

THE ROLE OF EMOTIONAL FACTORS IN THE FINANCIAL PHENOMENA

Agnieszka Ścianowska*

1. Introduction

In the traditional literature concerning the financial markets, there are two basic assumptions stating the following: during the process of decision making, the subjects gather and use all available information in order to obtain the maximum of usefulness and they have unlimited information processing capacity which enables them to update their beliefs on the basis of new information in continuous way. Such assumptions are based on a belief that individuals act traditionally, i.e. they use all proper information available when they form expectations concerning the future economic situation. (Garcia, Roa, pp. 297-315).

The most recent study on finances suggests that in fact, the information has very little to do with the process of making the financial decision. In many circumstances, the multiple factors of psychological nature not only seem to be crucial during the decision making process, but also shape the role that information plays in them. (Garcia, Roa, pp. 297-315).

Such study has contributed to the development of a new financial concept, the so-called behavioral finances, which focuses on the behavior of investors that leads to multiple market anomalies and market ineffectiveness. This new financial concept explains the individual and group behavior through the integration of knowledge in the fields of: anthropology, sociology, psychology, finances and economics. Thanks to the use of that knowledge, said concept becomes the means to predict the situations which will take place on the financial markets in the future periods, (Park, Sohn, 2013).

The important stage in development of this relatively new knowledge branch is the application of quantitative methods in the analysis and predicting of events on the financial markets including the psychological factors being traditionally considered as impossible to measure.

**Dr Agnieszka Ścianowska, Institute of Social Sciences and Technology Management, Faculty of Organization and Management, Lodz University of Technology.*

2. The financial decision making process in the light of behavioral finances theory

In the matters of traditional look at the financial decisions, the informative problems are perceived as resulting from the complexity of processes concerning savings and investments. The belief dominating for a long time stated that to make such decisions, agents must be able to predict different varieties such as: future interest rate, availability of increasing amount of various financial instruments, probable risk and effectiveness of investment, level of future salary, taxes and inflation, pensions packages concerning the particular person, in progressively complex conditions, as well as uncertain economical and financial surrounding. In accordance with this attitude, in order to make a financial decision, a person needs the information and knowledge of finances, as well as the skill of processing them. As the theory of Fisher, Hicks and Kaldor shows, the early elaborations in finances solved the problem of lack of information and processing skills by introducing the assumption of perfect agents or ideal information, or generally considering simple rules of action based on the situation of partnerships and their forecast results obtained from the financial investments, such as: net present value and internal rate of return (Garcia, Roa, pp. 297-315).

The early research on financing was developed in the conditions of economic and financial environment being much less complex than it is currently. However, along with the increase of financial and economical environment complexity, it became necessary to propose more realistic assumptions on usage and obtaining of the information, especially regarding the fact how the individuals construct the forecasts, which are used then in the decision making. return (Garcia, Roa, pp. 297-315).

In accordance with the theory of rational expectations, which assumes that the individuals use all available information in the intelligent way, i.e. they know the basic patterns of economic policy and the best model reflecting the presence. Simultaneously, the expected changes, especially recalled by the movements in the economic policy, can lead to agent's mistakes because this theory does not assume the perfection of information. However, the mistakes in predictions do not have the systematic nature because agents learn through their mistakes.

Also on the basis of rational expectations, the theories of investments and savings were developed within the frames of lives of Modigliani and Brumberg and the Friedman's theory of permanent income. return (Garcia, Roa, pp. 297-315).

In the traditional theory of investing created by Merton, and Samuelson, it is assumed that the individuals maximize the usefulness by using the information or during the process of learning, by the assumption of rational expectations. Simultaneously, it is believed that the prices of shares reflect the company's

economic condition and give the information which can be later used by agents to formulate the value of future income transfer in the forms of dividend and profits. In this case, the concept of rational expectations leads to the hypothesis of effective markets, in accordance to which, the current market prices of assets reflect all existing information referring to them as well as the future price volatility depending on the accidental and unpredictable occurrence of new information. Due to the fact that in the theory of rational expectations, they are dependent on the information, the low quality of information can lead to the faulty forecast.

