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EMERGING MARKETS – GALAPAGOS FOR BEHAVIORAL FINANCIAL RESEARCH

In this paper an analysis of investors' and portfolio managers' psychological characteristics has been undertaken in order to evaluate future movement of index value at stock market. At emerging stock markets the significant high noise does not exist and changes are of recognizable character. Emerging stock markets are convenient for studying the basic legality that rules at financial stock markets. By analyzing the behavior and future index value predictions of portfolio managers and investors at Belgrade stock exchange, we prove that correlated direction of change in investors' sentiments with real values of directed change in stock market index is negatively correlated. The results of the research show that unrealistic optimism and unrealistic pessimism of investors at stock markets in emerging countries are present. Further study of factors which influence decision-makers will be about creating new models for more successful evaluation and prediction of stock market movements.

Keywords: *behavior finance; emerging market; stock exchange; sentiment index; optimism and pessimism.*

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РИНКИ, ЩО РОЗВИВАЮТЬСЯ, ЯК УНІКАЛЬНЕ СЕРЕДОВИЩЕ ДЛЯ ДОСЛІДЖЕНЬ З ПОВЕДІНКОВИХ ФІНАНСІВ

У статті проведено аналіз психологічних характеристик інвесторів і портфельних менеджерів із метою оцінювання майбутнього руху індексної вартості на фондовому ринку. На фондових ринках, що розвиваються, немає високого рівня шуму і зміни носять впізнаваний характер. Такі ринки зручні для вивчення основних законів, які правлять на фінансових ринках. Аналізуючи поведінку портфельних менеджерів і інвесторів на Белградській біржі і прогнозування ними індексної вартості, доведено, що напрям змін в настроях інвесторів з реальними значеннями направленої зміни в біржовому індексі корелюють негативно. Результати дослідження показали, що на фондових ринках країн, що розвиваються, існують нереалістичний оптимізм і нереалістичний песимізм інвесторів. Подальше вивчення чинників, які впливають на осіб, що приймають рішення, матиме на меті створення нових моделей для більш успішного оцінювання і прогнозування рухів фондового ринку.

Ключові слова: *поведінкові фінанси; ринки, що розвиваються; біржа; індекс настрою; оптимізм і песимізм.*

Форм. 2. Табл. 3. Літ. 27.

Снежана Сандо, Младен Радишич, Душан Добромиров

РАЗВИВАЮЩИЕСЯ РЫНКИ – УНИКАЛЬНАЯ СРЕДА ДЛЯ ИССЛЕДОВАНИЙ В ОБЛАСТИ ПОВЕДЕНЧЕСКИХ ФИНАНСОВ

В статье проведен анализ психологических характеристик инвесторов и портфельных менеджеров с целью оценки будущего движения индексной стоимости на фондовом рынке. На развивающихся фондовых рынках нет высокого уровня шума и изменения носят узнаваемый характер. Такие рынки удобны для изучения основных законов, которые правят на финансовых рынках. Анализируя поведение портфельных менеджеров и инвесторов на Белградской бирже и их прогнозы индексной стоимости,

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доказано, что направление изменений в настроениях инвесторов коррелирует отрицательно с реальными значениями направленного изменения в биржевом индексе. Результаты исследования показали, что на фондовых рынках развивающихся стран существуют нереалистический оптимизм и нереалистический пессимизм инвесторов. Дальнейшее изучение факторов, влияющих на лица, принимающие решения, будет иметь целью создание новых моделей для более успешной оценки и прогнозирования движений фондового рынка.
Ключевые слова: *поведенческие финансы; развивающиеся рынки; биржа; индекс настроения; оптимизм и пессимизм.*

Introduction. The estimation of future price movements at stock market, given by portfolio managers and investors, is under the influence of psychological factors. We would like to examine the correlation between movements in the BELEXline index direction and direction of change of BELEXsentiment index movements. BELEXsentiment is expressed as a ponder value of votes of the most active members at the stock market based on the certain criterion of portfolio managers and investment funds as well as the visitors of Belgrade stock exchange website.

