THE HERDING BEHAVIOR ON SMALL CAPITAL MARKETS: EVIDENCE FROM ROMANIA

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Abstract: *The evolution of financial markets is influenced by the speculative bubbles and by the occurance of financial crisis. The speculative bubbles are formed on the markets when take place an unsustainable growth in the price of a financial asset, which leads to a high level of instability and to the rise of financial crashes. One of the cause of speculative bubbles is the herding behavior of investors characterized by trading in the same direction on the market, the same stocks, in the same period of time, or when they ignore the private information and trades similar with other investors, which may lead to incorrect trading decision. The aim of this paper is to test the existence of herding behavior on the Romanian stock market and the impact of the subprime financial crisis on the behavior of investors. We have analyzed the Romanian stock market on sector level by using firm level data. The statistical methodology used in this paper was proposed by Chang et al. (2000) and uses the cross sectional absolute deviation of returns (CSAD) as a measure of return dispersion.The results indicate the existence of herding behavior of investors in various sectors, both for upper and lower markets. We also conclude that during the subprime crisis, is no evidence of herding, due to the fact that the impact of the crisis was transmitted globally.*

Key words: speculative bubble, herding behavior, financial crisis
JEL Classification: C1, C5, G1,

1. Introduction

The evolution of stock markets is influenced by the occurance of financial bubbles and the manifestation of financial crisis. The bubbles are formed when there is an unsustainable growth in the asset prices, leading to financial instability and to emergence of the market crashes. The effect of a financial crisis persists over time and can take a long period of time for an economy to return to an upward trend, due to the impact of negative shocks caused by the bursting of speculative bubbles.

The history of financial crisis was marked by several speculative bubbles. There is evidence of financial crisis since Mesopotamia, when traders gave loans to farmers, but when the crops were below than expected, the farmers became too indebted, which caused more social protests. After a while, the traders canceled their debts and gave the farmers the opportunity of a new begining. Further, in Ancients Greece, by the Reform of Thessaloniki since 54 BC, were canceled the indebtedness and outlowed the enslavement for debt, in order to improve the situation of the indebted farmers (Brunnermeier and Oehmke, 2012). Moreover, the speculative bubble of the tulip bulbs formed due to the speculation that caused a strong growth of the tulip bulbs prices (Neal and Weidenmier, 2003). The eighteenth century was characterized by the occurance of two bubbles, Mississippi bubble and the Southern Sea bubble. Further, we enumerate the bubbles that led to the financial crisis, with a major impact on the evolution of stock prices: Latin America debt crisis of 1825, the international crisis of 1873, the Barings crisis in 1890, the stock market crisis of 1893, the panic of 1907, the Great Depresion of 1929, the

crisis loans in Mexico and other developing countries in the 1970s, the speculative bubble from the real estate and stock markets in Japan during the period 1985-1989, the speculative bubble from the real estate and the stock markets in Finland, Norway and Sweden during the period 1985-1989, the real estate and stock markets bubble of Thailnada, Malaysia, Indonesia and other countries from Asia during the period 1992-1997, the wave of foreign investment in Mexico in the period 1990-1993, the dot.com bubble in the United States during the period 1995-2000 and the stock market crash from 2007.

Kindleberger and Aliber (2005) defined the speculative bubble as an asset purchase, not because of the return on investment, but to the expectation that the asset can be sold later at a higher price. Further, it is essential to identify the causes which lead to the occurance of the speculative bubbles, the moment when a bubble is formed, to forecaste when will take place the sharp decrease in the stocks prices and the occurance of the stock market crash. But what are the causes that can lead to a speculative bubble? One of the causes of the speculative bubbles is the herd behavior of investors, which implies that investors trades in the same direction on the market (there is a high correlation between investors' behavior), the same stocks, in the same period of time, or when investors ignore the private information that they hold and trades similar with other investors, which could cause wrong trading decisions (Patterson and Sharma, 2007). This irrational behavior of investors lead to deviations of the asset prices from their fundamental value, resulting in a strong growth of the financial asset prices, often followed by the collapse of the prices and the occurrence of financial crashes (Claessens and Kose, 2013).

This paper comes to enrich the existing financial literature by analyzing the presence of the herding behavior of investors on the Romanian capital market at sector level, by taking into consideration several variables: market return, the absolute market return, the market evolution (upper trend, lower trend), the influence of the developed markets and other emerging markets on the Romanian capital market and the impact of the subprime crisis. The paper is structured as follows: Section 2 describes the literature, Section 3 presents the methodology, Section 4 examines the data, Section 5 analyzes the empirical results obtained and in Section 6 are mentioned the conclusions.

