
Munich Personal RePEc Archive

Overreaction and underreaction on the BUCHAREST STOCK EXCHANGE

Stefanescu, Razvan and Dumitriu, Ramona and Nistor, Costel

Dunarea de Jos University of Galati, Dunarea de Jos University of Galati, Romania, Dunarea de Jos University of Galati, Romania

12 April 2012

Online at https://mpra.ub.uni-muenchen.de/41555/
MPRA Paper No. 41555, posted 27 Sep 2012 10:28 UTC

OVERREACTION AND UNDERREACTION ON THE BUCHAREST STOCK EXCHANGE

Lect, Razvan Stefanescu, Lect, Ramona Dumitriu, and Assoc Prof, Costel Nistor

University "Dunarea de Jos" Galati, Romania, rzvn_stefanescu@yahoo.com

Abstract: *Efficient Market Hypothesis states that financial markets react instantaneous and unbiased to new information. However, in the last decades empirical researches revealed some anomalies in investors reactions to the events that caused shocks on the financial markets. There are two main hypotheses to describe such behaviors. The first one - Overreaction Hypothesis stipulates that investors overreact on the day when a shock occurs and they correct on the next days by opposite actions. The second one - Underreaction Hypothesis considers that investors underreact on the day of a shock and they apply corrections on the next days by opposite actions. These behaviors are influenced by the nature of events that cause shocks and by some characteristics of the financial markets. In this paper we explore the short-term reactions that followed positive and negative shocks from the Romanian capital market, using daily values of the main indexes from the Bucharest Stock Exchange for a period of time between January 2005 and March 2011. Depending on the horizons taken into consideration and on the nature of the shocks we find evidences for the Efficient Market Hypothesis, Overreaction Hypothesis and the Underreaction Hypothesis. We also find that actual global crisis caused significant changes in the investors' reactions to the shocks.*

Keywords: Efficient Markets, Overreaction Hypothesis, Underreaction Hypothesis, Romanian Capital Market

JEL Classification: G01, G02, G14

1. Introduction

One of the most disputed principles of Fama (1970) Efficient Market Hypothesis (EMH) states that prices of the financial assets react instantaneous and unbiased to new information [9]. In the last decades the financial literature provided pro and contra arguments to this statement [4, 10, 11, 12, 15].

Researches revealed various anomalies that induce doubt to EMH. Some of them are associated to the financial markets reactions to the shocks. In the field of the behavioral finance there are two main hypotheses that contest the efficient reactions to the shocks: Overreaction Hypothesis (OH) and Underreaction Hypothesis (UH). OH presumes that investors overreact to the positive shocks (usually generated by unexpected and extreme good news) and to the negative shocks (which usualy followed unexpected and extreme bad news) correcting their behavior lately [7, 8, 16]. The knowledge about these reactions could be fructified by employing contrarian strategies in which past loser stocks are bought and past winner stocks are sold [1, 13].

UH presumes that investors underreact to the shocks and adjust their behavior in the next days [5, 6]. The knowledge about underreactions could be exploited by momentum strategies which consist in buying the past winner stocks and selling the past loser stocks [2, 18].

Some empirical researches found that size of a firm could significantly influence the reactions to shocks of its stock prices [3, 17, 19]. It was also revealed that in turbulent times these reactions were different to the ones from quiet times [14].

In this paper we investigate the reactions to shocks on the Romanian capital market. In our investigation we use daily

values of eight important indexes from the Bucharest Stock Exchange (BSE) for two periods of time: before and during the global crisis.

The remainder of the paper is organized as it follows: the second part describes the data and methodology employed in our investigation, the third part presents the empirical results and the fourth part concludes.

2. Data and Methodology

In our investigation we employ daily closing values of the main indexes from the two components of BSE: BET, where are listed all big companies, and RASDAQ, where are listed smaller firms. For BET we use five indexes:

- BET, that expresses the price movement of the most liquid 10 companies listed on the BVB regulated market;
- BET-C, which reflects the evolution of all the big companies listed on BSE, excepting the investment funds (SIFs);
- BET-FI, that describes the price movement of the investment funds (SIFs);
- BET-XT, which reflects the evolution of the most liquid 25 shares traded on the BSE, including SIFs;
- BET-NG, that expresses the evolution of companies which have the main business activity located in the energy sector and the related utilities.

For RASDAQ we employ the values of three indexes:

- RASDAQ-C (RAQ-C), which describes the prices evolution of all the stocks, traded on RASDAQ market;
- RAQ-I, that expresses the prices of the stocks listed on the First Category of Excellence on RASDAQ market;
- RAQ-II, which reflects the prices of the stocks listed on the Second Category of Excellence on RASDAQ market.