The main factor that influences the change in values of stock prices is contained in the increase or decrease of trust among associates at the financial market. It is easy to notice psychological perception of investors at a rising market. Analysis of financial market comovement and correlation is an important issue for both policy makers and market participants, such as portfolio managers.

When investment decisions are made on the expectation base, decision-makers are influenced by real mathematical aims of work as well as subjectively experienced change in the surroundings. On this base studies influence of investment makers are established and how they could be aimed at creating new models which will be used in further decision-making.

In his paper Black (1986) showed that investors, with no access to inside information, irrationally act on noise as if it were information that would give them an edge. According to Kyle (1985), such investors are called "noise traders." Noise trading usually represents the actions of irrational agents (De Long et al., 1990). At emerging markets, such as Belgrade stock exchange, there is no high noise and changes are of recognizable character.

Conditions for investment decision-making. While choosing investment strategies, decision-makers use various data to make decisions, but they are facing certain limitations. Decision-making is not just about evaluating the situation objectively, but also about facing subjective circumstances. Investors often do not have adequate information about the core of a problem, they do not have time or means to get information and often are incapable to understand the given information. They are facing the impossibility of memorizing so many information and limited ability of counting (Simon, 1976). They often make decisions which are not the best but most satisfactory. If the time for decision-making is short or cost of getting information is too high, this method of using the bounded rationality is becoming more important. Decision-makers are relying on heuristic principle as widely knowledgeable strategy based on intuition or which are applicable in similar situations. Daglas Bernheim (2009) in his work supports the attitude which economists should investigate, while the degree of satisfactory as a foundation for prosperity is in question. Perplexity of measuring the

level of satisfaction is directed to the question whether to equalize welfare and self-observed happiness to establish the problem of aggregation, to identify welfare out of neurobiological activities.

Thaler and Sunstein (2003) also think that decision-making is influenced, for example, by the way information is presented and by whom, no matter if the presenter wishes to influence the decision or not and if he is active or not. Libertarian paternalism, such as a suggestion of the concept by these authors, is indicating on minimal limitations when discretion of a person is at stake, also in an inevitable way, planner who sets the conditions which person will choose should do such to bring best possible decision by choosing the best method. Although investors do not have the influence on many factors which are important for the process of decision-making, keeping the influence to the process by which they are making decisions encourages them.

Depending on which method investors apply in decision-making, the process itself depends on the choice of alternatives. The investors have access to the application of methods of decision-making and selection of alternatives that is best in most of the method or approach to the analysis methods themselves and testing the consistency of their solutions and make decisions by applying the best method (Pavlicic, 2004). Although investors have no influence on many factors that influence the decision process, retain influence over the process by which decisions are taken. The choice of models for decision-making is still a subjective element in the decision-making process.

Subjective theory of probability and hypothesis of rational expectations are coming on almost sure future (Davidson, 2002). Aim of these theories is to establish the model of behavior of investor decision-making. Assumption is that investors are rational and they act in ergodic conditions, that is, the structure of process is not changing under the human influence. According to Keynes (1952) the future is not certain or ergodic, basing on previous experience, it is not possible to determine future movements and human decisions, so there is no pre-established balance at financial market. Considering that the future is uncertain and unergodic, foundation of the success at a market is to foresee the situation successfully based on the investor estimation about future market movements by which decisions are made.

Influence of psychological factors on investors behavior. In the behaviorist model of decision-making, emotions play significant role, while rationality is applied in both classical and behaviorist model. Emotional influence is of high importance in making decisions and it is common to all participants of a financial market, regardless their knowledge and experience in investments. Main criterion for rational decision is efficiency. A decision is rational if a decision-maker believes that the chosen means are the most efficient ones, if defined goals are achieved quickest by chosen action and if goals of a decision-maker are real goals that should be set. The influence of psychology in financial decisions was more studied when stock market became available. The psychological influence in investment decision-making is presented by Daniel Kahneman and Amos Tversky in 1979 in their paper "*Prospect Theory: An Analysis of Decision Under Risk*". Psychological phenomenon which affect rational investors decisions are: biases (excessive optimism, overconfidence, confirmation bias and illusion of control), heuristics (shows the influence on decision-making and encircle representativeness, availability, anchoring and adjustment and affect heuristic) and