As the consequence of the crisis of many traditional financial theories, the approach accepted in matter of behavioral finances was to give the alternative for the theory of usefulness maximization for better presenting of decision making processes, including the psychological factors documented by specialists of cognitive psychology (Schinckus, 2011). The elaborations concerning the behavioral finances are partly caused by the excessive trust in group and cognitive mistakes of particular individuals which lead to the excessive investments in assets bearing risk or show the excessive appetite for risk, opposite to the market signals based on the real, available and clear information (Garcia, Roa, pp. 297-315).

It results from the observed dependency in behavioral finances, in accordance with which the subjects are eager to store information which is consistent with their preferences but they ignore the opposite ones. Therefore, in accordance with the theory of cognitive dissonance, the subjects have greater trust in their beliefs than it is justified and they use only a part of available information. (Garcia, Roa, pp. 297-315) In reality, even if they process the information, sometimes they prefer to ignore it, following the impulse or opinions of others.

Shafir and Tversky (1992) analyzed this effect using „the prison dilemma” and showed that when people were forced to make a decision in the situation including uncertainty, they generally tended to reduce it by obtaining the additional information even if their final decision was not based on it. Apart from this research, other authors showed that the additional information can increase trust in the mad decision, even if the quality and accuracy of this decision is not increased. It suggests that when more information is available, people have greater trust in their beliefs than they should. This phenomenon is known as the „knowledge illusion” and it shows the tendency of growth along with the increase of difficulty in the decision making process. Subjects seek additional information even if it is inadequate, because they believe that obtaining greater amount of information will influence positively the quality of their own decision (Garcia, Roa, pp. 297-315).

The analysis of the problem with obtaining the information and dealing with uncertainty overcame by the individuals within the behavioral finances showed also the significant role of excessive trust in their own beliefs in economic reality perception. The processes of making investment decisions constitute one of the

crucial areas where people reveal, most frequently, the excessive self-esteem which in this context can be defined as overestimating of the obtained information accuracy, which brings the investors to reject the available information referring to the real value of financial assets (Benabou, Tirole, 871-915).

Another characteristic tendency for the decision making processes is occurrence of investors' belief that the available information is the most appropriate; and the assigning a higher probability of events occurring, which is easier to check, more updated and familiar. It led to the formulation of perspective theory by Kahneman and Tversky. The authors such as Goldstein and Gigerenzer, Nisbett and Sloan describing other phenomena, claim that the individuals usually seem to respond to the particular and connected statistical information in a better way than to the statistical information of general nature. It led to the strong development of investment advisory services being characterized through a transfer made by an adviser of the particular information concerning the financial instruments during the conversation which decides about the direction of the investment (Garcia, Roa, pp. 297-315).

However, the experiments conducted by DeBondt and Thaler, (1985) reveal the correctness according to which the investors, characterized by the highest self-esteem, have the tendency to enter into transactions in the more aggressive way in comparison to the others. The authors such as Baker M., Ruback R. and Wurgler J. assumed that there are both rational managers as well as irrational investors in a particular financial market. The investors can overestimate the effects of particular investment which results in the ineffective allocation of capital, rejecting simultaneously the investments with the positive value. On the other hand, the underestimated companies in a good economic condition can be forced to resign from the precious investment opportunities. (Hyoyoun, Wook, 2013).

The similar consequences holds the behavior of irrational investors of fusion transactions and takeovers. Shleifer and Vishny, while analyzing the market of these transactions, offered the temporary model of market. They assumed that because the company-purchaser is often overestimated, the purpose of overtaking is not obtaining the effect of business synergy but maintaining the temporary higher value for the long-term stockholders. Baker, Ruback, and Wurgler (2004) assumed that there are also irrational managers in the capital market who overestimate their skills and are certain that their actions lead to the maximization of company's value. They have the tendency to make exceeded investments until the time when they meet the limit of debt, however the level of over-investment decreases when they need to use their own capital to finance said investment. The development of behavioral finances resulted not only in defining the particular phenomena observed on the financial market but also made them the basis of strategy of behavioral finances. According to Bloomberg, 13 funds use the crucial concepts of behavioral finances (Table 1).