For each index we use a sample of data for the period January 2005 – March 2011, except for BET-XT and BET-NG which were introduced on January 2007. We split each sample into two sub-samples: before and after 15th of September 2008 (the day when it was announced the bankruptcy of Lehman Brothers).

For each index i we calculate the raw return ($r_{i,t}$) by the formula:

$$r_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} * 100 \qquad (1)$$

where $P_{i,t}$ and $P_{i,t-1}$ are the closing prices of index i on the days t and t-1, respectively.

We identify the positive and negative shocks using the method employed by Lasfer et al. (2003) [14]. We find that a positive shock occurs in a day t^+ if the following condition is satisfied:

$$r_{i,t^+} > AVG(r_{i,[-60;-11]}) + 2 * STD(r_{i,[-60;-11]}) \quad (2)$$

where r_{i,t^+} is the return of the index i from the day t^+, AVG ($r_{i,[-60;-11]}$) is the average daily returns for a period that starts 60 days before the day t^+, and ends 11 days before the day t^+, while STD ($r_{i,[-60;-11]}$) is the standard deviation for the same period.

We find that a negative shock occurs in a day t^- if the following condition is satisfied:

$$r_{i,t^-} < AVG(r_{i,[-60;-11]}) - 2 * STD(r_{i,[-60;-11]}) \quad (3)$$

where r_{i,t^-} is the return of the index i from the day t^-.

We separate the autonomous shocks from the positive or negative shocks we detected by excluding the successive shocks (a successive shock is one that occurs less than 10 days after an autonomous shock). In order to identify over, under and efficient reactions we compute the post-shocks abnormal returns ($AR_{i,t}$) using the formula:

$$AR_{i,t} = r_{i,t} - AVG(r_{i,[-60;-11]}) \qquad (4)$$

For each autonomous shock we calculate the Cumulative Abnormal Returns for the next 1, 2, 3, 4, 5 and 10 days as:

$$CAR_{i,t}^{n} = \sum_{t=1}^{n} AR_{i,t} \qquad (5)$$

where $CAR_{i,t}^{n}$ is the Cumulative Abnormal Returns of the index i for the next n days that follow an autonomous shock from a day t.

We compute the Average

Cumulative Abnormal Returns of the index i for the next n days ($ACAR_{i,t}^{n}$) as:

$$ACAR_{i,t}^{n} = \frac{1}{n}\sum_{t=1}^{n} CAR_{i,t} \quad (6)$$

We employ for each autonomous shock, t-statistics, to test the significance of Average Cumulative Abnormal Returns. Based on the tests results we classify the after shock behaviours of returns into three categories:

- Overreactions, when a positive shock is followed by significant negative abnormal returns or when a negative shock is followed by significant positive abnormal returns;
- Underreactions, when a positive shock is followed by significant positive abnormal returns or when a negative shock is followed by significant negative abnormal returns;
- Efficient reactions, when we don't find significant positive or negative abnormal returns after an autonomous shock.

3. Empirical Results

Table 1 and 2 present the shocks that occurred on BSE before and during the global crisis. We find that largest amounts of positive and negative shocks were for RAQ II which includes the smallest companies.

Table 1 Shocks before the global crisis

Index	*Positive shocks*		*Negative shocks*	
	Number of shocks	*Mean reaction*	*Number of shocks*	*Mean reaction*
BET	17	3.59837	16	-3.8248
BET C	17	3.05788	18	-3.24778
BET FI	20	5.21389	17	-4.843
BET NG	8	3.90775	9	-3.67398
BET XT	10	3.70531	9	-4.66584
RAQ C	15	4.23921	17	-3.49404
RAQ I	27	4.93983	15	-4.30664
RAQ II	27	4.71395	20	-4.32176

Table 2 Shocks during the global crisis

Index	*Positive shocks*		*Negative shocks*	
	Number of shocks	*Mean reaction*	*Number of shocks*	*Mean reaction*
BET	16	5.47769	19	-5.37829
BET C	18	4.74996	19	-4.68247
BET FI	19	7.05576	15	-6.05096
BET NG	19	5.27121	19	-4.19939
BET XT	17	5.24995	17	-5.03733
RAQ C	16	2.17871	17	-1.91937
RAQ I	20	6.4429	23	-9.22096
RAQ II	23	9.72803	27	-8.31141

Table 3 Cumulative Abnormal Returns following a positive shock before the global crisis

