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Financial Internet Quarterly „e-Finanse" 2018, vol. 14/ no. 2, s. 1-8

DOI: 10.2478/fiqf-2018-0007

DETERMINANTS OF INVESTMENT DECISIONS ON THE CAPITAL MARKET

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Abstract

The article deals with the psychological determinants of investment decisions made by an individual investor on the capital market. The purpose of this article is to try to assess the relationship between capital involvement and selected personality traits and how individuals perceive investments in securities of different nominal unit price. The author attempts to verify whether specific price thresholds affect respondents in a similar way as prices of goods and services to customers, in the context of capital investment. The results of the nationwide survey of 564 individual investors are based on analyses using the model of the willingness to invest in shares with a specific nominal value compared to the individual characteristics of the respondents. The results of the study indicate a significant relationship between personality traits and the tendency to choose stocks with relatively low or very high denomination (current transaction price).

JEL classification: G11, G14, G41
Keywords: Behavioral finance, investment, capital market, investment psychology, denomination effect

Received: 20.11.2017 Accepted: 26.03.2018

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Introduction

Referring to the theory of capital market efficiency, financial assets are valued correctly, prices contain complete information available and provide the best approximation of the real value of securities. Under the assumptions of the market efficiency hypothesis by Fama (1970) it can be maintained that the valuation of assets by investors is rational and strives to maximize the utility of investors by properly and promptly processing all available information (Gajdka, 2013). Meanwhile, as research shows, investors cannot properly value assets, and the irrationality of their behavior is often collective. It is possible to distinguish specific patterns of behavior and stimuli that condition them.

Current world research and this author's research indicate different perceptions of very low-priced stocks, as very risky "penny stocks", as well as high – priced stocks, often associated with reputable and well-known financial companies, called "blue chips". According to the researcher, the individual characteristics and preferences of the investor can significantly determine his or her willingness to engage in equity in low or high priced shares, respectively, as a result of his or her perception of such securities.

The purpose of this article is an attempt to assess the relationship between capital involvement and selected personality traits and how individuals perceive investments in securities of different nominal unit price. The study fits current research trends focused on determinants of investment decisions, price perception, nominal price illusion and low price anomaly on the capital market. Data collected from a survey provides additional information, not available in quantitative analysis.

The following research hypotheses were formulated:

H1: The price of securities is important in the decision-making process of individual stock market investors.

H2: There is a significant correlation between the selected personality traits of the respondents and the way they perceive securities of different denominations.

In order to verify the hypotheses, a survey was conducted among 564 individual investors in Poland. Based on classified data, logit models were constructed to assess the probability of stock selection from a particular price group with a low or high nominal price.

The influence of price on investor behavior

In the field of economic psychology there are many examples of limited usability of models based on the rationality of decisions, such as sudden and impulsive purchasing decisions, excessive risk aversion, overestimation or underestimation (Zaleśkiewicz, 2015, Falkowski & Tyszka, 2006).

The market price of stocks is determined by the demand and supply of a given entity, conditioned by both rational premises and unreasonable investor behavior (Wnuczek & Mielcarz, 2009). A number of phenomena occur around the nominal stock prices that influence investor behavior.

Goodhart and Currio (1990) have observed the phenomenon of decimal price clustering. Price clustering by Harris (1991) and Grossman et al. (1997) reflect implicit agreements in price negotiations. Rounding up prices speeds up and simplifies negotiations. The theory of Christie and Schultz (1994), developed by other authors (eg. Godek, 1996, Kandel & Marx, 1997) refers to the use of price clustering as a means of maintaining a higher spread than would be the case in full competition.

Kandel, Sarig and Wohl (1999) point out that on the capital market IPOs favour round-the-clock prices. According to the authors, the demand for shares is conditioned, in part by the last digit of the share price. For prices ending in 0 and 5 demand for stocks is relatively higher, with prices ending with 0 being used more often than prices ending with 5. Investors participating in IPO transactions tend to use higher prices. In the case of an IPO, pricing strategies or agreements cannot be negotiated to reduce transaction costs, so the authors explain the inclusion of investors as more frequent use of rounds. Fernando, Krishnamurthy and Spindt (2004) also confirm that IPO offer price plays a strong role in determining an investor's investment decisions.