Table 1. The aims of investment funds using the concepts of behavioral finances

Fund name	Fund objective
JP Morgan Undiscovered Value Fund	To recognize irrational investors' behavior and to use it to earn excess profits in the markets
Activ Constant Profit GLB-I	To seek long-term growth
Conquest Behavioral Finance AMI	To achieve an absolute return with a long/short strategy
Activ Trend Global AMI-P	To seek long-term capital appreciation
Deka-BF Eurorenten Total Return-SA	To focus on total return
Deka-Institutionell –Protect A	To produce yields that are higher than comparable money market rates
Fund Advisors Cayaman SPC – Klio Fund	To achieve an absolute return with a long/short strategy.
Dog Fund	To seek long-term capital growth
LGT Global Activ Timer Fund (USD& EUR)	To strive for a dynamic market participation that increases equity exposure when bull markets are expected while decreasing equity exposure in bear a market.
Multi-Axxion Stockpicker	To outperform a portfolio consisting of international equities using a behavioral finance approach
HSH Strategy Sentiment LS	To seek absolute return
Maestro SICAV Lux-TBIC Global Equity Index Strategy Fund	To achieve highest possible return in the reference currency
Peccata Global	To seek mid to long-term returns & growth

Source: elaboration based on: Hyoyoun P., Wook S., 2013.

Despite the fact that from the point of view of effectiveness, the investment funds based on the theory of behavioral finances has better results comparing to other actively managed funds against the assumptions accepted by them (Hyoyoun, Wook, 2013). According to the opinion of such authors as Santoni and Kelshiker (Santoni, Kelshiker, 2010, pp. 56-72) they have no ability to predict the turning points on the market but they are characterized by the lower level of variability. The certain common deviations for all funds can be observed and they result from the behavioral factors on the market, such as the January effect. Because the funds as the investment companies constitute the important group of institutionalized participants of the financial market (Gruszczyńska-Broźbar, 2007). The occurrence of the exceeded self-esteem – as the characteristic of people managing e.g. the hedge funds – can be truly non-beneficial for the economics. It is the crucial factor that the excessive self-esteem occurs in people who are the experts in the particular field and it can lead to prevention of information processing and, as the consequence, to make wrong decisions (Garcia, Roa, pp. 297-315). The managers of these funds, paid depending on the achieved results, can apply multiple investment techniques including the short and long positions and leverage to increase the profits and lower the risk (Łobodziński, 2014). Hedging refers

to all activities aiming at limitation of investment risk connected with the changes of prices on the markets. The increase of risk in the wallet of investment hedge fund – shaped by the instruments such as currencies, shares and derivatives – often constitutes the reason for financial crisis. (Gabryelczyk, Ziarko-Siwek, 2007).

Determining the reasons for these recessions on the basis of theories supplied by the behavioral finances and supported by the use of quantitative methods, can create the significant impact on explanation of the phenomena existing in the financial markets.

3. Measurement of the emotional factors in the financial decision making process

Since the excessive self-esteem results from the theories elaborated within the scope of behavioral finances, it is often the most important determinant of shares' prices. The authors such as Karavias Y., Spilioti S., Tzavalis E. used the econometric techniques in order to determine the degree (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6) of deviation between the market prices of shares and their fundamental value, it can be explained by the risk premium and/or the effect of investors' emotions. The subject of research concerned the moods of investors caused by the effect of „infection”. To count the fundamental values of shares, the authors used the book values and the forecast of annual profits of the companies noted in the stock market during 1987-2012. This way, they used one of the complementary methods of valuation of phenomena occurring on the financial market - the fundamental analysis – aiming at preparing the information necessary to determine the value of company and to estimate the value of its incomes in the future, as well as to determine the expected scale of changes in shares prices (Ostrowska, 2007).