Index	*AR-1*	*ACAR-2*	*ACAR-3*	*ACAR-4*	*ACAR-5*	*ACAR-10*
BET	0.943173 (1.71015)	1.66516 (2.56472**)	1.68875 (2.35056**)	1.43701 (1.66098)	0.891975 (0.843542)	1.96108 (1.29063)
BET C	1.0056 (1.85846*)	1.53713 (2.55656**)	1.47279 (2.42051**)	1.43778 (1.92535*)	1.23546 (1.37775)	1.69012 (1.27861)
BET FI	1.32763 (1.54032)	1.55324 (1.79411*)	1.28153 (1.30952)	0.876127 (0.832044)	1.15156 (0.847187)	1.04119 (0.575465)
BET NG	0.166919 (0.168308)	1.28516 (1.05882)	1.90017 (1.05582)	2.41443 (1.04599)	2.31099 (0.928202)	1.24617 (0.452795)
BET	0.644605	0.578168	0.549095	0.777279	0.448091	7.41081

XT	(0.85773)	(0.978159)	(0.576237)	(0.988733)	(0.505249)	(0.043444)
RAQ C	0.285537 (1.05883)	0.351169 (1.00302)	0.354135 (0.778395)	0.636862 (1.04171)	0.269359 (0.318474)	0.492269 (0.385326)
RAQ I	0.635753 (1.232)	0.205496 (0.318628)	0.490757 (0.692632)	0.684369 (0.943039)	0.993646 (1.11038)	1.0121 (0.83404)
RAQ II	-0.367333 (-0.923)	-1.10102 (-1.9424**)	-0.844754 (-1.30142)	-0.732716 (-0.83535)	-0.754812 (-0.899155)	-0.376666 (-0.321115)

Notes: t-statistic appears in parentheses; ***, **, * mean significant at 0.01, 0.05, and 0.1 levels, respectively

Table 4 Cumulative Abnormal Returns following a negative shock before the global crisis

Index	*AR-1*	*ACAR-2*	*ACAR-3*	*ACAR-4*	*ACAR-5*	*ACAR-10*
BET	-0.0295 (-0.061)	0.0658311 (0.09064)	-0.43312 (-0.40114)	-0.458276 (-0.42108)	-0.903597 (-0.75166)	-0.537274 (-0.27954)
BET C	0.0938725 (0.215037)	0.383922 (0.602729)	0.17794 (0.204055)	0.0582945 (0.0573443)	0.149635 (0.148343)	-0.383489 (-0.23733)
BET FI	0.358872 (0.413101)	0.936365 (1.169)	0.409102 (0.339922)	0.0746547 (0.0621584)	-0.798043 (-0.5260)	-0.610803 (-0.32523)
BET NG	0.501898 (0.561493)	0.430441 (0.34553)	0.573139 (0.469545)	-0.747417 (-0.586149)	-0.030971 (-0.01934)	2.66218 (0.906025)
BET XT	-0.967921 (-1.16303)	-1.05021 (-0.878321)	-1.14683 (-0.80499)	-0.252871 (-0.163324)	-1.02144 (-0.49449)	-1.09147 (-0.37542)
RAQ C	-0.201129 (-1.06918)	-0.0824298 (-0.244502)	-0.47763 (-1.04904)	-0.60284 (-1.10197)	-0.927201 (-1.26342)	-1.30055 (-1.36118)
RAQ I	0.165478 (0.328312)	-0.775217 (-1.05162)	-0.94203 (-0.98517)	-1.62801 (-1.31632)	-2.37769 (-1.74765)	-1.71297 (-0.87042)
RAQ II	0.729 (1.06811)	0.942025 (1.10849)	0.82596 (0.936872)	1.54546 (1.28096)	1.69353 (1.19979)	2.12698 (1.21384)

Note: t-statistic appears in parentheses.

In the Table 3 there are presented the cumulative abnormal returns that followed positive shocks before the global crisis. Depending on the horizon of time, the results provide arguments in favour of all the three hypotheses. For three indexes we found evidences that support UH: BET, for the second and third day, BET-C for the first fourth days and BET FI for the second day. We detect evidences in favour of OH for the second day of RAQ II. EMH cannot be rejected in the case of four indexes: BET NG, BET XT, RAQ C and RAQ I.

The Table 4 presents the values of cumulative abnormal returns that followed the negative shocks before the global crisis. The results provide, for all the eight indexes, evidences in favour of EMH.