2.Literature review

The herding behavior has been the subject of several studies in the financial literature. Chiang and Zhend (2010) have studied the herding behavior for 18 capital markets: developed capital markets (Australia, France, Germany, Hong-Kong, Japan, UK, US), capital markets from Latin America and other markets from Asia, during the period 1988-2009. In order to identify the herding behavior, the authors have used CSSD model and CSAD model and they conclude the existence of herding bahavior in the markets analyzed, except US and Latin America. The investors from Latin America markets herd with US market, but do not herd with other investors from Latin America. For the Asian markets, the results indicate an assymetry in the herding behavior in the case of upper markets. Moreover, the results sustained that a financial crisis triggers the herding behavior in the country of origin of the crisis, and then produces a contagion effect that spreads the crisis in the neighboring countries. Another study was realized by Chaing et al. (2007) for the two phases of the Asian crisis. Using the DCC GARCH model to highlight the contagion between Asian market and US market, which was included in the model as an exogenous global factor, they concluded that the first phase of the crisis was characterized by a contagion evidenced by an increase in correlations and the second phase of the crisis was characterized by a herding behavior sustained by maintaining continuous the correlations at a high level. Moreover, Zhou and Lai (2009) have analyzed the herding behavior in the case of Hong Kong Composite Index, by using intraday

cotations. They concluded that the herding behavior is influenced by the geographical classification and the industry. Also, the results indicate a higher frequency of herding behavior on sales transactions than those on purchases. Also the results provides evidence of informational cascading through the important role of the fashion leaders, when the informed investors trade with noise. Demirer et al. (2009) have analyzed the herding behavior of the Taiwanese stock market, at sector level by using CSSD and CSAD methodology and the space based models proposed by Hwang and Salmon (2004). According to the CSSD method, the herding behavior has not been identified, except the electronic sector. This method can lead to incorrect inferences because do not consider the comovements between the returns of individual assets and the aggregate market returns. The results obtained by CSAD method, which has a nonlinear component and by the state space based models sustained the presence of herding behavior for all the activity sectors. By using CSSD and CSAD methods for both A-shares and B-shares from the Chinese stock market, Tan et al. (2008) found evidence of herding behavior both for A-shares and B-shares. Also, they observed that in the case of monthy data, the presence of herding behavior is lower, indicating that this behavior is much visible on short time horizons. Moreover the authors have studied the presence of asymmetry in the herding behavior depending on the trading volume and the volatility. The results showed the presence of asymmetry in the behavior of investors in Shanghai A shares, especially in periods of upper markets characterized by large trading volumes. For B-shares investors, the results provide no evidence of asymmetry, this market is characterized more by the presence of the institutional investors, compared with A-shares market that is characterized by the presence of individual investors.

Regarding the herding behavior for the Latin America stock markets, Cajueiro et al. (2009) analyzed the development of bubbles and crashes for the most liquid stocks traded on Brazilian Stock Exchange using intraday series during the period January 2008-March 2008. Using the log periodic power model of Sornette, they concluded that this method can be used to predict the end of asset bubbles and a large drowdawn in stock prices.

Regarding the herding behavior for the European markets, Kratunova and Kallinterakis (2007) analyzed the Bulgarian stock market by using the methodology proposed by Hwan and Salmong (2004). The results indicated that the thin trading cause an underestimation of the herding behavior. Another study was realized by Caporale et al. (2008) for the Greek stock market by taking into consideration daily, weekly and monthly data, during the period 1998-2007. By using CSSD and CSAD methodology, the results pointed out that the presence of the herding behavior is stronger for daily data, showing the short term nature of this behavior. Further, the authors concluded that during the crisis of 1999, the investors had a herding behavior, and following that, since 2002, they become more rational, because of the new institutional reforms and the presence of the foreign institutional investors. Pele et al. (2013) studied the herding behavior for the Romanian stock market by using log periodic power low models. Analyzing the evolution of the BET FI Index, they concluded that LPPL models can be used to identify the behavior of a stock market bubble. In the case of BET-FI Index, the LPPL models realized an accurate prediction of the stock market crash in January 2008. In iliquid markets the herding behavior involves expansions in trading activity.