Basing the shares estimation on the book value of the company and value of future profits of the company for a few periods from the future, which can be obtained from the financial statements published by the companies (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6), the authors avoided the assumption concerning payment of dividends which is connected with high uncertainty. The identification of these factors and the measurement of the power of their influence on the prices of shares, helped reveal to what degree, in comparison to the observed numbers, it can constitute the explanation of the level of the general deviation of the prices of shares from their basic values for data in cross-section of branch and for time ranges. Data used in the analysis included 37 companies of index FTSE 100, noted in the permanent way on the stock in Great Britain within 1987-2012. This period includes the range of extraordinary events, such as the crisis of stocks in 1987, 1997, 2001, 2008 and 2010, which can be caused by the influence of the behavioral factors on the prices of shares (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6).

The occurrence of statistical significant dependences as the crucial condition of the quantitative method application (Łuniewska, 2008, p. 18), has been used by the authors to analyze the phenomena in scope of the behavioral finances. The authors used Ohlson's model, in accordance to which, the fundamental value of share i , within time t (marked as), is determined by the book value and the discounted value of future profits, which means:

$$P_{it} = B_{it} + \sum_{\tau=1}^n \frac{\varepsilon(E_{it+\tau} - r_f B_{it+\tau-1})}{(1+r_f)^\tau} \text{ for all } i, \quad (1)$$

Where $B_{it+\tau-1}$ and $E_{it+\tau}$ mean respectively the book value of the company and the profits of company i for one share, r_f is the risk-free interest rate (known as the discount factor), $\varepsilon(\cdot)$ means the expectations operator, depending on the information set of current period it and $E_{it+\tau} - r_f B_{it+\tau-1}$, presents the over average profits of the company i in the future period $t + \tau$, these profits constitute the difference between the profits $E_{it+\tau}$ of the company i by the cost of lost possibilities to invest its capital (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6). In accordance to the competitive powers, it is assumed that the profits $(E_{it+\tau} - r_f B_{it+\tau-1})$ tend to reach zero. Therefore, they are equal 0 in the formula (1), after the period of $t + n$. The model (1) does not include the risk premium and/or the results of investors' moods. These effects can explain the differences between the basic values of share price P_{it}^* , and their market value, marked as P_{it} . It is expected that the results of risk premium lead to the decrease of real (market) price of share P_{it} within time t , in comparison to its basic value P_{it}^* in order to discount the possible future losses or discount the future gains $E_{it+\tau} - r_f B_{it+\tau-1}$. Such losses may require higher expected profits of share i , comparing with those included in its fundamental value P_{it} . On the other hand the effects of investors' moods cause the tendency to overestimate price P_{it} in the periods of optimism in the market and to return towards its basic value P_{it} in the periods of financial crisis (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6). To survey the relative weight of risk premium and/or the effects of emotions in explanation of inclinations of the price of shares from their basic value, i.e. $P_{it} - P_{it}^*$, the authors considered the model (2) determined by means of the following formula:

$$P_{it}^* - P_{it} = c_i + \sum_{j=1}^J \beta_{ij} Z_{ijt} + \sum_{k=1}^K \gamma_{ik} X_{kt} + \delta_i SENT + u_{it}$$

$$u_{it} = \sum_{m=1}^M a_{im} f_{mt} + e_{it}$$

for $i = 1, 2, \dots, N$

$t = 1, 2, \dots, T$, (2) where u_{it} is the determinant of mistake which represents common factor.

The model (2) concerns three different groups of variables explaining the difference between $P_{it} - P_{it}^*$ because every event is the effect of interaction between many factors (Łuniewska, Tarczyński, 2006, p. 9). The first group includes variables Z_{ijt} reflecting the influence of various specific factors for the company such as its profit rate to the price; rate of book value to the market price; and rate of dividend to the price, marked as follows: E/P, B / M i D / P. These variables can cover the factors connected with the risk premium being current in the model of Fama-French (Fama, French, pp. 23-49). It shall be emphasized that this set does not use multiple crucial variables such as: competitiveness, relationships with suppliers and recipients and technological progress (Garstka, 2009). The second group defined by the variables of X_{kt} includes k-observed macroeconomic variables reflecting the volatility of risk premium connected with the business cycle of common values for all shares i (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6). The last group of determining variables includes the factors enabling to cover the effect of investors' moods (marked as $SENT$) (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6).