There is strong evidence shown by Green and Hwang (2009) that stocks are categorized by investors based on price. This phenomenon is often used by some companies that proactively manage share prices to keep them relatively stable at a certain nominal range (Weld, Michaely, Thaler & Benartzi, 2009; Baker, Greenwood & Wurgler, 2009). However, it is also noticed that investors' preferences for stocks of different nominal prices are time – varying.

The illusion of price is one of the hypotheses used for justifying splits. Brennan and Copeland (1988), Ikenberry, Rankine and Stice, (1996) explain that managers who proceed with a split are signalling that the company is in good shape and are convinced of its profitability and ability to generate positive cash flows in the future. The hypothesis of optimal-range hypothesis indicates that the division of shares is aimed at attracting attention and gaining smaller shareholders. Although this is one of the more common explanations of the division of shares, the results of research in this area are ambiguous. In some studies, there has been an increase in the number of investors after splitting (eg, Lamourex & Poon, 1987, Amihud & Mendelson, 1988), and others indicate the lack of investor response to splits (Mukherji, Kim & Walker, 1997). Shares with low nominal price are more accessible, especially to minority investors. If more investors are able to buy low priced shares, their liquidity is expected to increase (eg. Baker & Gallagher, 1980; Muscarella & Vetsuypens, 1996; Schultz, 2000).

Hwang and Lu (2008) have shown that stock price is significant and inversely proportional to return rates. Low-priced stocks (penny stocks, with a price lower or equal to $ 5) achieve average returns higher than expensive shares (over $ 20). According to the authors, the strategy of buying low-price shares can provide above-average returns. Profitability of this pricing strategy does not decline over the 2-year period even after taking into account transaction costs and is maintained independently of other parameters such as company size, liquidity, book value to market value, stock-to-equity ratio and past performance.

On the Polish capital market research in the area of the low price anomaly is conducted relatively rarely. Research by Zaremba, Żmudziński (2014) and Zaremba and others (2015, pp. 242-260; 2016, pp. 163-174) were carried out on the Polish market and covered the period between 2000-2014. The study shows that on the Polish capital market there is a reversed effect of the low price, and therefore the situation in which high nominal companies record significantly higher rates of return than relatively low-cost companies. Analyses carried out on the effect of anchoring in merger and acquisition transactions (Biegańska, Jasiniak, Pastusiak & Pluskota, 2016, pp. 451-446) have shown that higher returns were obtained when buying the cheapest shares of the companies acquired 3 months before and during the merger.

So far, it has not been clearly verified why investors are influenced by nominal prices, however, there are some empirical evidences explaining these phenomena.

The average rate of return typical of low-priced stocks (penny stocks) in relation to returns provided by high – priced stocks are explained by Hwang (2008) by the nominal price illusion. If there are two values with the same characteristics and a significantly different nominal price, the same rate of return results in higher stock price rises for stocks with a higher nominal price. Investors naively interpret this phenomenon as based on the how high priced shares are too expensive to grow and expect low price shares to rise at a faster rate. In this perspective, if managers are aware of the preferences of investors, they will maintain low share prices to maximize their value. Kumar (2009) explains this by the 'cheap bets' and lottery stocks. Low price stocks seem to have some features characteristic for lottery stocks and for those investors who search for 'cheap bets' and high profits they seem to be attractive. Another explanation is formulated by Green and Hwang (2009). They indicate that investors may perceive low – priced stocks as those that are close to zero and have higher upside potential that high – priced stocks. A similar theory is described by Baker, Greenwood, and Wurgler (2009) who indicate that investors may suffer from nominal price illusion and perceive that cheaper stocks provide higher growth probability and there is not much to lose.

Methodology of the study

The study proposed in this paper aims to verify the relationship between some specific characteristics of individual investors and their tendency to choose low or high nominal price shares. Research results fit into current research directions related with determinants of investment decisions, price perception on the capital market and the low price anomaly.

The analyses relate to subjective perception of stock nominal value (current price) as a factor determining the potential profit and investment risk of a given asset.

The survey was nationwide and conducted on a sample of 564 individual investors. Sample selection was purposeful. It is representative of the structure of individual investors in Poland, established on the basis of research carried out by the Association of Individual Investors (Retrieved from: http://www.sii.org.pl/11751/

edukacja-i-analizy/badania-i rankingi/ogolnopolskie-badanie-inwestorow-obi-2017.html).

