authors

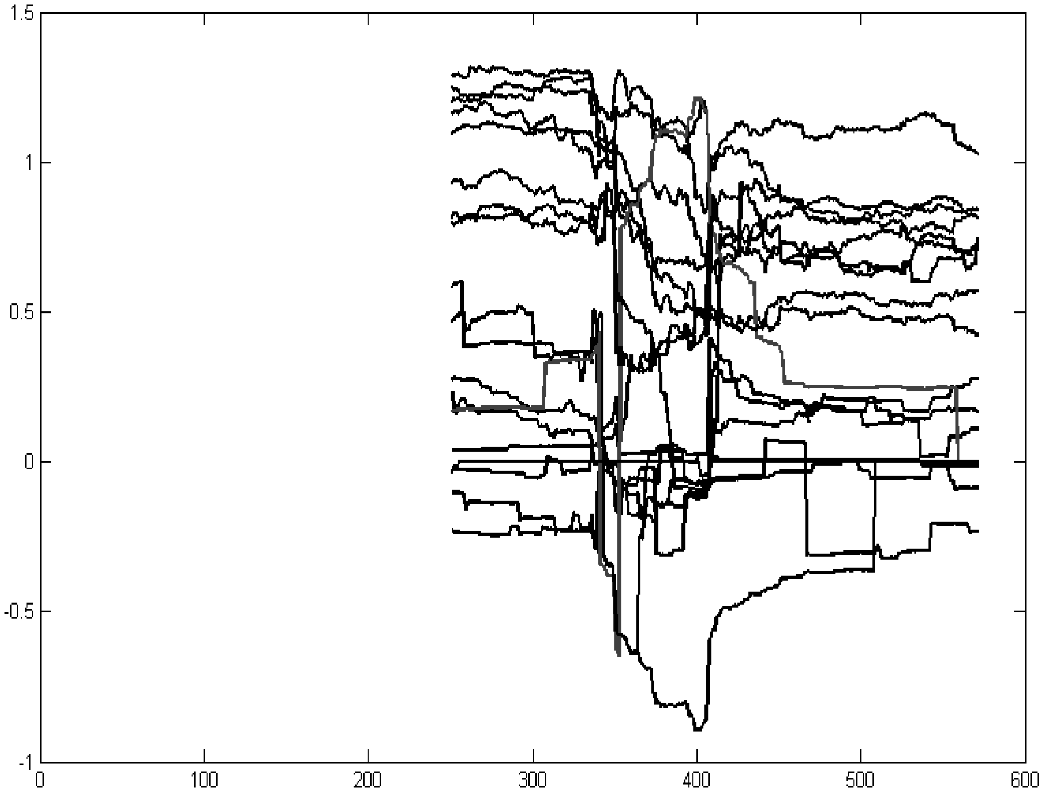
Table 4

European funds allocated to Romania in 2007-2013 (billion EUR)

The period	Total for 2007-2013	2007	2008	2009	2010	2011	2012	2013
The European Fund of regional development	8,98	0,60	0,86	1,16	1,42	1,53	1,63	1,79
The cohesion fund	6,55	0,44	0,64	0,86	1,03	1,11	1,19	1,28
The social european fund	3,68	0,23	0,36	0,49	0,58	0,63	0,69	0,70
The entire structural and cohesion fund	*19,21*	*1,28*	*1,85*	*2,51*	*3,03*	*3,26*	*3,51*	*3,77*
The european fund for agriculture and rural development	8,02	0,74	1,02	1,32	1,24	1,23	1,24	1,23
The European fund for fishing	0,23	0,02	0,02	0,03	0,04	0,04	0,04	0,05
The entire european fund for agriculture and rural development	*8,25*	*0,76*	*1,05*	*1,35*	*1,27*	*1,27*	*1,28*	*1,28*
TOTAL	27,47	2,03	2,90	3,86	4,30	4,54	4,79	5,05

Source of data : Ministry of Economy

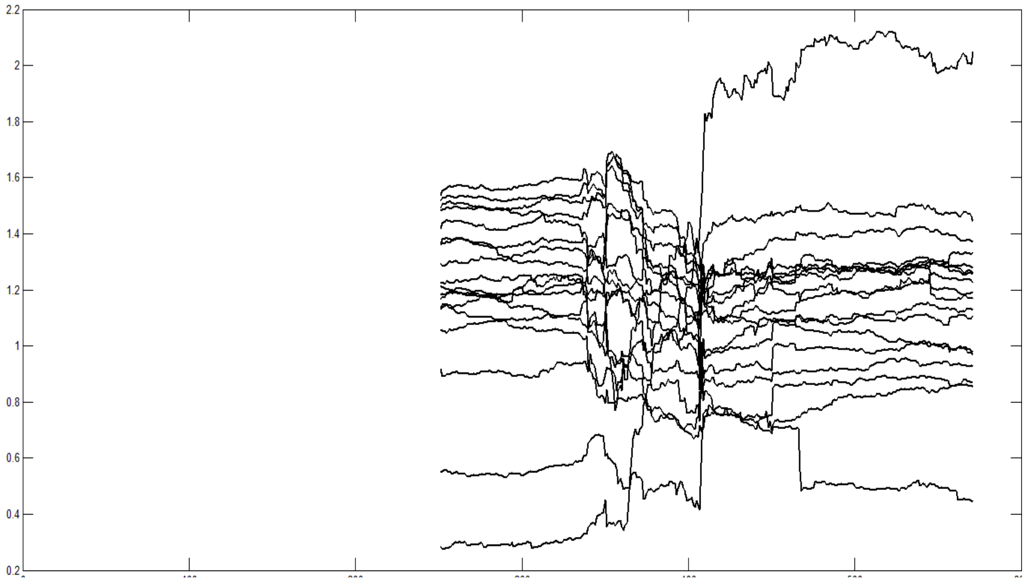
Figure 1
Beta coefficient with rolling period of 250 days for companies in the target group



