# FINANCIAL CONTAGION AND INVESTORS BEHAVIOR

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*ABSTRACT: International capital markets, in general, seem to be volatile markets, influenced by many factors, a phenomenon that affects both developed markets, as well as least developed, with emerging market economies suffering most because of this. It is clear, however, that volatility will remain for as long as it is delayed the adoption of specific measures at national and international financial architecture level, measures that may be necessary to reduce these risks, to limit their impact, and that the question financial market can relapse in a manner as efficiently as possible.*

*Key words: investor behaviour, financial crisis, rational investor, irational investor, financial contagion*

*JEL codes: G11, G12, G19*

## Introduction

Reducing volatility is an important objective stated by the recent reforms. Mainly, because the high volatility of the international capital markets, and the narrowed capacity of handling this volatility by this markets, makes the countries beneficiary of the contagion, vulnerable to excessively big shocks and crises. Secondly, international capital markets appear to be extremely susceptible to contagion in a frequent manner.

The exact causes of this volatility are not yet known, or the best international financial architecture that can regulate international capital movements. However, reducing volatility and contagion was an important stated objective of recent reforms, contributing to the emergence of two important reasons for reshaping the international financial architecture and standardization of the global economy. First, the high volatility of international capital flows on the emerging markets and the limited capacity of these markets to cope with this volatility make the contagion "beneficiary" country vulnerable to excessively high shocks and crises, frequently and in a disturbing manner. Secondly, the international capital markets appear to be extremely susceptible to contagion. Such proposals to reform the international financial architecture should be based on a thorough understanding of the contagion causes and consequences.

During periods of crisis, the transmission of shocks are transmitted appears to be different and these differences appear to be important for the investors. Empirical studies have helped identify the types of links between countries and other conditions that make a country vulnerable to contagion during financial crisis, although very little is known about the importance of macroeconomic and institutional factors in the propagation of financial shocks. In the same time empirical research has helped identify the countries that are exposed to risk of contagion and some interventionist policy that can reduce risks, although they were able to be identified in a way that is too general to be helpful. Saying that the volatility is a reason is not helping. It might be helpful to find the limit of volatility from which the country enters in a danger zone.

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**The link between volatility and contagion**

Much of the current debate on reforming international financial architecture is aimed at reducing the risk of contagion - best defined, as we already have pointed, as a significant increase of market linkages after a shock suffered by a country (or group of countries). This definition stresses the importance of other links through which shocks are normally transmitted, including trade between countries and financial links. During periods of crisis, the way the shocks are transmitted appears to be different and these differences appear to be important. Empirical studies have helped identify the types of links between countries and other macroeconomic conditions that may make a country vulnerable to contagion during financial crisis, although very little is known about the importance of macroeconomic and institutional factors in the propagation of financial shocks. In the same time empirical research has helped identify the countries that are exposed to risk of contagion and some interventionist policy that can reduce risks, although they were able to be identified in a way that is too general to be helpful.

We can say that contagion is the migration of market disturbances - mostly those who have a negatively impact on the market - from one country to another, a process observed through the exchange rates, prices of shares, bonds, and capital evolution (or trend). The main causes of contagion can be divided conceptually into two categories. The first category focuses on across the border influences arising from the normal interdependence between open economies. This interdependence makes shocks, whether globally or locally, to be transmitted between countries, because of the real and financial links between them. The second category involves a financial crisis, which is not linked to observed changes in macroeconomic bases or other fundamental bases, but it is only the result of the investors behavior or so it seems.

Propagation of financial crisis depends on the integration degree of the financial market. If a country is completely integrated into the international financial market, or if the financial markets in one region are very well connected, assets prices and other macroeconomic variables will evolve in the same manner. The higher is the integration degree, the greater would be the contagion effects of a shock from another country. Conversely, countries that are not financially integrated, because of the limited access to the capital markets or the lack of access to the international financing, are, by definition, immune to contagion. In this sense, global financial markets would facilitate the transmission of shocks, but it wouldn't cause them. Actions of investors, who are ex-ante individually rational, and also collectively rational, even if leads to volatility and may require policy changes, should be considered to be fundamental causes.

Governments and the private sector, as well as international financial institutions, should take measures to minimize and manage the risk of financial contagion. But it is not clear how these measures must be combined to obtain the best result possible. But, should every country have the task of improving its financial sector and increase transparency of data, or there is a need to reform in line with international rules by which investors must operate? Does contagion always show the influence of basic factors or countries simply should have access to greater liquidity so they can withstand the pressures of contagion? To get answers, you must first look at what is known about the causes and transmission of contagion.