framing effects (loss aversion, aversion to a sure loss-understand the influence of certain prerequisite made in advance at making a decision). Decision made by investor who applies the classical theory of decision-making is optimal. When behavior theory of decision-making is applied, decisions are satisfactory. Differences between optimal and satisfactory decisions is in request which is established before decision-making, in the number of defined criterion of decision-making, difference in confirmation approach of adequate criterion. Starting criterion of expectation in investment is of great importance. Companies expect high effect of investment in the future, and that shows the importance of studying behavior factors of investor's expectations.

Studying behavior of a person who makes decisions is important because it shows which potential choice would a decision-maker make. Individual differences which psychologists notice as mutual connection which are important for the process of decision-making are:

1. Value – a directive which a person uses when facing decision-making.
2. Personality – the influence of subconscious on decision-maker.
3. Tendency to risk – people could be afraid of risk – risk aversion person, person with neutral attitude to risk – risk neutral person, and risk taker – person who has high tendency to take risk.
4. Potential insecurity – self-confident and weak-willed people have characteristic decisions, as well as knowledge and expectancy of success or failure of already made decision (Donelly et al., 1992).

At a financial market one of the ways to foresee the share price is to apply technical analysis. Making investment decision is mostly benefited in currency trading, semi-success is in future market, but bad success is benefited at stock market. Reason for this result is increased expectation of investors to a risky portfolio, as a compensation for time value of money and system risk, to make more income (Sewell, 2011). Considering the uncertainty of technical analysis at investment decision-making, studying the psychology factors which influence investors is of great importance. Masud (Masud et al., 2011) came to the result that 4 of 5 managers admit the influence of behaviorist factor on decision-making. As a result of the research it is said that the importance of studying investors psychology profiles, considering the studying of classical numerical analysis, which are advocated by the classical economists. Some authors (Sadi et al., 2011) show a strong correlation between investors personality and perceptional errors at a stock market. They also indicate the need to organize a training to lower the bad influence of prejudice.

Unrealistic optimism and unrealistic pessimism. In this work we are going to observe two factors influencing portfolio managers: unrealistic optimism and unrealistic pessimism. In order to conclude whether the rule of unreal optimism and unreal pessimism is applicable at stock exchange of emerging markets we shall investigate the following.

Questioning correlation direction movement of BELEXline and direction of change of BELEXsentiment in the same period. Disposition which a decision-maker can choose from can be positive (*Bonum futurum*) or negative (*Malum futurum*) (Chang, 2009). Reasons why people choose optimism or pessimism is the topic for psychology study and could be well used in researching the rules at financial markets. Psychologists have also known for years that optimism and pessimism exert a great

deal of influence on decision-making, risk-taking, physical and mental health (Chang, 2001).

Optimists are more active and more focused on the methods to fight a problem. Also, optimists are more determined to overcome hard tasks, while pessimists make better effects in the long run (Nes, Segerstorm, 2006). The term "unrealistic optimism" is used in the work of Weinstein and Klein (1996) and the term "unrealistic pessimism" is used by Dolinski and coauthors (1987).

In the work of Heifetz and Spiegel (2004), optimistic or pessimistic agent over-(under) estimates the impact of their actions. Unrealistic optimists tend to make risky financial decisions more frequently. In situations of limited opportunity to evaluate knowledge due to time pressure or lack of information, evaluations are based on affect (Lench, Ditto, 2008). Nofsinger's (2005) research indicates that a high level of optimism in society implies more optimistic investors.

Emerging markets have expressed a positive correlation between investors' overconfidence and trading volume. According to Statman et al. (2006), trading volume has been linked to investor's behavioral biases. Also, contemporaneous is a significant positive relation between volume and volatility, as stated by Zaiane and Abaoub (2009). They conclude that the most prominent explanation of excess volume is overconfidence.