3.Methodology

The analysis of the herding behavior of investors can be realized by using the statistical methods based on returns dispersions: cross-sectional standard deviation (CSSD) and cross-sectional absolute standard deviation (CSAD). In order to capture the return dispersions, Christie and Huang (1995) developed the cross sectional standard deviation model, which can be determined by using the following equation:

$$CSSD_t = \sqrt{\frac{\sum_{i=1}^{n}\left(R_{i,t} - R_{m,t}\right)^2}{(n-1)}}$$

where, n represents the number of firms in the portofolio, $R_{i,t}$ is the observed stock return of industry i at time t, $R_{m,t}$ is the cross sectional average of n returns in the portofolio for day t.

Chang et al. (2000) proposed the cross-sectional absolute standard deviation (CSAD) as a measure of return dispersions:

$$CSAD_t = \frac{1}{n}\sum_{i=1}^{n}\left|R_{i,t} - R_{m,t}\right|$$

The authors considers that during extreme conditions on the markets, they expect that the linkage between return dispersion and market return to be nonlinear.

Similar with Chiang and Zheng (2010), in order to identify the herding behavior of investors for the Romanian stock market, we use the following equation:

$$CSSD_t = \alpha + \gamma_1 R_{m,t} + \gamma_2\left|R_{m,t}\right| + \gamma_3 R_{m,t}^2 + \varepsilon_t$$

where $R_{m,t}$ is the cross sectional average of n returns in the portofolio for day t, $\left|R_{m,t}\right|$ is the absolute value, $R_{m,t}^2$ is the nonlinear component, if the coefficient of this variable is negative and statistically significant, support the presence of herding behavior on the market. According to Chiang and Zheng (2010) the introduction of the variable $R_{m,t}$ on the right side of the equation, compared to the original model proposed by Chang et al. (2000) is due to capture the asymmetric investor behavior under different market conditions.

4.Data

The data used in this study contains daily returns for 33 companies listed in the category I and II on the Bucharest Stock Exchange during the period January 2004 - December 2013. Also, we have analyzed the evolution of BET Index, Dow Jones Average Index, in order to see if investors from the Romanian stock market herd with the investors from US. The herding behavior of investors occurs if they behave uniform and take the same trading decisions. The herding behavior can be observed especially in a group where each member can see the transactions made by other members of the group (Demirer et al., 2010). The analyzed companies were divided into sectors of activities, such as: mining and quarrying, manufacturing, pharmaceuticals, trade, hotels and restaurants, financial intermediation and banking. We have applied the logarithmic return determined as: $R_{t=}\ln\left(\frac{P_t}{P_{t-1}}\right)$where P_t , $P_{t-1}$is the stock price. The data source is BSE.

The table below provides the CSAD daily descriptive statistics related to each sector of activity. The highest mean is recorded in the case of manufacturing, trade and pharmaceuticals indicating significantly higher variations for these sectors. The highest values of volatility are registered for trade, suggesting that the market had unexpected variations due to unexpected news and market shocks. The lowest values of volatility are recorded for the financial intermediation, mining and quarring industry, hotels and restaurants and banking, indicating the possible presence of the herd behavior of investors, taking similar trading decisions.

Table 1: Summary statistics of cross sectional absolute standard deviations

	N	Mean	Min	Max	Std.dev	Skewness	Kurtosis
Mining	5	0.0165	0.0007	0.1839	0.0113	3.0075	24.2378
Manufacturing	6	0.0506	0.0004	0.4345	0.0525	2.4520	7.8846
Pharmaceuticals	3	0.0268	0.0001	1.1416	0.0597	8.8024	116.0103
Trade	4	0.0287	0.0000	9.0774	0.2563	35.0782	136.89
Hotels and restaurants	3	0.0240	0.0001	0.7710	0.0306	12.6484	274.9259
Financial intermediation	8	0.0146	0.0014	0.1399	0.0112	2.8457	13.9009
Banking	4	0.01453	0.0003	1.3311	0.0405	27.991	90.0635

Source: Authors' calculation

5.Empirical results

The table 2 provides the results obtained for the CSAD method. Due to the high variation in dispersion, the model was estimated by using the Newey-West consistent estimator (1997). When building the models, we consider the BET Index as the market index. The evolution of investor behavior is influenced by the evolution of market returns, which may lead to asymmetries in the herd behavior for different market conditions, both for ascending and descending periods (Tan et al, 2008).

The equation of the model has the following form: $\mathrm{CSAD_t} = \alpha + \gamma_1 (1 - \mathrm{D})\mathrm{R_{m,t}} + \gamma_2 \mathrm{DR_{m,t}} + \gamma_3 (1 - \mathrm{D})\mathrm{R^2_{m,t}} + \gamma_4 \mathrm{DR^2_{m,t}} + \varepsilon_t$, where D represents a dummy variable which is equal to one, if the market return for the day t is negative, and zero, otherwise. The estimates regarding the herding behavior of investors in asymmetric market conditions can be seen in the table below.