Causes of contagion appearance can be divided conceptually into two categories. The first category focuses on across the border influences arising from the normal interdependence between open economies. This interdependence makes shocks, whether globally or locally, to be transmitted between countries, because of the real and financial links between them.

Reacting in the same manner would not normally be called contagion, but if this occurs during a period of crisis and their effect is negative, than this can be called contagion. Most of empirical works seek to explain and compute the degree to which markets react to the same kind of factors and the transmitting mechanisms, for example, how and under what conditions a speculative

attack on a currency can influence other currencies linked through fundamental relationships of any kind (trade, macroeconomic policy, etc.).

The second category involves a financial crisis, which is not linked to observed changes in macroeconomic bases or other fundamental bases, but it is only the result of the investors behavior or other financial agent's behavior. In this definition, contagion appears when a cross border influence come out on another market, even when there are no global shocks and the interdependence and fundamental factors are not the ones that have triggered it. A crisis in one country may, for example, lead investors to withdraw founds from more then one market without taking into account the fundamental economic differences between them. This type of contagion is often said to be caused by "irrational" behavior, such as financial panic, the effect of collective behavior (heard), loss of trust and increased aversion to risk.

**Investor behavior**

Empirical evidence which seem to strongly contradict the assumption that price cannot be determined, but is obtained randomly (random walk) have stimulated the recent development of what has come to be known as "behavior finance". Assumptions behind the theories on the behavior of investors are often based on psychological research or common sense. However, clearly, the study of the behavior or the development of financial markets could benefit of a more complete image, if it would be known how investors actually behave and how they react to the same information depending on the differences between them (behavior conduct).

In the context of the recent financial crisis, was supported by some experts that foreign portfolio investors may have been those which by their reaction (which had the same effect as the market trends) have led to the propagation of the crisis that began in the United States (eg, rushing to buy when the market is growing and rushing to sell when the market is declining), and by their mutual desire to copy the behavior of other investors, ignored the information on the economic fundamentals of the countries on which markets they were investing. This kind of behavior could be exacerbated by the crisis in a manner not justified by the economic characteristics of the country. Understanding the behavior of foreign investors is also relevant to the discussion on the opportunity of having control over the invested capital. A careful statistic documentation of the investors' trading behavior in order to bring evidence for supporting the fairness or falsity of these assumptions is quite small, because there are very few such studies. But the assumption may be related to the development of new literatures in investor's behavior, especially in the financial intern context where there aren't yet too developed individual investors from the financial knowledge point of view. For example, it was supported the hypothesis that the trading behavior of individual investors is often influenced by irrationality, meaning shocks of emotional nature. It was also supported by some experts that institutional investors often have a behavior that imitates the conduct of the other investors from the market, alleged to be more informed, although this trend is in quantitative low. There are also theoretical models, in which there are irrational investors disturbing the market and rational investors who pursued positive strategies of feedback destabilizing prices in the process.

There is the concern that international portfolio investors can transmit information (including events, or lessons and experiences gained from a particular market) and that by sharing information they find on a market to another market could destabilize the second one.

We can question, however, that by their behavior whether rational or irrational investors allow shocks form a country to cross geographic boundaries and to affect the financial market of another country.

Another cause of contagion concerns imperfect information and differences between the investors' expectations. In the absence of better information which asserts the contrary, investors may believe that a financial crisis in one country could lead to similar crises in other countries. A crisis in one country can influence the exchange rate of currencies of other countries with similar

economic conditions, and in investors mind is likely that the same problem occur here. Such behavior may reflect the rational and as well the irrational behavior. If a crisis reflects and reveals weak economic foundation, investors may rationally conclude that the country which is economically and even geographically in the same place, will probably face the same problems; such judgments helps to explain the way in which crises are contagious. This transmission channel assumes, of course, that investors are incorrectly informed about the actual characteristics of each country and therefore they make decisions based on known indicators, including those that have been highlighted in other countries, which may or not reflect the actual state of the vulnerability of the country in question. Information that investors use can also include actions taken by other investors, which leads us to the information asymmetry effect on the investors behavior.

Often investors do not have a full picture of economic conditions since this affects their profits, for that to hold as much information about the market in which they are investing they have to spend more and thus their profits will decrease, at least theoretically. In part, this limitation reflects the cost of collecting and processing the information.