Methodology for calculation of BELEXline index. Belgrade stock exchange index – BELEXline is pondered by market capitalization which is found in the free float and not adaptable for paid dividends. It is not protected from dilatation effect occurring because of dividend payment. Severity of components of the index is limited to a maximum 10% weight, considering free-float market capitalization of the index (Belgrade stock exchange, 2011). Considering that BELEXline in index basket encircles only a hundred most liquid shares, it is believed to be the most precise represent of Serbian stock market. Belgrade stock exchange issues index data starting from 30.09.2004. Start value of the index was 1000,00 index points, while start value of the market capitalization index altogether is: 121.509.581.652,00 dinars (stock market capitalization on the day base data, after the closing of the market). Data number of issuers whose stocks are in the index basket: 100.

BELEXline is counted every trading day as index value and as relative and absolute value of index (in %).

Data about index values BELEXline used in the analysis are from 01.05.2005–31.12.2011.

Methodology for calculation of BELEXsentiment index. Since 2005, Belgrade stock exchange established an indicator based on the prediction of the following month's movement of BELEXline index value. BELEX sentiment is the indicator aimed at identification of expected relevant market participants, considering trend developments of the market movement at Belgrade stock exchange in the following month (Belgrade stock exchange, 2011). BELEXsentiment is an active indicator of market expectancy based on the analysis of the historical data. After conducting a poll of stock market members, portfolio managers of investment and pension funds as well as voices gathered through website, we come to a ponder value of BELEXsentiment. Stock exchange members and fund members are in up to 45%, while Internet voters are present with 10% of the poll. Active participants come out with direction and

intensity of expected movement of index value according to categories: powerful fall, moderate fall, easy fall, stagnation, easy rise, moderate rise and powerful rise.

After BELEXsentiment calculation, the public announcement is done. BELEXsentiment could take values from 0–200, while 100 is the based value. If BELEXsentiment has value less than 100, it would indicate the negative expectations from market investors, while value more than 100 indicates the positive expectation at financial market. Intensity of change is not quantified, but deviations which exist when expectations are moving in the same direction are the subject of the most successful managers' description from the previous period. As various economical factors influence the analysis and prediction occurrences at the market for the following month, the most successful managers will be subject in the paper.

Data and methodology. In the analysis we calculate correlation of two indicators – BELEXline and BELEXsentiment. We saw that emerging stock markets are convenient for studying basic financial principles. The reason for that is the lack high noise and the fact that changes are of recognizable character at emerging stock markets. In the analysis we use the official data from Belgrade stock exchange, monthly values of BELEXline index and BELEXsentiment values for the period from June 2005 to December 2011. Total number of the observed months is 80 (Appendices A and B).

Method I: We use the following scheme:

Strongly following, if $R \geq 2{,}5$.

Good following, if $1{,}5 \leq R < 2{,}5$.

Low following, if $0 \leq R < 1{,}5$.

Let us define the function R as:

$$R = \frac{The\_numbers\_of\_good\_samples}{The\_numbers\_of\_wrong\_samples}, \quad (1)$$

where *The_numbers_of_good_samples* – for proving the hypothesis; *The_numbers_of_wrong_samples* – for do not proving the hypothesis.

Let us denote the value of coefficient $V_n = 1$, when the change of value BELEXline index experiences growth and $V_n = -1$, when the change of value BELEXline falls.

Then, we denote the value of coefficient $S_n = 1$, when the change of direction BELEXsentiment index experiences growth and $S_n = -1$, when the change of direction BELEXsentiment falls. Mathematically, we observed two samples V_n and S_n, with size n, where $n = 1{,}2...80$. When $V_n \times V_{n+1} = -1$, then follows $V_{n+1} = V_m$ and $S_{n+1} = S_m$.

By using the aforementioned criterion, we checked the values and get new series for 27 samples ($m = 1, 2, ..., 27$).

The hypothesis is proven when $V_m \times S_m = -1$.

The hypothesis is not proven when $V_m \times S_m = 1$.