One of the model advantages (2) is that apart from the observed economical changes it enables to include m-unobserved common factors, explaining the inclinations of $P_{it} - P_{it}^*$, despite those included by means of the observed economical variables. The relative importance of these factors for the difference of $P_{it} - P_{it}^*$ can be assessed by the measurement of model adjusting such as the determination factor R^2 . Panel data methods enable to estimate the time series observations of factors f_{mt} from the residuals of model (2), obtained in a first step, by exploiting the cross-section dimension of the data (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6). Table 2 includes the statistics' influence summary on the deviation $P_{it} - P_{it}^*$ of various groups of variables explaining the model (2), including the factors values of correlations between them.

Table 2. Summary statistics of price deviations and the different groups of explanatory variables of model including correlations coefficient values among all of them

correlation	Price deviations	E/P	B/M	D/P	SIZE	DF	MARKET	SENT	GROWTH	INF	TREM	EXCH
Price deviations	1	-0,08	-0,45	-0,23	0,15	-0,06	0,05	0,06	-0,05	-0,05	-0,005	0,09
E/P		1	0,15	-0,01	0,06	-0,08	-0,00	0,01	-0,06	0,02	0,07	0,02
B/M			1	0,48	-0,18	0,15	-0,06	-0,10	0,07	0,16	-0,10	-0,05
D/P				1	-0,25	0,12	-0,04	-0,10	0,02	0,08	-0,07	-0,04
SIZE					1	0,06	0,31	0,21	0,11	-0,04	0,08	0,15
DF						1	0,23	-0,24	0,65	0,6	-0,69	0,23
MARKET							1	0,17	0,13	-0,03	0,03	0,2
SENT								1	0,14	-0,24	0,4	0,31
Summary statistics												
Mean	1,49	0,13	0,56	0,04	-0,08	5,83	2,10	-0,97				
SD	3,34	1,33	0,48	0,03	0,35	(3,81)	6,87	9,89				
min	-21,23	-2,84	-1,12	0	-3,32	0,24	-16,32	-19,49				
max	23,49	26,6	4,25	0,31	1,79	14,48	13,06	24,43				

Source: elaboration based on: Karavias Y., Spilioti S., Tzavalis E., 2016, pp. 1-6.

The data concerning the market prices are obtained 15 days after the announcement day of annual financial statements from the list when they absorb the information included in the financial statements of the companies. On the other hand, the fundamental prices P_{it} are calculated with regard to the data concerning profits and book value on the day of annual financial statements of the companies. The variable, such as the size of the company „*SIZE*”, is calculated as the product of the market price of the share and the amount of shares in turnover. The variables such as the book values B_{it} and E_{it} are counted appropriately on the basis of balance and summary of gains and losses. E_{it} is used to calculate the extraordinary future gains determined as AE , by the formula:

$$AE = \sum_{\tau=1}^N \frac{\varepsilon(E_{it+\tau} - r_f B_{it+\tau-1})}{(1+r_f)^\tau}$$

where $E_{it+\tau}$ is counted for $N=5$ of future periods and forecast $B_{it+\tau}$ are obtained as:

$$B_{it+\tau} = B_{it} + \tau - 1 + E_{it} + \tau, - D_{it} + \tau$$

where: $D_{it+\tau}$ means the forecast of dividend for the share in the period $t+\tau$.

It is calculated by means of current rate of dividends payment k as $D_{it} + \tau = E_{it} + \tau \times k$. The macro economic variables used in the analysis are measured in the following way: *GROWTH* means the growth rate of GDP UK; *INF* is based on the index of prices of consumption goods of UK; *TERM* is the difference between rate of interests of 10-year-long debentures and 3-month-long treasury bill; *DF* means rate of interests for 3-month-long treasury bill; *EXCH* is the percentage change of real effective currency rate. The annual turnovers on the stock market (MARKET) are calculated on the basis of prices index FTSE100 UK. The variable presenting the sentimental factor SENT is percentage change of moods index marked as SI. This indicator is the weighted average of particular indicators of trust, such as the indicator of trust in: industrial, service, financial, detail trade and construction sectors and the rate of consumers' trust. The advantage of this model is the fact that in comparison to the consumers' trust indicator often applied in the empirical research (SI), it can constitute more representative measurement of investors sentiments maintained in the economics and at any moment (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6).