Table 2: Herding behavior under up and down markets

Industry/Coefficients	Lower market / Upper market				
	α	γ_1	γ_2	γ_3	γ_4
Mining	0.013***	0.323***	-0.162***	-0.966	2.003***
Manufacturing	0.048***	0.262**	0.217	-0.419	2.486
Pharmaceuticals	0.022***	2.352***	-1.801***	**-24.361*** **	**-14.590*** **
Trade	0.022***	0.636***	-0.7707	-4.667	-5.288
Hotels and restaurants	0.017***	0.688***	-0.476***	-2.610	0.556
Financial intermediation	0.011***	1.207***	-1.004***	-10.964***	-6.175***
Banking	0.010***	1.131***	-1.095***	-9.314	-6.744

Source: Authors' calculation, ***Statistical significance at 1%, **Statistical significance at 5%, ***Statistical significance at 10%

The value recorded by $\gamma_3$coefficient is negative and statistically significant for pharmaceuticals and financial intermediation, providing evidence of herding behavior of investors in an upper market. Further, the coefficient γ_4 recorded negative values and statistically significant in the case of pharmaceuticals, and financial intermediation, claiming this herd behavior of investors in a falling market. Financial intermediation and pharmaceuticals are sectors characterized by high liquidity and high volumes of trading, indicating that in the case of small markets, herding behavior determine the expansion in trading activity. Similar assumption were made by Pele et al. (2013) and Lee (2009) The herding behavior is manifested especially in a falling market. Similar results regarding the presence of asymmetry in herding behavior were obtained by Demir et al. (2010) for the Taiwanese stock market.

According to the results obtained from the literature, the herding behavior is more persistent in the periods characterized by extreme events(Chiang and Zheng, 2010; Tan, 2008). To highlight the impact of financial crisis on the herding behavior we have included in the model a dummy variable. In order to quantify the impact of the subprime crisis on the behavior of investors from the Romanian capital market, we have estimated the following model:

$$CSAD_t = \alpha + \gamma_1 R_{m,t} + \gamma_2 |R_{m.t}| + \gamma_3 \left(R_{m,t}\right)^2 + \gamma_4 \left(R_{US,t}\right)^2 + \varepsilon_t$$

Table 3: Herding behavior during crisis periods

Industry	α	γ_1	γ_2	γ_3	γ_4
Mining	0.015***	-0.005	0.308***	-0.482***	0.616
Manufacturing	0.051***	-0.085***	0.289**	-0.341*	0.317
Pharmaceuticals	0.031***	-0.656***	0.308	-1.696***	-0.607
Trade	0.027***	0.009	0.304***	-0.478***	0.360
Hotels and restaurants	0.024***	-0.023*	0.460***	-0.764***	2.833***
Financial intermediation	0.013***	-0.016*	0.367***	-0.581***	1.705**
Banking	0.009***	0.002	0.424***	-0.415	-0.571

Source: Authors' calculation, ***Statistical significance at 1%, **Statistical significance at 5%, ***Statistical significance at 10%

Further, similar with Chiang and Zheng D(2010), we have analyzed the impact of the subprime crisis by taking into consideration the period March 2008 - March 2009, on the herding behavior of investors from the Romanian capital market. The value of the

$\gamma_3$coefficient is negative and statistically significant for mining, manufacturing, pharmaceuticals, trade, hotels and restaurants and financial intermediation, indicating a decreasing and nonlinear relation between return dispersions and market return. The negative values of γ_3 coefficient sustained the presence of herding behavior for all the sector mentioned above. Further, the $\gamma_4$coefficient captures the impact of the subprime crisis on the returns dispersion. No negative value recorded for this coefficient is statistically significant, indicating that there is no evidence to support that in the context of financial crisis, the investors from the capital market in Romania herd to those from the U.S. stock market. The results sustained that the return dispersions are independent from the evolution of financial crisis. These results are similar to those obtained by (Chiang and Zheng, 2010), which concluded that this results may be due to the fact that subprime financial crisis manifeted globally. The values of the variable $R_{US,m,t}$ were already reflected in the values of the variable $R^2_{m,t}$, which determine the estimated value of the coefficient $\gamma_4$to be insignificant.