Source of data: Bucharest Stock Exchange; calculations by the authors

Figure 2

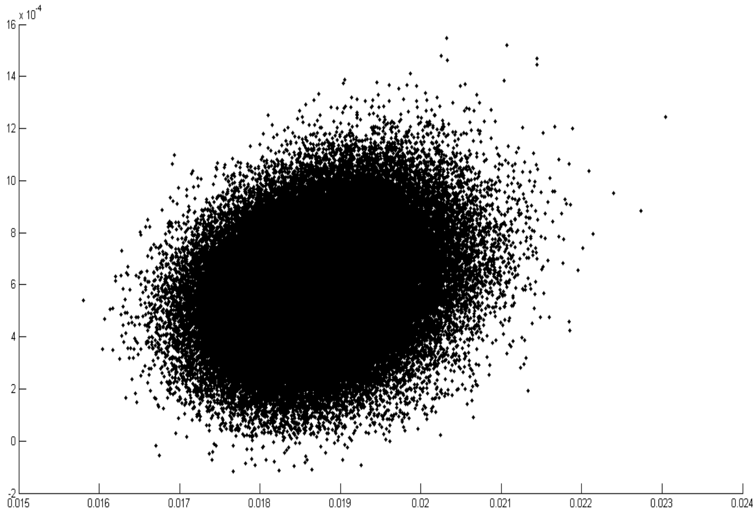
Beta coefficient with rolling period of 250 days for companies in the control group



Source of data: Bucharest Stock Exchange; calculations by the authors

Figure 3

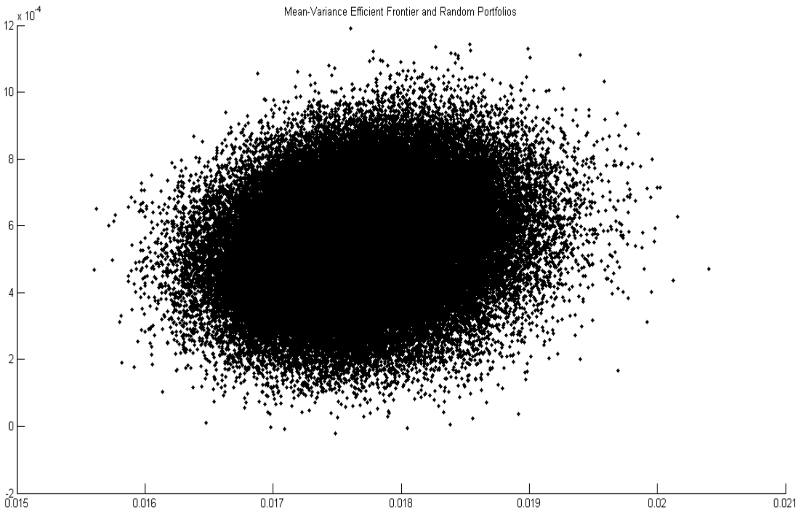
Random generated portfolios of type (1)



Source of data: Bucharest Stock Exchange; calculations by the authors

Figure 4

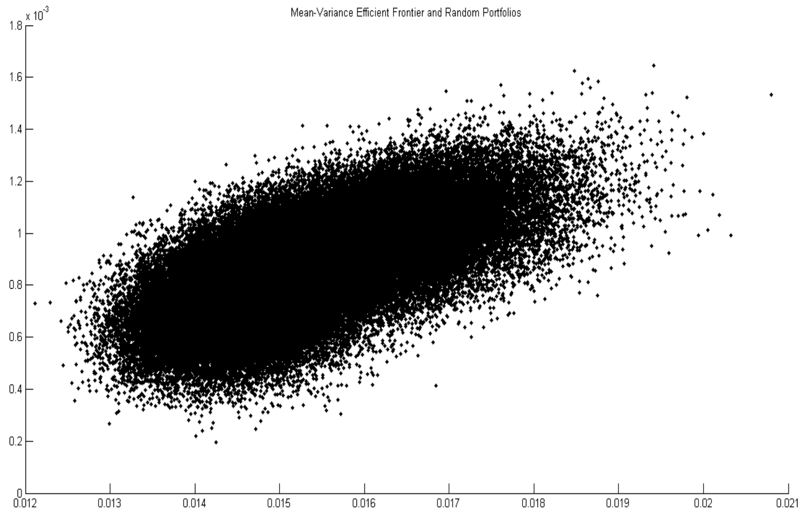
Random generated portfolios of type (2)



Source of data: Bucharest Stock Exchange; calculations by the authors

Figure 5

Random generated portfolios of type (3)



Source of data: Bucharest Stock Exchange; calculations by the authors