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REACTIONS TO SHOCKS OF THE ROMANIAN COMPANIES STOCK PRICES

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Abstract: *In the recent context, capital markets are often affected by extreme events which generate sharp changes to the stock prices. According to the Efficient Market Hypothesis, all the information that causes such shocks is incorporated in the same day in stock prices. However, empirical researches revealed situations in which the reactions of stock prices to shocks lasted for many days. In this paper we investigate the reactions to shocks of the stock prices of 14 companies from the first tier of the Bucharest Stock Exchange. We employ daily values of their closing stock prices between 2000 and 2012. In order to capture the impact of market instability we split this sample of data into two sub-samples: a relative quiet period from 2000 to 2006 and a more turbulent period from 2007 to 2012. We identify positive and negative shocks and we quantify the stock prices reactions to these sharp changes. The results indicate that turbulences of the capital market stimulated underreactions to the negative shocks.*

Keywords: *Stock market shocks, Romanian capital market, Underreaction, Overreaction*

1. INTRODUCTION

In the last decades the capital markets became very sensitive to extreme events that could caused sharp changes of stock prices. The study of the financial market reactions to such shocks is stimulated by practical and theoretical reasons. The knowledge about after shock behaviors of stock returns could be useful in the investment strategies. The financial market reactions to shocks became also one of the main battlefields between two theories: the Efficient Market Hypothesis (EMH) and the Behavioral Finance. EMH presumes that investors behave rationally and all the information that caused a shock is incorporated in the same day in stock prices [5]. By contrary, the Behavioral Finance revealed two types of the irrational reactions. The first type, Overreactions Hypothesis (OH) describes a situation where the investors display exaggerated behaviors when a shock occurs aggravating its effects. In the next days they adjust their attitude restoring the equilibrium [4, 8]. Such circumstances could be exploited by contrarian strategies based on buying the past loser stocks and selling the past winner stocks [1]. The second type, the Underreaction Hypothesis (UH) presents a situation in which investors initially underestimate a shock correcting lately their behavior [6]. This kind of circumstances could be exploited by momentum strategies in which the past loser stocks are sold and the past winner stocks are bought [2].

An important aspect of the after shock reactions consists in their persistence over time. Some studies revealed different behaviors during quiet and turbulent times [3,7].

In this paper we approach the reactions to shocks displayed by the stocks of 14

companies from the first tier of the Bucharest Stock Exchange (BSE). We investigate the after shock behaviors for two periods of time. The first one, from 2000 to 2006, when the Romanian capital market consolidated, could be considered as relatively quiet. Instead, during the second one, from 2007 to 2012, the effects of some processes (Romania's adhesion to European Union, the recent global crisis etc.) generated turbulences on BSE.

The rest of this paper is organized as it follows. The second part describes the methods of investigating the after shocks reactions, the third part presents the results and the fourth part concludes.

2. DATA AND METHODOLOGY

In our investigation we use daily closing values of 14 companies stocks from the first tier of BSE for a time period between January 2000 and December 2012. The sample of 14 companies includes six financial companies: a bank, BANCA TRANSILVANIA S. A. (TLV) and five investment funds (SIFs): SIF BANAT CRISANA S.A. (SIF1), SIF MOLDOVA S.A., (SIF2), SIF TRANSILVANIA S.A. (SIF 3), SIF MUNTENIA S.A (SIF 4) and SIF OLTENIA S.A. (SIF5). There are also eight non-financial companies ALRO S. A. (ALR), ANTIBIOTICE S. A. (ATB), S. C. AZOMUREŞ S. A. (AZO), ELECTROMAGNETICA S. A. BUCURESTI (ELMA), IMPACT DEVELOPER & CONTRACTOR S.A. (IMP), OIL TERMINAL S. A. (OIL), OLTCHIM S. A. RM. VALCEA (OLT) and TURBOMECANICA S. A. (TBM). For each stock we split the sample of data into two sub-samples:

- first sub-sample, corresponding to a relative quiet period, from 1st of January 2000 to the 31st of December 2006;
- second sub-sample, corresponding to a turbulent period, from the 1st of January 2007 to the 31st of December 2012.

The reactions of stock prices to the shocks are analyzed following the method used by Lasfer et al. (2003) [7]. For each stock i we compute the raw return ($r_{i,t}$) by the formula:

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

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

We identify a positive shock occurred in a day t^+ by imposing the condition:

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

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 identify a negative shock occurred in a day t^- by imposing the condition:

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

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

The autonomous shocks are revealed by excluding the successive shocks (A successive shock is a shock that occurs less than 10 days after an autonomous shock).