Method II: In calculations we used SPPS statistical tool, through which we got the base statistic values, Spearman's coefficient.

Spearman's coefficient of corelation rank(ρ) is:

$$\rho = 1 - \frac{6 \times \sum_{i=1}^{n} d_i^2}{n^3 - n}, \quad (2)$$

where ρ – Spearman's coefficient; n – number of paired; $d_1 = r(x_i) - r(y_i)$ – difference in paired ranks x i y; i = paired score.

We calculated Spearman's coefficient by using two types of data sets as follows: the direction the values of BELEXline and the direction of change value of BELEXsentiment (<>100). By doing so, we are able to present a quantitative value of equality or inequality between those two rankings. In general, the coefficient of correlation may assume any value on a scale from -1 to +1 inclusively, and it describes the strength of the relationship between two sets of interval-scaled or ratio-scaled variables (Lind et al., 2006). A correlation coefficient close to -1 or +1 indicates a high correlation, correlation coefficient close to -0.5 or +0.5 indicates a moderate correlation, while coefficient close to 0 shows a weak correlation (Dobromirov et al., 2011).

Results.

Method I: We get series of 27 samples from 80 observations. That proof shows that there is not big noise at emerging market stock exchange and we do not have much changing. The results show that the function $R = 2$. Although result of $R = 2$ correlation indicates presence of good correlation. Direction of change index sentiment (decrease or increase) is good correlated to a direction of change of BELEXline. The results of the study show that if the index value has risen last month, investors and portfolio managers will continue evaluation of the trend. Also if the index value has dropped over the last month, estimation will be in the same direction. Considering there is a good correlation, we conclude there is a connection between unreal optimistic influence and unreal pessimistic investor and, therefore, there is a possibility of improving predictions by revealing the influence of psychological factors.

Method II: By using statistical tools we get the results which show that Spearman's (ρ) coefficient of correlation rank ρ = -0,346 is statistically significant at the level $p < 0.05$ (Sig. (1-tailed)). This indicates that direction of change BELEXsentiment is in a moderate negative correlation with direction of change BELEXline (Table 1). Unless value of the BELEXline has been in plus or minus during the last month, investors would prefer to keep the same direction the following month.

Table 1. **Spearman's ρ for direction of change in investor's sentiments and direction of BELEXline**

			V_m	S_m
Spearman's ρ	V_m	Correlation Coefficient	1,000	-0,346*
		Sig. (1-tailed)		0,038
		N – The numbers of samples	27	27
	S_m	Correlation Coefficient	-0,346*	1,000
		Sig. (1-tailed)	0,038	
		N – The numbers of samples	27	27

* Correlation is significant at the 0.05 level (1-tailed).

If we do the accounting direction of change for index value level, considering the previous value, we see that when the index is increasing, direction in the following month could be increasing or decreasing. Emerging markets are without noise and this sample which is relevant for our research is rather small. The numbers of directions of change at the stock market are 27/80, that is 33.75%.

The Spearman's (ρ) coefficient is -0,346, with the level of significance at $p < 0.05$, but the sample relevant is rather small and considering that we use scheme shows in Method 1 and proof that direction of BELEXline and direction of change BELEXsentiment are correlated. Linear rise of direction sentiment change of BELEXsentiment is adequate to direction fall change of BELEXline. This indicates that investors follow their direction of predictions. Unrealistic optimist believes in index value increase, but what is really happening is not necessary the increase of index value. Unrealistic pessimist believes that if there has been a decrease in the previous month, it surely will continue in the following month as well. Real index value is not necessary in decrease.

The proposal of more efficient model for index value prediction, which could coordinate psychological factors and highly correlated values of BELEXsentiment and BELEXline, will be the topic of the following research.

Conclusion. In this paper the analysis of psychological factors in decision-making about investing at Belgrade stock exchange has been considered. decision-makers are influenced by real, mathematical indicators, but also by subjectively experienced changes.