Table 2 presents the statistics of deviation of prices $P_{it} - P_{it}^*$ and various groups of determining variables of model (2), including the factor of correlation. As well as in other research, the results in the table show that the average values E/P , B/M , D/P and MARKET are positive in scope of the sample surveyed by the authors. Except B/M , D/P and SENT, all other exhibit substantial volatility. The average value of $P_{it} - P_{it}^*$ equals 1.5, not equal to zero at the level of 5% of importance which is coherent with the hypothesis of investors sentiments, stating

that $P_{it} > P_{it}^*$, as the result of excessive optimism. However, the standard deviation and the minimal value of $P_{it} - P_{it}^*$ registered in the table exhibit that there is great probability of negative values of $P_{it} - P_{it}^*$ for example: $P_{it} < P_{it}^*$ for a few cases given in the sample which is consistent with the risk premium hypothesis (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6). Finally, the results in the table reveal that there is low level of correlation between the specific variables for the company and the macroeconomic variables of model which mean that those two different groups of data can be treated as the independent risk sources. The variable connected with sentiments *SENT* seems to be more correlated with the macroeconomic variables *TERM* and *EXCH* than with the variable concerning the economic growth *GROWTH*.

To evaluate the relative meaning of sentiments and the effects of risk premium influence in the explanation of deviations of $P_{it} - P_{it}^*$, the authors conducted the calculations of model for five different specifications. The first one concerns in the model only those variables being connected with the effect of sentiments changes i.e. *SENT*, and second one included only a group of company specific variables such as (E/P, B/M, D/P, size). The third specification includes only the set of macroeconomic variables (*GROWTH*, *INF*, *TERM*, *EXCH*, *MARKET*), and the fourth one concerns simultaneously all aforementioned groups of variables. Last but not least, the final – fifth – specification of the model includes the unobserved factors which had the significant influence on $P_{it} - P_{it}^*$. Despite the aforementioned, there are also two other specifications of the model. The first one uses the percentage change of consumers' trust index, marked as *CC*, instead of the variable concerning the emotions *SENT*, while the second one includes the variable *CRISIS* being useful in covering the effects that are often connected with the periods of financial crisis, where the prices of shares P_{it} tend towards the primary values of P_{it}^* . The interaction of *CRISIS* with *SENT* (or *CC*), defined as $CRISIS \times SENT$, enabled to catch the negative effects of sentiments for the P_{it} prices of shares.

In accordance to the results obtained by the authors, the variable influencing the sentiments of investors (*SENT*) has the significant and positive impact on the deviation of prices $P_{it} - P_{it}^*$ of all alternative specifications of the estimated model. This variable, in reference to the company specific variables or presenting the macroeconomic situation, explains the significant part of whole variability of $P_{it} - P_{it}^*$. The important conclusion from the model on the basis of the deviation estimation concerning the variable which refers to the sentiments is that in normal periods 1% growth of economic sentiments causes the increase of P_{it} price of 2 pence in reference to P_{it}^* , ceteris paribus. The role of variable as the rate of consumers' trust *CC* is also significant at the level of 8%. The negative calculations of deviation for *CRISIS* and $CRISIS \times SENT$ are also agreeable with the forecasts concerning the sentiments

influence on the shares prices in the period of financial crisis. They are caused by the amendments of shares prices P_{it} in regard to their primary values P_{it}^* (Karavias, Spilioti, Tzavalis, 2016, pp.1-6). The following correctness which can be observed, concerns the fact that the specific variables for the company explain higher percentage of entire price change for $P_{it} - P_{it}^*$ than the macroeconomic ones.

The connection of these two groups significantly increases the explanatory power of model (2) which as R^2 reaches the level of 22%, while including in model the unobserved factors increases the explanatory power of model by only 2%. These results exhibit that the majority of volatility $P_{it} - P_{it}^*$ can result from the unsystematic factors ("economic noise") which are not connected with the systematic factors of f_{mt} and other groups of observed variables.