Brokers, traditionally rational agents, recognize that financial agents could close irrational transactions, but argue that this way of trading does not substantially affect the prices as sophisticated investors (arbitrageurs) conduct rapid contrary operations in order to eliminate deviations from the “true” economic value. With this scenario in mind we can say that speculative irrational bubbles can not appear. However, if arbitrageurs are faced with limited capital and assess their investment within a finite time horizon, they could not act against what they see as a deviation from the true economic value. From this point of view, arbitrageurs can not remove a speculative bubble, but neither will participate actively in its formation.

Optimal planning for individuals and organizations depends primarily on the present and forecasted level (or computed based on past income) of income in aggregate stock market. Rapid changes in market prices could cause an incorrect allocation of resources which can be very expensive.

Imagine in alternative a world in which smart investors or arbitrageurs, in fact, can see the direction in which the uninformed investors will be trading and will act before this investors’ action can influence price. Shiller (2000) bring into discussion another reason why institutional capital may evolve in line with the market, noting that: “professional investors… are not immune to the “popular” culture of investment which we can observe at individual investors" wanting to show that if the great mass of investors considered a investment profitable (for example), actions taken by them in accordance with their beliefs will influence professionals investors too.

Taking into account the fixed cost of collecting and processing information, most small investors simply can not afford to collect and process information specific to each country. In contrast, uninformed investors can find a less costly way and, therefore, more advantageous, to follow the trading patterns of informed investors. In making economic decisions, uninformed investors can then take into account portfolio decisions taken by better informed investors, because such decisions may provide useful information on the market.

Both informed and uninformed investors tend to seek out new information from those investors who have acted before them to adjust their portfolios. So, if informed investors withdraw their capital held in a market, information cascade makes that less informed investors to disregard their own information and act in the same sense as informed investors, thus leading to greater output of the capital market. The tendency to follow a collective behavior may increase as countries in which investments may be placed increased and investor’s number increased, therefore increasing the fixed costs of collecting and processing information specific to each country.

Another explanation for the increasing trend of collective behavior is that while investors have become increasingly diverse and establishing a reputation in the market has become relatively more expensive, investors are finding to be less expensive to follow "the herd". Because some investors, particularly fund managers, may be more concerned about maintaining a reputation that

would depend on the performance of their portfolios in relation to a given portfolio of the market, rather than their absolute performance, risk of behavior cascade may be particularly high among institutional investors. Thus, an individual institutional investor may refrain from taking action first, even if market developments favor a new portfolio, for fear of losing good reputation if the decision would prove to be wrong. To be on the safe side, individual investors can follow the collective behavior. All these results imply a rational behavior (albeit limited), but which, however, can cause volatility in financial markets.

Imitating a collective behavior shows a tendency in investors behavior of a particular group to mimic each other trading strategies. Portfolio investors can follow the herd both rational and irrational. Information's asymmetry may cause uninformed investors, but rational ones, to choose to act in the same way as informed investors do, because this ones are thought to be also rational, meaning they will also want to obtain profit; such an example is the "positive feedback" trading model where someone buys securities when their price increases and sells them when prices are falling. This trading pattern may be the result of the extrapolation of investor expectations about the prices of securities, of the automatic orders to stop losses when the price falls below a certain limit, of the forced liquidation when an investor is unable to cope with margin calls or of an insurance portfolio investment's calls for sale of shares when the price falls and for buying them if the price increase. While the problem of information could become more serious, when it comes to invest in a foreign market than when we invest in the domestic market, imitating the behavior of other investors may also have a maximizing tendency.

Following this logic suggests that (1) individual investors tend to imitate the behavior of other investors rather than institutional investors who benefit of financial resources needed for collecting and processing information about foreign markets and (2) non-resident investors have a tendency to imitate much more of the trading strategies of residents investors, foreign investors assuming that the latter have more information about the country in which they live.

There is an alternative explanation for adopting this type of behavior among institutional investors. Unlike the institutional investors, the managers of investment funds are subject to continuous review (e.g., quarterly for mutual funds and annually for pension funds) on their performance in relation to a reference point and / or one from another, determining the investors to mimic each other trading mode to a greater extent. This suggests a forecast made in a perspective opposite to the asymmetry of information, namely (1) institutional investors have a more accentuated "herd" behavior than individual investors, and that (2) there is no presumption that can make as to sustain an increase in this copying behavior for institutional non-resident form the residents ones (assuming that all face the same regular comparison of their performance).