For each autonomous shock we compute the post-shocks abnormal returns ($AR_{i,t}$) using the formula:

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

Then we calculate the Cumulative Abnormal Returns for the next 1, 2, 3, 4 and 5 days as:

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

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

We compute the Average Cumulative Abnormal Returns of the stock 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 use t-statistics to test the significance of Average Cumulative Abnormal Returns. The results are used in classifying the after shock behaviors 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

The Table 1 reports the reactions to autonomous positive shocks. For the period 2000 - 2006 we find underreactions for six stocks: ATB (the days t+1 and t+5), AZO (the days t+2, t+3 and t+5), OIL (the day t+2), OLT (the days t+1, t+2 and t+3), SIF4 (the days t+3, t+4 and t+5)and TLV (the day t+1). A single stock, ELMA (the day t+5) overreacted, while the other seven stocks exhibited efficient reactions. During the period 2007 - 2012 the results indicate underreactions for five stocks: ALR (the day t+3), OLT (for all five days that followed a positive shock), SIF2 (the days t+1 and t+2), SIF3 (the days t+1 and t+2) and SIF4 (the days t+1, t+2 and t+3), while the other nine stocks had efficient reactions.

The reactions to negative shocks are presented in the Table 2. For the period 2000 - 2006 12 stocks displayed efficient reactions, OIL underreacted (the day t+1), while OLT overreacted (the days t+1 and t+2). During the period 2007-2012 we find overreactions for four stocks: ATB (the days t+4 and t+5), AZO (the day t+4), OIL (the days t+3 and t+4) and TBM (the days t+3 and t+4), underreactions for six stocks: IMP (the day t+3), SIF1 (the day t+2), SIF2 (the days t+1, t+3, t+4 and t+5), SIF3 (the day t+3), SIF4 (the days t+2 and t+3) and SIF5 (the day t+2), while the other four stocks exhibited efficient reactions.

4. CONCLUSIONS

In this paper we analyzed the reactions to shocks of 14 stocks from BSE for two periods of time: the first one relatively quiet, from 2000 to 2006 and the second, a turbulent one, from 2007 to 2012. Our results indicate some significant differences between the two periods.

In the case of reactions to positive shocks we find that passing from quiet to turbulent circumstances increased the number of stocks with efficient behaviors from seven to nine. This change could be associated to the BSE instability which eliminated some patterns in the investors' behaviors. In the case of negative shocks the changes are more obvious. All the five stocks of fund investment passed from efficient reactions to underreactions. This evolution could be linked to a pessimist attitude induced to investors by the global crisis. Such attitude made them believe that effects of the bad news would persist for more than one day.

This investigation could be extended to other stocks from BSE.

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APPENDIX

Table 1 - Reactions to autonomous positive shocks

Stock	Number of positive shocks	AR-1	ACAR-2	ACAR-3	ACAR-4	ACAR-5
Panel A: 2000-2006						
ALR	36	1.28471 (1.12975)	2.15614 (1.23723)	0.666471 (0.351136)	0.57635, (0.290496)	-0.818546 (-0.39608)
ATB	40	1.47279 (2.09871**)	1.83873 (1.60004)	2.34465 (1.54005)	2.63577 (1.581)	3.26851 (1.7502*)
AZO	23	1.83056 (1.64647)	2.67821 (2.31369**)	3.33716 (1.81371*)	2.39534 (1.65175)	3.55225 (2.14091**)
ELMA	32	-1.42958 (-1.10591)	-3.18512 (-1.59113)	-2.09238 (-0.947892)	-2.79982 (-1.52455)	-4.09914 (-1.9347*)
IMP	35	0.109293 (0.138027)	0.400268 (0.398896)	1.29648 (1.02353)	0.103885 (0.0703047)	0.174713 (0.109392)
OIL	35	1.47792 (1.48648)	2.7361 (1.89127*)	2.36805 (1.45265)	2.47425 (1.20813)	2.60958 (1.0877)
OLT	39	2.16208 (2.0455**)	2.69795 (1.7968*)	2.54531 (1.69779*)	2.62837 (1.50555)	1.87578 (0.977103)
SIF1	39	0.991198 (1.50263)	0.369261 (0.38551)	0.950514 (0.825641)	0.774697 (0.663631)	1.95589 (1.59843)
SIF2	43	0.621611 (0.792831)	-0.308069 (-0.325303)	-0.0546573 (-0.063285)	-0.192802 (-0.210617)	0.056298 (0.048057)
SIF3	38	0.241134 (0.403702)	-0.392023 (-0.38363)	-0.058085 (-0.04544)	-0.0940346 (-0.057578)	0.007883 (0.004832)
SIF4	38	0.299996 (0.542162)	0.751979 (0.951136)	2.10742 (2.27312**)	2.24801 (2.11362**)	3.09963 (2.65977**)
SIF5	35	0.62086 (0.753914)	0.599622 (0.718237)	2.20236 (1.63747)	1.76518 (1.49375)	2.2653 (1.5483)
TBM	39	-0.277131 (-0.26535)	-0.357937 (-0.274867)	-0.652565 (-0.474401)	-0.67533 (-0.46758)	-1.20345 (-0.7665)
TLV	34	1.08552 (2.11384**)	0.50092 (0.5788)	0.917534 (1.02003)	1.51017 (1.41469)	1.30297 (0.95927)
Panel B: 2007-2012						
ALR	31	1.12816 (1.57308)	0.948182 (1.02804)	2.27741 (1.75213*)	2.74448 (1.64023)	2.79951 (1.39485)
ATB	32	0.994999 (1.38944)	0.695639 (0.791918)	0.62878 (0.569866)	0.281583 (0.28697)	-0.297027 (-0.278535)