Personal characteristics and psychological profile influence investors and their decision-making. Emerging markets are without big noise and that is why they are convenient for studying basic legalities at financial markets. We have investigated how the rules of unrealistic optimism and unrealistic pessimism work when achieved index value was studied and it influenced the prediction of expected index value by investors and portfolio managers. By using Method 2 proven correlation direction real index value of BELEXline and estimated direction of change of BELEXsentiment show the moderate negative correlation. Meaning, investors in most cases estimate increase or decrease of index value considering achieved value of the previous month. By using Method 1 we proved there is a positive correlation between directions of index movement, which implies to investors sentiment in prediction where he wishes to stay in the same direction. If the value of index was increasing, unrealistic optimist believes it would continue in the same direction. Real values do not show index values increase necessary. Unrealistic pessimist believes, when in the previous period an increase was achieved, that in the following month it will surely decrease. Real value does not show index value decrease necessary.

In the forthcoming research we shall see how behavior factors influence decision-makers, in order to create new models, which will help investors to make more successful estimation of stock exchange movements. Also, we shall compare sentiment index at other stock exchanges in region and we tend to research their correlations.

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Appendix A. **The change of values of BELEXline and BELEXsentiment index**

n	Months	BELEXline Δ %	BELEXsentiment (<>100)	Direction BELEXline V_n	Direction of change BELEXsentiment S_n
1	May 2005	-1,37		-1	
2	Jun. 2005	4,27	-1.44	1	-1
3	Jul. 2005	-1,16	44,33	-1	1
4	Aug. 2005	6,28	26,25	1	-1
5	Sep. 2005	2,62	50	1	1

The end of *Appendix A*

n	Months	BELEXline Δ %	BELEXsentiment (<>100)	Direction BELEXline V_n	Direction of change BELEXsentiment S_n
6	Oct. 2005	1,35	42,08	1	-1
7	Nov. 2005	0,58	23,41	1	-1
8	Dec. 2005	0,11	36,88	1	1
9	Jan. 2006	0,14	29,25	1	-1
10	Feb. 2006	4,86	29,64	1	1
11	Mar. 2006	2,67	44,00	1	1
12	Apr. 2006	-2,35	45,00	-1	1
13	May 2006	3,73	22,14	1	-1
14	Jun. 2006	-4,58	6,50	-1	-1
15	Jul. 2006	5,94	-12,50	1	-1
16	Aug. 2006	3,91	27,69	1	1
17	Sep. 2006	4,46	50,00	1	1
18	Oct. 2006	2,01	54,00	1	1
19	Nov. 2006	1,95	47,86	1	-1
20	Dec. 2006	9,16	40,96	1	-1
21	Jan. 2007	13,36	22,73	1	-1
22	Feb. 2007	9,18	36,25	1	1
23	Mar. 2007	28,28	26,43	1	-1
24	Apr. 2007	17,68	39,09	1	1
25	May 2007	-7,3	21,00	-1	-1
26	Jun. 2007	-3,22	-3,00	-1	-1
27	Jul. 2007	1,79	6,25	1	1
28	Aug. 2007	0,09	40,00	1	1
29	Sep. 2007	-2,4	51,25	-1	1
30	Oct. 2007	-6,77	30,71	-1	-1
31	Nov. 2007	-9,55	-17,50	-1	-1
32	Dec. 2007	2,53	-13,57	1	1
33	Jan. 2008	-5,25	-10,68	-1	1
34	Feb. 2008	-3,61	-30,00	-1	-1
35	Mar. 2008	-12,32	-6,92	-1	1
36	Apr. 2008	-7,98	-33,75	-1	-1
37	May 2008	9,54	0,00	1	1
38	Jun. 2008	0,01	16,25	1	1
39	Jul. 2008	-13,02	17,86	-1	1
40	Aug. 2008	-8	3,75	-1	-1
41	Sep. 2008	-21,53	-15,00	-1	-1
42	Oct. 2008	-27,75	-31,00	-1	-1
43	Nov. 2008	-13,84	-52,71	-1	-1
44	Dec. 2008	-0,86	-45,00	-1	1
45	Jan. 2009	-6,06	-13,33	-1	1
46	Feb. 2009	-15,55	-6,12	-1	1
47	Mar. 2009	-11,18	-31,82	-1	-1
48	Apr. 2009	6,97	-23,61	1	1
49	May 2009	26,39	-6,36	1	1
50	Jun. 2009	2,74	-5,85	1	1
51	Jul. 2009	-1,42	-3,30	-1	1
52	Aug. 2009	17,19	0,94	1	1
53	Sep. 2009	14,26	26,60	1	1
54	Oct. 2009	-1,46	36,80	-1	1
55	Nov. 2009	-13,71	20,02	-1	-1
56	Dec. 2009	-0,34	14,67	-1	-1
57	Jan. 2010	1,61	0,92	1	-1
58	Feb. 2010	2,21	3,89	1	1
59	Mar. 2010	-4,06	6,27	-1	1