Analysis of concrete situations may partly reveal if higher income generated by trading strategies that rely on the income generated in the past are due to the related risk changing characteristics or to behavioral trends. Suppose, for example, that investors that are generally perceived as sophisticated, are following momentum strategies (which are based on impulse) and get a superior performance (either because of momentum, taking the decisions before others, or because other superior investment features which they possess). Moreover, suppose that investors that are generally perceived as being naive or uninformed or uneducated (those who have lower profits) are adopting contrary trading strategies, perceived as abnormal (or that not take into account the financial theory), thereby obtain an inferior performance. This would be consistent with the assertion that the impulse is a behavioral abnormality in which "smart" investors take advantage of "naive" investors.

The inverse relation between behavior and performance of foreign and domestic investors could be inferred by adding a constraint - each sale transaction coincides with a buying transaction. Therefore if the buying transaction occurs after an impulse, then the sale shows a contrary behavior. This property is also valid for the group transactions. For this reason, when institutional investors'

strategies are characterized by impulse, then the trading act of the investors who do not belong to the institutional class must present contrary behavior, and vice versa.

Generally, the more sophisticated are domestic investors and the greater the capital invested in shares, the less contrary behavior shows the investment strategy.

Creators of the utility theory insist on lowering the relevance of individual investor behavior as financial markets are increasingly driven by institutional investors. These professionals are most likely rational investors; thereby they are sicking to make profit. Of course they benefit of the most effective analytical tools available. In such a market sophisticated investors are the ones which, by exploiting the arbitrage opportunities on the market, establish market prices.

Are professional investors really immune to behavioral abnormalities? We focus primarily on the disposition effect, which describes the tendency of investors to sell shares whose prices have increased (the wining ones) before those whose prices have fallen (the loser one). Behavioral researchers attribute this phenomenon to a combination of "risk aversion" and „anchoring" to an asset. In an efficient market, the disposition effect should not be present, the price paid when purchasing an asset should be a cost much exceeded by the time of sale.

Our results could be part of the manifestation of a much larger phenomenon in which investors, typically, are eager to collect the money that the winning shares brought them or to buy shares with declining prices, or both, whereas sophisticated investors are patient enough to do the opposite. If it is true that non- sophisticated investors react based on past trends, they also should have exaggerated reactions contrary to other types of information such as earnings announcement.

The behavior of individual investors may yet be considered rational and irrational? And which of the two types of behavior can lead to the spread of financial crisis, to the contagion?

**The study**

To analyze the influence of investor behavior, we chose to pay attention to the reaction of Romanian financial market during the last financial crisis. The current financial crisis' starting point was the fall of sub-prime market in the United States in August 2007. This fall had many negative effects on the global financial market: first the U.S. had to act on financial markets by helping financial institutions in difficulty and then lowering FED's (Federal Reserve System) reference interest rate in order to relaunch the real economy. However the measures taken could not stop the propagation of financial crisis on other financial markets.

The Romanian capital market, being an open market, can be influenced by external events, meaning that by definition could be the "beneficiary" of the contagion effect. However, to measure contagion influences in Romania during the current financial crisis we also have to take into account the links with other countries such as trade links, macroeconomic links and policy links and if the Romanian financial market reacts in the same manner in which other states did, states that are linked to Romania in this way, it not shows contagion but only shows the interdependence between Romania and this others countries.

To measure the Romania's commercial linkages with another country should be calculated the share of foreign trade with this country form total foreign trade of Romania.

In figure No: 1 we've selected countries with which Romania is conducting commercial transactions (import and export) that excess at least 1% of total foreign trade of Romania. Romania has the strongest trade links with Italy (22.06% of total) and Germany (15.38% of total). We can see that foreign trade with the European Union member states hold over 70% of total foreign trade of our country. Considering this and also that starting with 2007 Romania is an European Union member state, we could draw the conclusion that trade links, political links and even those made on macroeconomic bases (since the entry into the EU implies the integration into a common market with the same operating rules and later, entering into the euro area) between Romania and the European Union are strong enough that our capital market can be influenced by the development of the European Union capital markets.. As we have brought into question in the beginning of the

article, a financial market crisis, it is transmitted primarily through the classical channels, which shows that the evolution of the Romanian capital market will be influenced by the evolution of capital markets in European Union in a very large proportion. However the influence of these markets may not be 100% because foreign trade does not reach 100% and the macro economical bases are not identical with those of the European Union as a whole.