In order to determine the impact of the individual characteristics of the respondent on the choice of preferred stocks (stocks of nominal unit price up to PLN 1, PLN 1 to PLN 10, PLN 10 to PLN 100, above PLN 100), a logit model was used. These models are used to describe qualitative variables in the context of the probability of occurrence of a phenomenon in the form of a binary variable. For the purpose of the study, the variable is the choice of high denominated shares or none. The linear probability model in the theoretical form can be written as:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_k x_{ki} + \varepsilon_i$$

where:

y (i) is a zero-one variable,

x (1, 2...) is an explanatory variable,

β (1, 2...) is a regression parameter,

i – number of observations,

It should be noted that:

$$\hat{Y}_i = E(Y_i) = P\{Y_i = 1\} \times 1 + P\{Y_i = 0\} \times 0 = P\{Y_i = 1\} = p_i$$

However, from the functional form of the model it follows that:

$$\hat{Y}_i = E(Y_i) = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_k x_{ki}$$

From the above it follows that:

$$p_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_k x_{ki}$$

where:

p (i) is a probability of certain phenomena occurance.

This means that the theoretical value of the explanatory variable can be interpreted as the probability that the variable y (i) will be 1. In the logistic probability model, the function has the form:

$$p_i = \frac{e^{z_i}}{1 + e^{z_i}}$$

where:

$$z_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_k x_{ki} + \varepsilon_i$$

Two separate estimates have been proposed, which in different ways answer the question about the most commonly used groups of shares.

Q: What kind of financial instruments is most often chosen for investment (please indicate only one answer):

a) Stocks up to 1 PLN;
b) Stocks of value from 1 to 10 PLN;
c) Stocks of value from 10 to 100 PLN;
d) Stocks of value exceeding 100 PLN.

Only the answers of respondents who chose extreme options - a and d, corresponding to the stocks up to 1 PLN and above 100 PLN, were included in the first variant of the model. The second version of the model assumes grouping answers a and b as options "0" and answers c and d as option "1". In this way, in the second model, the price group of cheap and expensive shares was extended, dividing them into unit prices of up to 10 PLN and above.

Perception of low and high – priced stocks - survey results

Firstly, a model was created in which the decision on the choice of low or high – priced stocks was based on the purchase of stocks up to PLN 1 or over PLN 100. The selection of the penny stock portfolio is marked as a "0" decision, while the selection of a portfolio of companies with nominal value of over PLN 100 is a decision of "1". The following characteristics of the respondent were analysed:

1) invested capital (% of income) - a variable describing the total capital invested on the stock market as a percentage of total income,
2) value of the portfolio (PLN) - value of the investment portfolio managed by the investor, expressed in PLN,
3) investment period - the period of time describing investor experience, time since when investor has been investing in the capital market,
4) frequency of transactions - the frequency of stock transactions made during the year by the investor,
5) price group of shares with an above-average return rate - subjective opinion of the respondent on the probability of achieving an above-average return on shares with a unitary market price of 9.99 PLN, from 10 PLN to 99 PLN and above 100 PLN,
6) the position after the loss - the period after which the investor withdraws from the loss position - from 1 to 2 days after the occurrence of the loss, within a week, a month, a quarter or later from the occurrence of a loss,
7) risk of loss / profitability - subjective evaluation of the respondent in relation to the stock market transactions – which statement is closer: the stock market is a risk of loss / stock market is a chance for profit,
8) gender,
9) education: basic, basic vocational, secondary,

higher (including postgraduate) major (economics, finance, financial / capital markets, management), higher (including postgraduate)

10) the level of optimism - established on the basis of LOT - R life - orientation test (Jurczyński, 2009).

Below is the specification of the final model that makes the decision dependent on the respondents' characteristics.

Number of 'correct prediction' cases = 117 (94,4%)

f(beta'x) to the average of independent variables = 0,475

The likelihood ratio Chi-square(6) = 103,799 (0,0000)

According to the specification, it was found that people who spend a small percentage of their income on capital investments are more likely to buy penny stocks. With the increase in capital involvement, the desire to buy such companies decreases. Another important factor is market experience declared by respondents. People who are less active in the market are most likely to buy cheap companies. With the increase in investment time, which we can identify with increased experience, the desire to own pennies decreases. According to the author, this situation is related to the fact that more experienced investors are more aware of the potential risks of sudden price fluctuations, which in the case of penny stocks quickly translate into a relatively high percentage of change in the level of capital held.