Analyzing the impact of specific features for the company and the macroeconomic variables on $P_{it} - P_{it}^*$, the bilateral dependence for B/M and D/P can be revealed to be in compliance with the hypothesis concerning the risk premium. It can be explained that the growth of B/M or D/P which influences lowering the price of shares P_{it} relatively to P_{it}^* , compensates to investors the possible loss of development of company and gains possibility in the future (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6).

In reference to the macroeconomic group of variables, the results of research reveal that TERM, EXCH and DF have crucial influence on the volatility of shares prices in reference to their fundamental value, at the level of 5%, in all specifications of the considered model. The role of economic growth (GROWTH) is significant at the of 5%, only for the specification of a model without factors f_{mt} level (Karavias, Spilioti, Tzavalis, 2016, pp. 1-6).

The negative estimations of deviation indicators (TERM and DF) can be considered as reflection of potential losses in the share prices caused by future increase of interest rate, and in case of GROWTH, it can mean the worsening conditions in the future perspective of companies' development. Additionally, the positive sign of EXCH deviation can be connected with the fact that the growth of effective real currency rate means the improvement of the international competitiveness with the national economics which decreases the risk of share price.

To check if the above conclusions are applicable in reference to the endogeneity terms resulting from the current correlation between the determining variables and the category of mistake, the estimations of model (2) were presented excepted the non-observed factors f_{mt} , based on the first difference, 2-leveled estimator GMM. Instead of factors f_{mt} , to cover the adjustment of share prices in the past to $P_{it} - P_{it}^*$ all estimated specifications of the model include the dynamic repressors as the deviations from price of one period earlier $P_{it-1} - P_{it-1}^*$. The results for the modified version of a model confirm the strong influence of investors' sentiments on the difference $P_{it} - P_{it}^*$. As before, the negative

calculations of deviation factors of CRISIS and $\text{CRISIS} \times \text{SENT}$ (or $\text{CRISIS} \times \text{CC}$) reflect the amendments of prices P_{it} to their basic values P_{it}^* , occurring in the periods of financial crisis. The role of other determining variables in the model is different only for SIZE because in the modified model, its determining force grows up to 5%, in all versions of model, including the influence of financial crisis on $P_{it} - P_{it}^*$. The positive relation between these variables can reflect the opinions of investors concerning the shares of big companies' capital which are connected with lower risk of bankruptcy due to their size, and which cause higher offered prices in comparison to the small companies (Baker, Wurgler, 2006, 1645-1680). It constitutes another proof for the behavioral attitude to the share valuation.

4. Conclusion

The recalled model of the estimation of the price of shares – based on the forecast of incomes conducted by the analysts and the book values – shows that the inclinations of shares market prices from their basic values can be explained both by the risk premium as well as the effects of the investors' moods. It constitutes the clear evidence of the significant progress in development of relatively new knowledge branch – which is the behavioral finances – by the possibility of applying the quantitative methods to analyze and the psychological factors being traditionally considered as impossible to measure. The use of econometric models enables to catch the significant influence of optimism on the overstating of current prices of shares in comparison to their basic values in the periods of normal business cycle and the influence of negative moods of investors on the return of shares prices to their basic values of financial crisis. The authors of the recalled model showed that the effects connected with the risk premium can be caught by the particular variables such as the relationship between the price and the book value and dividend and the size of the company, and the macro economic variables such as spread between the long-term and short-term earning capacity rate of legal papers, the rates of interests change regarding 3-month long credits and the effective real currency exchange rate. The quantitative methods confirm also the increased correlation between the macroeconomic variables than the microeconomic ones' and the investor's mood (Baker, Wurgler, 2006, pp. 1645-1680). The development of quantitative methods to measure the phenomena occurring in scope of the behavioral finances will result in better understanding of observed values on the financial markets, which must be nevertheless conducted all the time in scope of the theories worked out in cognitive psychology as well as the traditional finances.

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