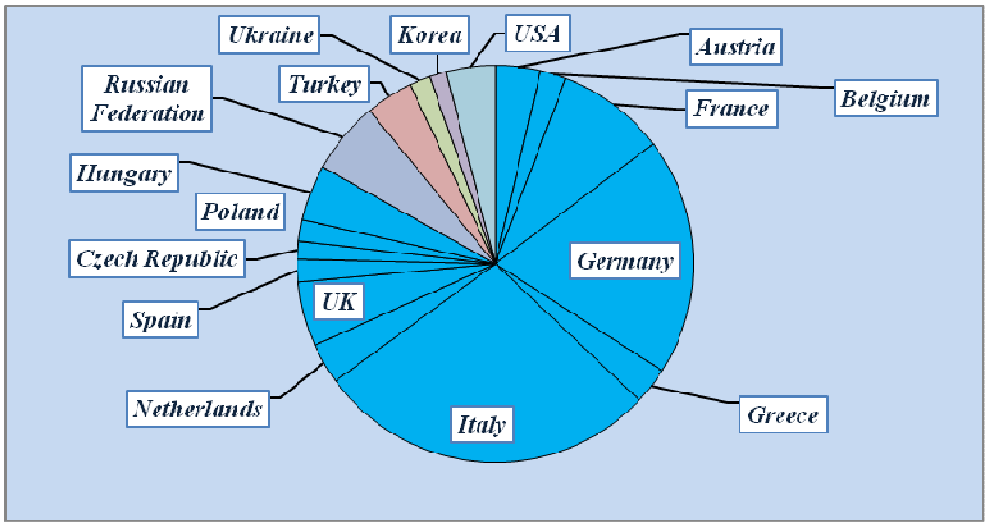


**Fig. no. 1 – Percentage of other countries' foreign trade with Romania**

To see if there is any contagious influence on Romanian market during the crisis we chose to compare the variation in securities prices traded on the capital market. For this we followed the BET and Euronext 100 evolution. BET index reflects the total capitalization of the Bucharest Stock Exchange, the one which represents the Romanian capital market and the Euronext 100 shows the market capitalization for the first one hundred stocks that are the most traded securities of Euronext. In our study we considered the Euronext exchange market as the one market which represents all the influences of capital markets in the European Union. The companies' shares included in the Euronext 100 have more than 80% of market capitalization. To achieve a better comparability of the data set we referred to BET's value expressed in euro (so we made sure that the evolution is not influenced by the exchange rate) and in our charts we translated it's graph into a closer position to Euronext 100's graphic (by dividing the BET value with ten) in order to obtain a better view.

The period of data collection is of 2 years from 21 February 2007 on 19 February 2009, daily recordings (without weekends and holidays). We used this period in order to include both the period before the beginning of the crisis on US sub-prime market and the period extended till after the last drop in the global stock exchange, i.e. 15 October 2008.

So, to be in concordance with the biggest events included in this two years period, we divided our plot in 3 periods first: from 21 February 2007 to August 1 2007 (a period that does not include major events, being the one that shows a normal period), second: from August 1 2007 until June 1 2008 (a period that includes the beginning of the crisis on U.S. market and shows it effects on the other markets), third: from June 1 2008 until 19 February 2009, a period which includes the last fall of capital markets around the world.

We can see from Figure No: 2 that although the general trend of the two indices is the same, namely it shows a growth, the two indices do not evolve in the same way, in an identical manner. There are common points only when price falls and the last part of the BET graph recorded a higher growth than the Euronext index. This is consistent with our theory, namely that between the two markets there is the phenomenon of interdependence and that interdependence becomes stronger only when it was a shock, an abrupt decrease on a market. Since it is impossible that at that time the

degree of interdependence recorded a sudden change in, we could say that is clear evidence of an influence of investor behavior, which reacts to the shock of the first market (probably Euronext) by adopting a similar behavior on the second market. So investors sell assets because they expect their price to fall and thereby lead to a true lowering of prices.