AZO	37	1.18965 (1.19791)	1.01652 (0.721718)	1.5545 (0.804131)	2.42872 (0.978391)	2.5851 (1.03347)
ELMA	34	0.0281777 (0.0297107)	-0.215611 (-0.224353)	-0.191639 (-0.158145)	-0.851403 (-0.646633)	-1.2737 (-0.927948)
IMP	31	-0.134904 (-0.118769)	1.51198 (.90663)	0.885133 (0.399295)	0.926103 (0.343167)	0.86303 (0.25644)
OIL	32	0.912754 (0.817113)	0.590447 (0.418741)	1.01363 (0.749784)	1.05501 (0.708919)	1.05957 (0.672403)
OLT	31	4.982 (3.61657***)	6.23061 (3.46849***)	6.84 (3.08878***)	9.05757 (3.3449***)	11.0244 (3.2176***)
SIF1	28	0.484375 (0.66641)	0.314409 (0.371009)	0.438862 (0.335758)	1.38089 (0.77403)	1.98361 (1.01268)
SIF2	31	1.51855 (2.20264**)	1.30963 (1.71486*)	0.53111 (0.652913)	0.480955 (0.411264)	1.75214 (0.936007)
SIF3	37	1.41469 (2.16775**)	1.19874 (1.74593*)	0.556784 (0.639032)	0.26843 (0.242935)	0.253653 (0.22199)
SIF4	31	1.88128 (2.91357***)	1.71052 (2.88232***)	1.44464 (1.88356*)	0.985456 (1.48065)	1.45146 (1.23076)
SIF5	28	0.712514 (0.941642)	1.07285 (1.11177)	0.418724 (0.321376)	0.803163 (0.431304)	1.88285 (0.81806)
TBM	31	1.00307 (0.914403)	1.2201 (1.17547)	1.2985 (1.0538)	2.42997 (1.54543)	2.26397 (1.3173)
TLV	36	0.321113 (0.605463)	0.358994 (0.525421)	0.744188 (0.87307)	-0.177906 (-0.21463)	-0.464823 (-0.43419)

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

Table 2 - Reactions to the autonomous negative shocks

Stock	**Number of positive shocks**	**AR-1**	**ACAR-2**	**ACAR-3**	**ACAR-4**	**ACAR-5**
Panel A: 2000-2006						
ALR	30	-0.652694 (-0.59151)	-0.147905 (-0.08766)	-1.72605 (-0.755632)	-3.55249 (-1.26144)	-2.3353 (-0.951415)
ATB	27	1.27011 (1.23177)	-0.282812 (-0.17279)	-1.94684 (-0.830454)	-3.07961 (-0.980731)	-5.05781 (-1.29412)
AZO	15	0.391889 (0.220283)	1.63612 (0.587814)	1.55451 (0.592858)	1.8344 (0.591366)	1.2889 (0.401516)
ELMA	25	0.0610092 (0.0820935)	2.58315 (1.59984)	2.4813 (1.42168)	2.19943 (1.3144)	1.43816 (0.758186)
IMP	29	-0.198151 (-0.184435)	-0.569518 (-0.35169)	-0.779294 (-0.378966)	-1.58704 (-0.649825)	-1.70443 (-0.710633)