The next element that determines the purchase of high – priced stocks is the belief that the above-average return on these stocks is possible. Hence, for investors who perceive a positive relationship between stock prices and the probability of above-average returns, this is the case.

Another important element is the way the stock market is viewed - whether the investor treats it as a chance for profit or risk of loss - which reflects to some extent the level of investor optimism. In the case of investors who perceive the stock market as a profit opportunity, there is a greater tendency to acquire shares with a low nominal price. Assuming that penny stocks are characterized by a higher risk, investors' optimism seems to level them down. This also confirms the conclusions based on LOT-R's life-orientation test. Also, in this case, those who score higher for their optimistic attitude show a greater tendency to show interest in penny stocks.

The model also shows a positive correlation between the level of investor education and the direction of investing. People with higher education are more likely to purchase stocks with a high unit nominal price. We may associate this with earlier conclusions from the stock market questionnaire expressed by market engagement time. Investors with more knowledge are more aware of the additional risks associated with penny stocks.

It is worth pointing out that the proposed model by 94.4% correctly predicted the respondent's decision on the company's willingness to invest in very cheap (up to 1 PLN) or relatively expensive shares (from 100 PLN). This is a very high and unequivocal indication that the psychological characteristics and perception of reality shape the investor's approach to the growth potential of the companies concerned based on the current stock price.

The second method proposed by the author is to extend the perception of low – priced stocks to the range of 0 to 10 zlotys (option "0"), and high – priced stocks will be seen as all more expensive than 10 zlotys (option "1"). The purpose of calculating this variant is to check the consistency of the respondents' perceptions of stock prices and to verify whether there are indications of a

Table 1: Model of the *extreme* version A = 0 / D = 1

	Factor	Standard error	z	Value p	
Const	-7,86412	2,64793	-2,9699	0,00298	***
Invested capital (% of income)	0,764073	0,380726	2,0069	0,04476	**
Investment period (years)	0,992772	0,350431	2,8330	0,00461	***
Price group of shares with an above-average return rate	3,4917	0,713768	4,8919	<0,00001	***
Risk of loss / profitability	-2,2174	1,00246	-2,2120	0,02697	**
Optimism	-1,28147	0,724797	-1,7680	0,07706	*
Education	0,821966	0,441389	1,8622	0,06257	*

Source: Own elaboration

Table 2: Model of *combined* version A + B = 0 / C + D = 1

	Factor	Standard error	z	Value p	
Const	-4,89734	1,03349	-4,7386	<0,00001	***
Portfolio value (PLN)	0,193733	0,0881725	2,1972	0,02801	**
Frequency of transactions	-0,185521	0,0971133	-1,9104	0,05609	*
Price group of shares with an above-average return rate	0,864651	0,166373	5,1970	<0,00001	***
Position after loss	0,201035	0,0967696	2,0775	0,03776	**
Optimism	0,461773	0,225912	2,0440	0,04095	**
Gender	0,579453	0,261655	2,2146	0,02679	**
Education	0,256549	0,132135	1,9416	0,05219	*

Source: Own elaboration

potential crossing point where the investor no longer perceives the company as cheap. Estimation results in this variant are presented in Table 2.

Number of 'correct prediction' cases = 264 (70,4%)

f(beta'x) to the average of independent variables = 0,497

The likelihood ratio Chi-square (7) = 64,1946 (0,0000)

It should be noted that in the case of an extended estimation, we did not receive an identical set of variables that we can ultimately determine as statistically significant for the evaluation of the phenomenon under investigation. However, despite the different choice of variables, the nature of reasoning based on them is analogous to that of the first model. In this case also, investing a larger proportion of income and having a larger investment portfolio leads investors to invest in companies with a higher nominal unit stock price. Conversely, this relationship is inversely related to the frequency of transactions. Investors who trade with higher frequency are more likely to invest in cheaper companies. The lower the frequency of transactions during the year, the greater the probability of investing in high – priced stocks.