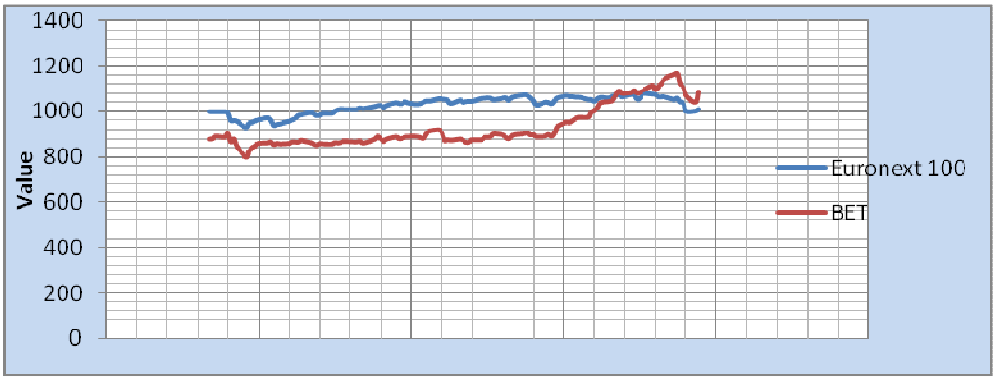


***Figure no.2 - The evolution of the two indexes between 21.02.2007 and 1.08.2007***

While the companies included in the Euronext-100 index have more than 80% of the total capitalization of this market, it is obvious that sudden changes in prices value in this market can be determined only by the behavior of institutional investors, the ones that have the sufficient financial strength to influence the market.

Watching the developments in the BET index we see that on the Romanian market the assets depreciation is more intense. We can thus draw the following conclusions, namely, 1) investors on the Romanian market are uninformed investors (probably because of high costs that would require getting specific information about other countries and because that cost could not cover the possible gains in this market) or in any case they have less information than those on the European market and then mimic their actions to achieve profits or 2) on the Romanian market are the same investors as on the European market and they withdraw funds from our market to cover losses on the more powerful Euronext stock exchange.

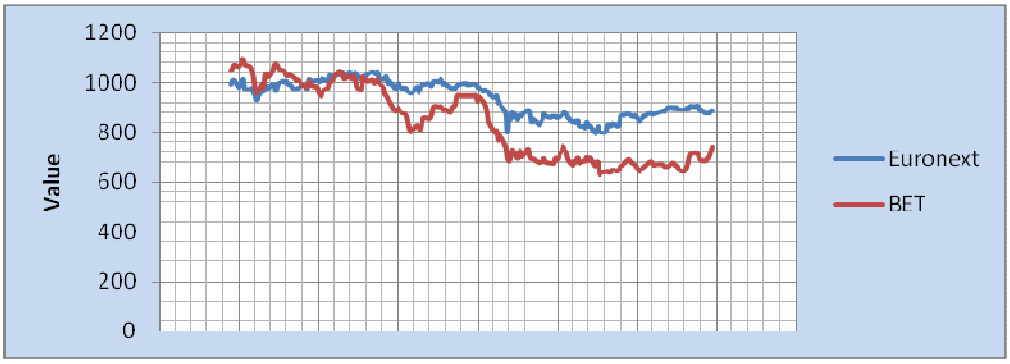


**Figure no. 3 - The evolution of the two indexes between 1.08.2007 and 1.06.2008**

We can remark from the No: 3 figure that after the outbreak of the crisis on the sub-prime market in the United States (first abrupt fall of the figure), the evolution of the two indices is much more similar than in the before period and in the second part of the period (from January 2008), when the financial crisis began to touch financial markets Europe, changes in the two indices are almost identical.

This clearly demonstrates the contagion of the Romanian market (the reverse is probably impossible because the difference in financial power is too high and so an eventual fall of the

Romanian market will not have a powerful effect over the Euronext stock exchange) since the economic or financial crisis was not yet felt by the Romanian economy.

We can see the Romania investor's indecision in the first part of No: 3 figure, who did not know how to react in front of this financial shock. However, with the financial crisis taking over Europe, it seems that investors had withdrew a large part of funds from Romanian market waiting to see how the Romanian economy will react in front of this crisis. While Euronext does not have the same decreasing trend and the same sharp rising of prices, we can suspect that we have to blame the Romanian investors for the market evolution, Romanian investors being much less prepared in terms of trading strategies and did not know how to react. This is again consistent with the theory of investor behavior influence on financial markets, as there is a relative stabilization of the Romanian market in the second part of the graph and we can assume that on the market remained only those investors strong enough to cope with losses, so individual investors were the ones who left the market.