Table 5 Cumulative Abnormal Returns following a positive shock during the global crisis

Index	*AR-1*	*ACAR-2*	*ACAR-3*	*ACAR-4*	*ACAR-5*	*ACAR-10*
BET	0.837295 (0.882114)	1.06806 (1.08252)	2.00702 (2.30797**)	2.3822 (2.10447*)	2.6627 (1.51444)	1.1262 (0.35643)
BET C	0.8215 (0.961155)	0.564314 (0.622928)	0.854924 (0.95382)	0.564863 (0.439933)	0.162953 (0.0796474)	-0.330482 (-0.10433)
BET FI	1.30949 (1.39117)	1.28286 (1.91609*)	2.15118 (0.1441)	2.73349 (1.28209)	2.44585 (1.12012)	0.652738 (0.157679)
BET NG	0.744271 (0.753817)	1.17066 (1.22283)	1.11067 (1.16603)	1.28189 (1.01187)	1.01813 (0.515857)	0.134758 (0.04315)
BET XT	0.745012 (0.872271)	1.21718 (1.88119*)	1.51398 (2.0874*)	2.20664 (1.82311*)	1.9061 (1.21401)	1.61665 (0.507954)
RAQ C	-0.328316 (-1.21931)	-0.71745 (-2.053*)	-0.827581 (-2.00641*)	-0.860031 (-1.71945)	-0.378521 (-0.616054)	0.0222189 (0.026588)
RAQ I	-0.112357 (-0.21003)	-0.667927 (-0.81517)	-1.00124 (-1.23041)	-0.934269 (-0.95495)	-1.7033 (-1.16154)	-5.49357 (-2.5054**)
RAQ II	-1.50087 (-2.358**)	-1.66889 (-1.8156*)	-2.03751 (-1.73106*)	-2.41878 (-2.186**)	-2.5439 (-2.04988*)	-4.19852 (-3.022***)

Notes: t-statistic appears in parentheses; ***, **, * mean significant at 0.01, 0.05, and 0.1 levels, respectively

Table 6 Cumulative Abnormal Returns following a negative shock during the global crisis

Index	AR-1	ACAR-2	ACAR-3	ACAR-4	ACAR-5	ACAR-10
BET	0.949883 (0.93285)	0.907245 (0.667444)	3.05091 (2.7961**)	3.74236 (3.13089***)	3.01029 (3.35211***)	1.38333 (0.7853)
BET C	-1.06851 (-1.2235)	-0.878594 (-0.75332)	0.287262 (0.217518)	0.493551 (0.304598)	0.44142 (0.38798)	0.304916 (0.184709)
BET FI	-1.1921 (-1.0139)	-4.64714 (-1.864*)	-6.51558 (-2.4417**)	-6.04578 (-1.93285*)	-4.92266 (2.05731*)	-2.95299 (-0.98518)
BET NG	0.298486 (0.283533)	-0.689456 (-0.38215)	-0.481995 (-0.251708)	-0.269625 (-0.117169)	0.0202664 (0.0120112)	0.0794708 (0.0424339)
BET XT	-1.39257 (-1.29374)	-1.20192 (-0.80738)	-0.524099 -0.324704	-0.362944 (-0.175975)	-0.187294 (-0.125677)	0.518979 (0.227606)
RAQ C	-1.37899 (-1.30749)	-1.84362 (-1.6554)	-1.48335 (-1.3023)	-1.48396 (-1.22557)	-1.39293 (-1.10673)	-1.65857 (-1.24514)
RAQ I	0.621221 (1.43048)	0.699991 (1.02639)	0.197803 (0.185911)	0.522081 (0.502493)	-0.465189 (-0.388121)	-1.26799 (-0.805)
RAQ II	0.805551 (0.946567)	1.46332 (1.22858)	1.56499 (1.33808)	1.62899 (1.14978)	1.40282 (1.04184)	2.57931 (1.67919)

Notes: t-statistic appears in parentheses; ***, **, * mean significant at 0.01, 0.05, and 0.1 levels, respectively

In the Table 5 there are presented the cumulative abnormal returns that followed the positive shocks before the global crisis. The results provide evidences in favour of UH in the case of three indexes: BET, for third and fourth days, BET FI, for the second day, and BET XT, between the second and fourth days. All the RASDAQ indexes offered symptoms of OH: RAQ C for the second and third days, RAQ I for the tenth day and RAQ II for the first fifth days and for the tenth day. For two indexes: Bet C and BET NG, the results indicate that EMH can not be rejected.

The Table 6 presents the cumulative abnormal returns that followed the negative shocks before the global crisis. The results provide evidences in favour of OH for two indexes: BET, between the third and fifth days and BET FI between the second and the fifth days. For the rest of six indexes, the results are in favour of EMH.

6. Conclusions

In this paper we investigated the reactions to shocks of eight indexes from BSE. The results revealed some circumstances with significant influence on the reactions to shocks.