The end of *Appendix A*

n	Months	BELEXline Δ %	BELEXsentiment (<>100)	Direction BELEXline V_n	Direction of change BELEXsentiment S_n
60	Apr. 2010	8,53	23,43	1	1
61	May 2010	-10,35	16,73	-1	-1
62	Jun. 2010	-2,65	0,78	-1	-1
63	Jul. 2010	-1,61	4,99	-1	1
64	Aug. 2010	0,59	4,95	1	-1
65	Sep. 2010	0,11	8,54	1	1
66	Oct. 2010	2,08	18,68	1	1
67	Nov. 2010	1,75	14,61	1	-1
68	Dec. 2010	0,69	27,84	1	1
69	Jan. 2011	8,42	-14,01	1	-1
70	Feb. 2011	2,61	-1,19	1	1
71	Mar. 2011	-0,14	22,70	-1	1
72	Apr. 2011	-1,7	26,93	-1	1
73	May 2011	6,79	-0,72	1	-1
74	Jun. 2011	-7,24	16,52	-1	1
75	Jul. 2011	-4,71	-8,66	-1	-1
76	Aug. 2011	-9,18	-10,72	-1	-1
77	Sep. 2011	-9,88	14,64	-1	1
78	Oct. 2011	-1,92	-12.04	-1	-1
79	Nov.2011	-8,26	14,22	-1	1
80	Dec.2011	0,35	-14.41	1	-1

Appendix B. **Hypothesis testing**

m	Months	Direction of BELEXline V_m	Direction of change BELEXsentiment S_m	V_m x S_m	Pred True/False
1.	Jun. 2005	1	-1	-1	T
2.	Jul. 2005	-1	1	-1	T
3.	Aug. 2005	1	-1	-1	T
4.	Apr. 2006	-1	1	-1	T
5.	May 2006	1	-1	-1	T
6.	Jun. 2006	-1	-1	1	⊥
7.	Jul. 2006	1	-1	-1	T
8.	May 2007	-1	-1	1	⊥
9.	Jul. 2007	1	1	1	⊥
10.	Sep. 2007	-1	1	-1	T
11.	Dec. 2007	1	1	1	⊥
12.	Jan. 2008	-1	1	-1	T
13.	May 2008	1	1	1	⊥
14.	Jul. 2008	-1	1	-1	T
15.	Apr. 2009	1	1	-1	⊥
16.	Jul. 2009	-1	1	-1	T
17.	Aug. 2009	1	1	1	⊥
18.	Oct. 2009	-1	1	-1	T
19.	Jan. 2010	1	-1	-1	T
20.	Mar. 2010	-1	1	-1	T
21.	Apr. 2010	1	1	1	⊥
22.	May 2010	-1	-1	1	⊥
23.	Aug. 2010	1	-1	-1	T

The end of *Appendix B*

m	Months	Direction of BELEXline V_m	Direction of change BELEXsentiment S_m	V_m x S_m	Pred True/False
24.	Mar. 2011	-1	1	-1	T
25.	May 2011	1	-1	-1	T
26.	Jun. 2011	-1	1	-1	T
27.	Dec.2011	1	-1	-1	T

T	18	66.67%
⊥	9	33.33%

R = 2

Стаття надійшла до редакції 22.05.2012.