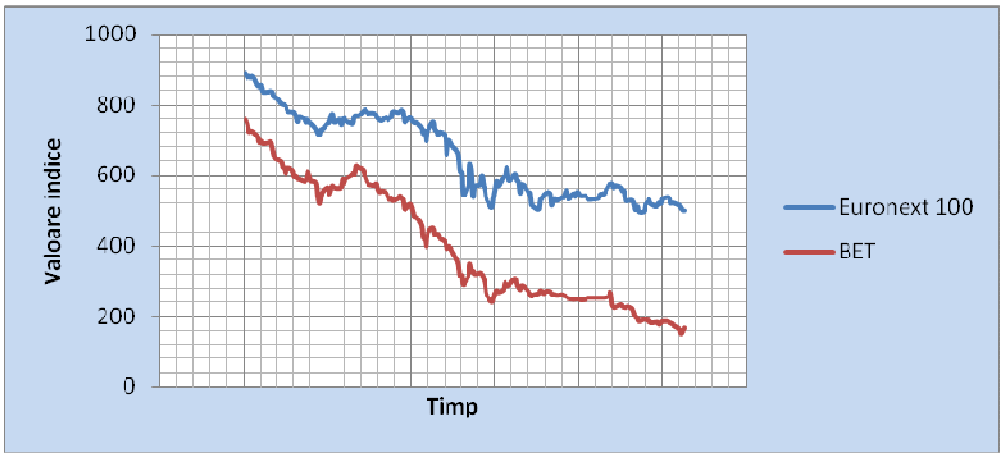


**Figure no. 4 - The evolution of the two indexes between 1.06.2008 and 19.02.2009**

We can notice from No: 4 figure, that along with the awareness of the financial crisis in Europe, till the collapse of stock exchanges across the globe on September 17 and then on October 15 2008, points that are highly visible on our chart, the two indices had a similar trend, but after 15 October 2008 the Romanian market continued to decline while Euronext has managed to maintain. While, most certain other elements of the interdependence equation remained largely the same, the pronounced decrease of the Romanian stock exchange may be due only to the investors behavior, mostly foreign investors. They had to cover the losses they suffered and than it is rational to assume that they have decided to withdraw from those markets that are too volatile (such as Romanian market) to be able to secure profits in other safer markets, the way Euronext would be. A massive withdrawal of such investors has led to a pronounced decrease in assets' prices traded at the Bucharest Stock Exchange, thus reaching the paradoxical situation in which some stocks are traded with a market value that is not even worth half of their economical value.

More than that, we can try to identify specific reaction based on a statistic offered by BVB which is referreing to the hall market in term of residents and nonresidents, firms and peoples.

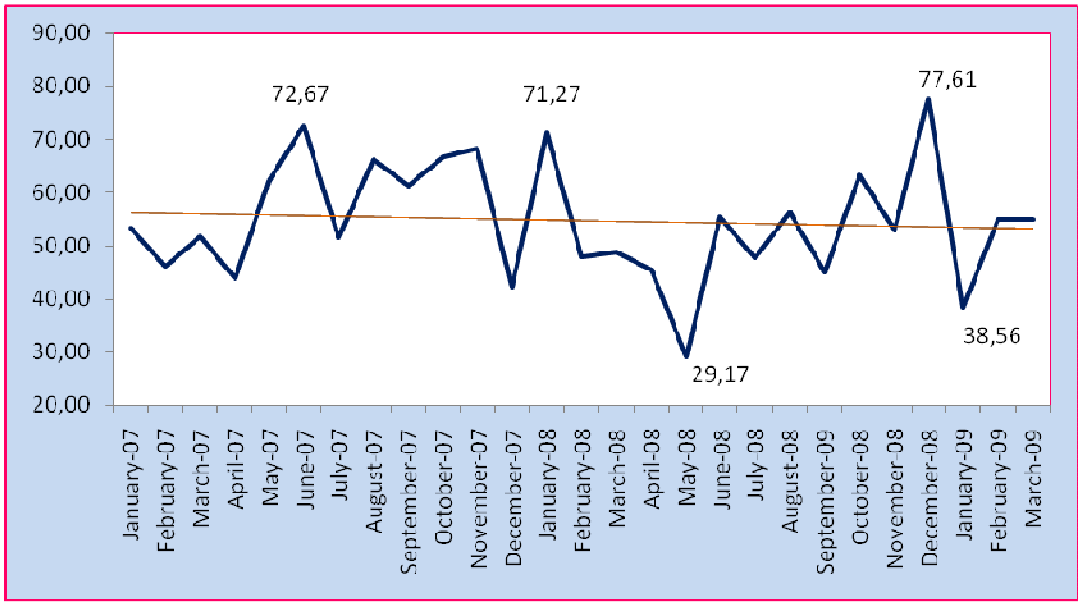


**Figure no. 5 - The procentaje of nonresidents firms sells in total sells of firms**

For the entire studied period, non-residents firms had an average of 54,67% in total sells of participant firms on Romanian market. On the chart are easily observed the higher and the lowest value, meaning 77,61% in December 2008 and 29,17% in May 2008.