With the fall in the frequency of transactions, the investor is more likely to buy stocks with a higher nominal price. It should be noted that this tendency is understandable from the point of view of current considerations, since low – priced stocks are more susceptible to short – term speculative jumps and therefore more rational short-term transactions are more rational in this case.

Those who choose portfolios of companies with low nominal prices withdraw from loss positions relatively quickly, preferably within 1 to 2 days of loss occurrence. Long-term investors who make transactions once every few months prefer the more expensive companies.

As in the first model, also in this case, investors who have declared that they perceive high – priced stocks as being able to achieve above-average rates of return are eager to invest in this price range.

Similar model conclusions also appear in the areas of education and the level of optimism. Also in this case, higher educated people are more likely to choose companies with higher nominal stock prices than those with lower education. Also for this model, the proposed optimism test confirms that more optimistic people are more likely to invest their capital in low – priced stocks.

The broad model approach also points to the importance of the variable in the questionnaire survey's gender profile. Due to the fact that it is a separate and extensive research area, the author treats these conclusions as indicative of the existence of the phenomenon and introduction to further research. It should be noted, however, that the broad model of the researched phenomenon is not as effective as the extreme model, and predicts 70.4% of preferred companies, which is still relatively good in the understanding of the author, however, far from the precision of the first model.

Conclusions

These studies analyse whether price perception influences investment decisions on the capital market. The paper provides the results of qualitative research that correspond with the up – to – date literature studies and contribute to the research niche in this area providing additional information about determinants of investors'

decisions on the capital market and their stock price perception.

The conclusions of the literature on the subject as well as the studies conducted show that the stock price may influence the investment decisions. There are indications that the investor's personality traits, including his or her knowledge and experience, may have an impact on his or her investment decisions as to the purchase of stocks at a certain price range. It may also be concluded that there might be a price limit, below which investors perceive stocks as cheap (or above which investors perceived stocks as expensive) and different levels of price may attract investors with different characters (more or less experienced, with higher or lower risk, more or less engaged in capital market transactions).

Low priced stocks are the primary investment objective of investors who spend a small percentage of their income on stock investment and have little experience in the stock market. Investors who are more optimistic and who view the stock market as a potential profit opportunity are also more likely to buy low priced stocks. The optimistic nature probably seemingly reduces the risk. Additionally, investors that prefer short-term transactions also choose low priced stocks.

Investors that are characterized by a higher level of knowledge and better experience have higher tendency to invest in high priced stocks. They also prefer transactions at lower frequency.

The results presented in this study provide some presumptions for further analysis. Price perception and price anomalies should still be studied in qualitative and quantitative areas. If investors perceive stocks differently due to price, it is worth verifying whether there are price barriers below or above which stocks are too cheap or too expensive to buy. We may expect that investors avoid stocks that are too cheap and will be called "junk – stocks", however, it is still hard to describe where the "junk – price" is found. As a consequence, the low price anomaly may appear only in a defined price range – above the "junk price".

References

Amihud, Y., Mendelson H. (1988). Liquidity and Asset Prices: Financial Management Implications. *Financial Management*, 5-15.

Baker, H.K., Gallagher, P.L. (1980). Management's View of Stock Splits. *Financial Management 9*, 73-77.

Baker, M., Greenwood, R., Wurgler, J., (2009). Catering Through Nominal Share Prices. *Journal of Finance, 64*, 2559–2590.

Biegańska, K., Jasiniak, M., Pastusiak, R., Pluskota, A. (2016). Efekt zakotwiczenia w transakcjach fuzji i przejęć na przykładzie Polski. *Finanse, Rynki Finansowe, Ubezpieczenia, vol 1*.(79), 585-593.

Brennan, M, Copeland, T.E. (1988). Stock Splits, Stock Prices, and Transaction Costs, *Journal of Financial Economics, 22*, 83-101.

Christie, W.G, Schultz, P.H. (1994). Why do Nasdaq Market Makers Avoid Odd – Eight Quotes?, *The Journal of Finance, 49*(5), 1813 – 1840.

Falkowski, A., Tyszka, T. (2006). *Psychologia zachowań konsumenckich.* Gdańsk: GWP.

Fama, E.F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance, 25*(2), 383-417.

Fernando, C., Krishnamurthy, S., Spindt, P., (2004). Are Share Price Levels Informative? Evidence from the Ownership, Pricing, Turnover, and Performance of IPO Firms. *Journal of Financial Markets, 7,* 377–403.