OIL	20	-2.78912 (-1.85297*)	-1.16255 (-0.65606)	-1.78164 (-0.752569)	-0.79702 (-0.456474)	-0.976569 (-0.554744)
OLT	28	2.2739 (2.65095**)	2.28942 (2.02123*)	2.11817 (1.37588)	3.03578 (1.35113)	2.41127 (0.915416)
SIF1	32	0.711265 (1.04481)	0.33294 (0.310625)	0.621689 (0.548477)	0.407887 (0.309344)	-0.089362 (-0.06001)
SIF2	34	-0.360819 (-0.382265)	-0.371012 (-0.29026)	-0.942389 (-0.59064)	-1.11434 (-0.63838)	-0.776724 (-0.4125)
SIF3	31	0.300398 (0.352551)	0.591515 (0.528843)	0.955291 (0.717792)	1.21581 (0.834575)	1.50397 (0.97561)
SIF4	32	0.277779 (0.271206)	0.754993 (0.484549)	0.917493 (0.54822)	1.03883 (0.545987)	1.05155 (0.506358)
SIF5	35	0.488871 (0.63212)	0.948851 (1.0331)	1.2008 (1.349)	0.993305 (0.81314)	1.16542 (0.935872)
TBM	27	0.991738 (0.63111)	-0.969154 (-0.47511)	-0.565332 (-0.21894)	-1.85852 (-0.55292)	-0.625495 (-0.17014)
TLV	30	-0.668406 (-0.98969)	-0.358702 (-0.35928)	-0.76737 (-0.7582)	-1.99504 (-1.5411)	-2.08526 (-1.2628)
Panel B: 2007-2012						
ALR	25	-0.4333 (-0.4383)	-1.0788 (-0.85063)	-1.68241 (-1.22479)	-2.00722 (-1.35538)	-1.42906 (-0.837285)
ATB	28	-0.607398 (-0.772334)	-1.27836 (-1.09888)	1.2784 (1.22775)	2.09113 (1.9821**)	2.40777 (2.52248**)
AZO	21	2.29972 (1.59046)	3.09297 (1.07643)	4.69142 (1.36501)	6.28902 (1.77089*)	5.26419 (1.16727)
ELMA	23	-1.08166 (-0.864464)	-1.14299 (-0.86586)	-1.56279 (-0.859265)	-0.0716091 (-0.051192)	-0.0114573 (-0.006144)
IMP	30	-1.50804 (-1.56877)	-2.52051 (-1.6048)	-2.91587 (-2.0542**)	-2.11301 (-1.20726)	-2.69441 (-1.53682)
OIL	27	1.30271 (1.31789)	1.17913 (0.943233)	3.35958 (3.1789***)	3.68148 (3.27869***)	4.66966 (3.47756***)
OLT	26	-0.115365 (-0.089129)	-1.41898 (-0.60957)	-0.412388 (-0.157106)	0.564132 (0.219507)	1.15913 (0.411306)
SIF1	28	-1.43278 (-1.51517)	-3.47999 (-2.549**)	-3.01374 (-1.49024)	-2.30056 (-1.0095)	-1.52313 (-0.7717)
SIF2	21	-2.16137 -(1.80833*)	-2.98767 (-1.57792)	-5.04911 (-2.2251**)	-4.6962 (-1.8687*)	-5.05335 (-2.54808**)
SIF3	27	-0.192365 (-0.234544)	-2.0299 (-1.26469)	-3.55446 (-1.84234*)	-3.54032 (-1.50578)	-3.48125 (-1.56693)
SIF4	31	-1.01589 (-1.52425)	-2.27377 (-2.341**)	-2.7007 (-1.9614**)	-1.65515 (-0.99316)	-1.64155 (-1.12451)
SIF5	26	-1.12908 (-1.43636)	-3.45662 (-2.141**)	-2.58622 (-1.42947)	-2.66372 (-1.2851)	-2.09386 (-1.07036)
TBM	31	1.13367 (1.48892)	0.608368 (0.761296)	1.52218 (1.80129*)	2.89066 (1.97659*)	2.16765 (1.2637)
TLV	25	-0.55403 (-0.7199)	0.726172 (0.71938)	-0.763059 (-0.6406)	-0.157031 (-0.1625)	-0.16957 (-0.1315)

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