So we can say that non-resident firms are not following a long term strategy, their are just "going with the flow" and alos that the non resident firms are ambiguity adverse that way the biggest sell on November 2008 when the Romanian capital market falled.

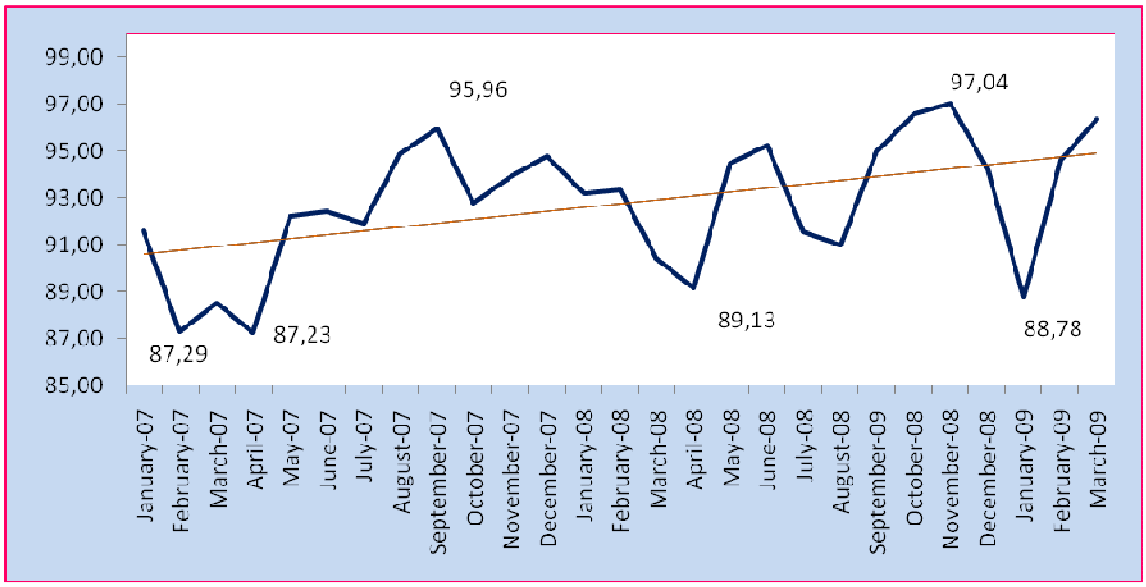


**Figure no.6 - The procentaje of residents non-firms in total purchases of non-firms**

If we take a quick look at the figure no.6 we can draw the conclusion that non-firms are trading based on moods and feeling. Why? Because the range of values of purchases is between 87,29% and 97,04% in total non-firms, but the range of values of sells is between 91,38% and 97,63% in total non firms. We can see that massive purchases in one month are followed by massive sells in another as the example of september-octomber 2007 shows as; Romanian investors

had 95,96% of purchases of nonfirms in September and in October when the crisis started to propagate had the biggest share is sells of nonfirm for the entire period of analysis.

**Conclusions**

The appearance of the contagion phenomena makes a very important object of study in our days. The investors were using international portfolio diversification in order to reduce their risk. Because of the recent development of the financial market (the increased degree of integration) this diversification it can not be easily obtained.

Taking into account the Romanian situation and the way the Romanian capital market has evolved in the period preceding the crisis and in the one after the beginning of the crisis, we conclude the following:

- The investors behavior, whether individual or rational, has a great influence on the capital market evolution;

- Financial markets are contagious in front of financial crises of the other markets only because of the investors behavior, noticing that the shocks registered on a stronger market are most certain transmitted to a smaller exchange stock market. These shocks are transmitted only if they are negative, i.e. indicating a decrease in the value of financial securities. We may therefore surmise that investors are more tempted to imitate the behavior of other investors when they think they will lose otherwise;

Even if we can surly prove that there is an influence of the investor behavior in the propagation of financial crises and sometimes even starting them would be very interesting to quantify accurately their influence to prevent such financial contagion. In light of this study we can add that the comovement of prices in two markets will increase when confronted with crisis making the investors to "lose" their diversification of risk. So by knowing what droves contagion these investors will be again able to lower their risk.

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