Gajdka, J. (2013). *Behawioralne finanse przedsiębiorstw: podstawowe podejścia i koncepcje.* Łódz: Wydawnictwo Uniwersytetu Łódzkiego.

Godek, P.E. (1996). Why Nasdaq Market Makers Avoid Odd-Eighth Quotes. *Journal of Financial Economics, 41*(3), 465-474.

Goodhart, C., Currio, R. (1990). Asset Price Discovery And Price Clustering in the Foreign Exchange Market, Working paper, London School of Economics.

Green, T., Hwang, B., (2009). Price-based Return Comovement. *Journal of Financial Economics, 93*, 37–50.

Grossman, S., Miller, M., Fishel, D., Cone, K., Ross, D. (1997). *Clustering and Competition In Asset Markets*, Lexecon Inc. Report, April.

Harris, L. (1991). Stock Price Clustering and Discreteness. *The Review of Financial Studies 4*, 389-415.
Hwang, S., Lu, C., Is Share Price Relevant? (September 25, 2008). 1-39. Retrieved from SSRN: https://ssrn.com/abstract=1341790 or http://dx.doi.org/10.2139/ssrn.1341790.
Ikenberry, D.L., Rankine, G., Stice, E.K. (1996). What do Stock Splits Really Signal?, *Journal of Financial and Quantitative Analysis, 31*(03), 357-375.
Jurczyński, Z. (2009). *Narzędzia pomiaru w promocji i psychologii zdrowia.* Warszawa: Pracownia Testów Psychologicznych Polskiego Towarzystwa Psychologicznego.
Kandel, E., Marx, L.M. (1997). Nasdaq Market Structure and Spread Patterns. *Journal of Financial Economics, 45*(1), 61-89.
Kandel, S., Sarig, O., Wohl, A. (1999). The Demand for Stocks: An Analysis of IPO Auctions. *Review of Financial Studies, 12*(2), 227-247.
Kumar, A. (2009). Who Gambles in the Stock Market. *Journal of Finance, 64*, 1889–1933.
Lamoureux, C.G., Poon, P. (1987). The Market Reaction to Stock Splits. *The Journal of Finance, 42*(5), 1347-1370.
Mukherji, S., Kim, Y., Walker, M. (1997). The Effect of Stock Splits on the Ownership Structure of Firms. *Journal of Corporate Finance, 3*, 167-188.
Muscarella, C., Vetsuypens, M. (1996). Stock Splits: Signalling or Liquidity? The Case of ADR 'Solo-splits'. *Journal of Financial Economics, 42*, 3-26.
Schultz, P. (2000). Stock Splits, Tick Size and Sponsorship. *Journal of Finance, 55*, 429-450.
Stowarzyszenie Inwestorów Indywidualnych, Ogólnopolskie Badanie Inwestorów 2017. Retrieved from http://www.sii.org.pl/11751/edukacja-i-analizy/badania-i-rankingi/ogolnopolskie-badanie-inwestorow-obi-2017.html.
Weld, W., Michaely, R., Thaler, R., Benartzi, S. (2009). The Nominal Share Price Puzzle. *Journal of Economic Perspectives, 23*, 121–142.
Wnuczak, P., Mielcarz, P. (2009). Wpływ czynników fundamentalnych na kapitalizację spółek giełdowych. *Zeszyty Naukowe Uniwersytetu Szczecińskiego, Finanse, Rynki finansowe, Ubezpieczenia nr 17*, 275–287.
Zaleśkiewicz, T. (2015). Psychologia ekonomiczna. Warszawa: PWN.
Zaremba, A. (2016). Investor Sentiment, Limits On Arbitrage, And The Performance Of Cross-Country Stock Market Anomalies. *Journal of Behavioral and Experimental Finance 9*, 136-163.
Zaremba, A., Okoń, Sz., Nowak, A, Konieczka, P. (2015). Anomalia niskiej czy może wysokiej ceny? Osobliwy przypadek polskiego rynku akcji. *Metody Ilościowe w Badaniach Ekonomicznych 16*(4), 242-260.
Zaremba, A., Żmudziński, R. (2014). Low Price Effect on the Polish Market. *Financial Internet Quarterly "e-Finanse", vol. 10*, no, 1, 69-85.