6.Conclusions

In this paper we have analyzed the herding behavior of investors from the Romanian stock market, at a sector level, by using firm level data of 33 companies, classified in 7 different sectors of activity. Firstly, we have tested the herding behavior both for upper and lower markets, moreover we examined the impact of the financial crisis and the global role of US stock market on the evolution of the Romanian stock market. Using the CSAD method which contains a nonlinear component, developed by Chang et al. (2000), we have concluded that the Romanian stock market is characterized by the existence of the herding behavior of investors. In the case of financial intermediation and pharmaceutical, the results obtained provided evidence of herding behavior, both for an upper an lower market. Analysing the impact of the subprime crisis, we have concluded that investors' behavior is independent toward the financial crisis, due to the fact that the impact of the crisis appears to be global.

References

Brunnermeier, M. and Oehmke, M. (2012) *Bubbles, financial crisis and systemic risk*, National Bureau of Economic Research, Working Paper no. 18398, pp. 3-89.

Chang, E.C., et al. (2000) "An examination of herd behavior in equity markets: an international perspective", *Journal of Banking and Finance*, Vol. 24, No. 10, pp. 1651-1699.

Neal, L. and Weidenmier, M (2003) *Crisis in the Global Economy from Tulips to Today*, Globalization in Historical Perspective, National Bureau of Economic Research, [Online], Available: http://www.nber.org/chapters/c9596.pdf, pp. 473-514.

Kindleberger, C.P. and Aliber, S.A. (2005) *Manias, Panics, and Crashes – A History of Financial Crisis,* John Willey & Sons, Fifth Edition, pp. 1-355.

Patterson, D.M. and Sharma, V. (2007) *Did herding cause the stock market bubble of 1998-2001?*,, Working Paper, SSRN, [Online], Available: https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=SNDE2008&paper_id=60, pp. 1-63.

Bikhchandani, S. et al. (1992) "A theory of fads, fashion, custom and cultural change as informational cascades", *Journal of Political Economy*, Vol. 100, pp. 992-1026.

Claessens, S. and Kose, M.A (2013) *Financial Crises: Explanations, Types, and Implications*, IMF Working Paper, Working Paper no. 28, pp. 2-65.

Chiang, T.C. and Zheng, D. (2010) "An empirical analysis of herd behavior in global stock markets", *Journal of Banking & Finance*, Vol. 34, pp. 1911-1921.

Chiang, T.C. et al. (2007) "Dynamic Correlation Analysis of Financial Contagion: Evidence from Asian Markets", *Journal of International Money and Finance*, Vol.26, pp. 1206-1228.

Zhou, R and Lai, R. (2009) "Herding and information based trading", *Journal of Empirical Finance*, Vol. 16, pp. 388-393.

Kratunova, T. and Kallinterakis, V. (2007) “Does Thin Trading Impact Upon the Measurement of Herding? Evidence from Bulgaria”, *Ekonomia*, Vol. 10, No.1, pp. 1-31.
Caporale, G.M. et al. (2008) “Herding behavior in extreme market conditions: the case of the Athens Stock Exchange”, *Economics Bulletin*, Vol.7, No.17, pp. 1-13.
Demirer, R et al. (2010) “Do investors herd in emerging stock markets?: Evidence from the Taiwanese market”, *Journal of Economic Behaviour & Organization*, Vol.76, pp. 283-285.
Tan, L. et al. (2008) “Herding behavior in Chinese stock markets: An examination of A and B shares”, *Pacific-Basin Finance Journal*, Vol. 16, pp. 61-77.
Pele, D.T. et al. (2013) *Herding Behaviour, Bubbles and Log Periodic Power Lows in Illiquid Stock Markets A Case Study on the Bucharest Stock Exchange*, T2013-109/VIII, Timbergen Institute Discussion Paper, pp. 1-17.
Cajueiro, D.O. et al. (2009) “Can we predict crashes? The case of the Brazilian stock market”, *Physica A*, Vol. 388, pp. 1603-1609.
Christie, W.G. and Huang, R.D. (1995) “Following the pied piper: do individual returns herd around the market?”, *Financial Analyst Journal*, Vol. 51, pp. 31-37.
Chang, E.C. (2000) “An examination of herd behavior in equity markets: An international perspective”, *Journal of Banking and Finance*, Vol. 24, No.10, pp. 1651-1699.
Lee, S. (2009) *Active Investment, Liquidity externalities and Markets for Information*, [Online], Available :http://www.unc.edu/~garciadi/asyinfo/infomarkets.pdf
Newey, W. and West, K. (1987) “A simple, positive semi-definite, heterokedasticity and autocorrelation consistent covariance matrix”, *Econometrica*, Vol. 55, pp. 703-708.