In the case of BET NG and BET XT we find no evidence in favour of UH or OH before the global crisis. This situation could be explained, in part, by the fact that two indexes were introduced in 2007 so the period of analysis was shorter in comparison with the other indexes. However, we also cannot reject EMH for BET NG reactions during the global crisis. This situation could be linked to the fact that circumstances which caused shocks in the Romanian energy sector during the both periods were very heterogeneous.

For the positive shocks from the two periods of time we found underreactions only for BET market, while the overreactions occurred only for RASDAQ market. These results could be explained by the size effect: in the case of small firms stocks from RASDAQ investors' expectations were more optimistic in comparison with the big companies stocks from BET. For the RASDAQ indexes the overreactions were more consistent during the global crisis than before it.

We identified only efficient reactions to the negative shocks before the global crisis. In this period BSE experienced an ascendant trend and the negative shocks were caused by heterogeneous events. During the global crisis we found overreactions on BET market. This

evolution could be explained by the pessimistic expectations about the big companies stocks.

References

[1] Chan K.C., On the contrarian investment strategy, *Journal of Business* 61, pp. 147–163, 1988.

[2] Chan Louis K. C., Narasimhan Jegadeesh, Josef Lakonsihok, Momentum Strategies, *Journal of Finance* 51, pp. 1681-1713, 1996.

[3] Clare A. and Thomas S., The overreaction hypothesis and the UK stock market, *Journal of Business Finance and Accounting*, 22: pp. 961-973, 1995.

[4] Cochrane, John H. *Financial markets and the real economy*. NBER Working Paper 11193, National Bureau of Economic Research, 2005.

[5] Daniel Kent D., Hirshleifer David A. and Subrahmanyam Avanidhar, *A Theory of Overconfidence, Self-Attribution, and Security Market Under- and Over-reactions* February 19, 1997, Available at SSRN: http://ssrn.com/abstract=2017 or http://dx.doi.org/10.2139/ssrn.2017

[6] Daniel K., Hirshleifer D., Subrahmanyam A., Investor Psychology and Security Market Under- and Overreactions, *Journal of Finance*, Vol. 53, pp. 1839 – 1886, 1998.

[7] De Bondt W.F.M. and Thaler R.H., Does the stock market overreact? *Journal of Finance*, 40: pp. 793-805, 1985.

[8] De Bondt W.F.M. and Thaler R.H., Further evidence on investor overreaction and stock market seasonality, *Journal of Finance*, 42: pp. 557-582, 1987.

[9] Fama Eugene F., Efficient Capital Markets: A Review of Theory and Empirical Work, *Journal of Finance*, Vol. 25, pp. 383-417, 1970.

[10] Fama Eugene, Market Efficiency, Long-Term Returns and Behavioural Finance, *Journal of Financial Economics*, 49, pp. 283-306, 1998.

[11] Fama Eugene F., Efficient capital markets: II, *Journal of Finance* 46: pp. 1575-1617, 1991.

[12] Grossman Sanford J. and Stiglitz Joseph E., On the impossibility of informationally efficient markets, *American Economic Review* 70: pp. 393-408, 1980.

[13] Jegadeesh Narasimhan, Titman Sheridan, Overreaction, Delayed Reaction, and Contrarian Profits, *Review of Financial Studies*, Vol. 8 No. 4, 1993, Available at SSRN: http://ssrn.com/abstract=7224

[14] Lasfer M. A., Melnik A. and D. C. Thomas, Short term reaction of stock markets in stresfull circumstances, *Journal of Banking and Finance*, Vol. 27, pp. 1959-1977, 2003.

[15] Rubinstein Mark, Rational markets: Yes or no? The affirmative case, *Financial Analysts Journal* 57: pp. 15-29, 2001.

[16] Skala, Dorota, Overconfidence in Psychology and Finance, *An Interdisciplinary Literature Review* (September 1, 2008), Bank i Kredyt, No. 4, pp. 33-50, 2008. Available at SSRN: http://ssrn.com/abstract=1261907

[17] Spyrou, S. Kassimatis, K. and Galariotis, E., *Short Term Overreaction, Underreaction and Efficient Reaction: Evidence from the London Stock Exchange,* SSRN paper series, pp. 1-47, 2005.

[18] Yu Hsin-Yi and Chen Li-Wen, *Momentum – Reversal Strategy*, SSRN paper series, May 25, 2011. Available at SSRN: http://ssrn.com/abstract=1663266 or http://dx.doi.org/10.2139/ssrn.1663266

[19] Zarowin P., Size, Seasonality and Stock Market Overreaction, *Journal of Financial and Quantitative Analysis*, 25, pp. 113-125, 1990.