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**THE EXPLORATION OF DISPOSITION EFFECT  
AMONG BUSINESS UNDERGRADUATES IN POLAND**

**Keywords:** behavioral finance, disposition effect, experimental study.

**JEL Classification:** G02.

**Abstract:** In this article the author attempts to explore the phenomena of disposition effect among Polish undergraduate students. The study shows that under experimental conditions participants do show disposition “to sell winners too early and ride losers too long”. Such disposition stands in opposition to rationale behavior which induces to hold stocks during the whole period of experiment. The research provides important insights into the field of behavioral finance and in particular into the global analysis of disposition effect.

*Translated by Monika Czerwonka*

**■■■ INTRODUCTION**

The traditional economic and finance theory is based on two premises. The first one implies that the market is efficient, i.e. the prices reflect all available information, so that there are no opportunities to earn extraordinary returns

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from private information. The second one assumes that individuals make rational decisions as to maximize one's expected utility.

Over the last several years the classical economic theory has ceased to be a sufficient explanation of the observed market price fluctuations and investors' behavior. There has been substantial evidence that stock prices do not follow random walk model and that returns can be predictable as well as that investors do not always act rationally and make systematic errors.

In this article the author attempts to describe and to show a way to measure the impact of a very well documented pattern in investor behavior – a disposition effect.

This study will first present the wide concept of behavioral finance and the short history and development of economic thought. Next it will present the idea of disposition effect and will review the number of studies devoted to it. Finally the objectives and methodology of the experiment conducted among students will be presented. The results section will detail the main findings of the study. The final section will provide conclusions and discussions in which research implications are outlined.

### **BEHAVIORAL FINANCE**

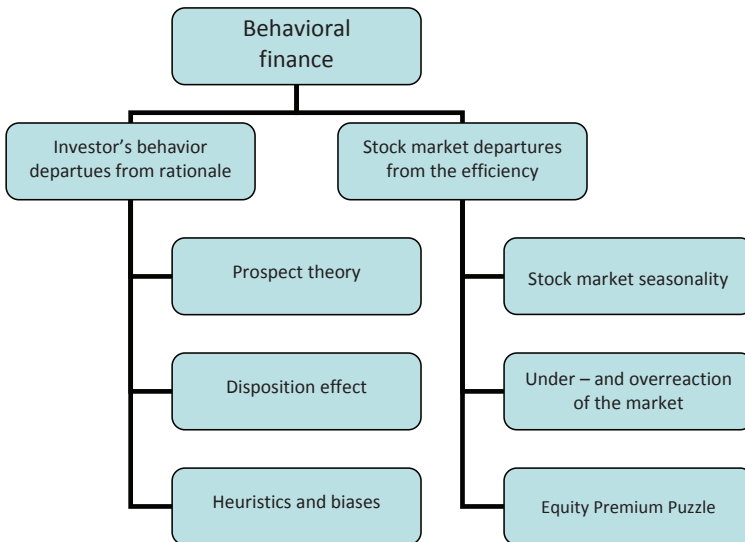
Behavioral economics or behavioral finance is an application of psychology and sociology into the economic or finance settings. It investigates what happens in markets if some of its agents do not act fully rational and display human limitations.

The story with the behavioral economics has begun over half a century ago when Edwards (1968) introduced decision-making as a research topic for psychologists and in Allais (1953) presented a psychology-based positive theory of choice under uncertainty. In 1956 Herbert Simon outlined a theory of information processing based on bounded rationality and in the late 80-ties and 90-ties many economists and psychologists found the common basis for their work (eg.: Kahneman, Tversky 1979; Thaler 1980; Shefrin, Statman 1985; Odean 1998). But first in 2002 behavioral economy was on everyone's mouth, as Daniel Kahneman was awarded the Noble Prize for having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty". Since 2002 there have been numerous studies in the field of behavioral economy and finance, which show intensified interest in this interdisciplinary subject. Recent Noble

Prize in economics for the Robert J. Shiller in 2013, one of the leading behavioral scientists, only confirmed the importance of psychological insights into the finance settings. Looking at the number of international publications, the concept of behavioral finance has gained a substantial position in the contemporary finance.

One can divide the literature on behavioral finance into two branches (Figure 1). The first one studies investor behavior which very often does not fulfill the assumption of a *homo oeconomicus* motivated by self-interest and capable of making rational decisions (Simon 1983). In this section of investor's behavior analysis we can mention the Prospect Theory (Kahneman, Tversky 1979), many examples of heuristics and biases (i.e cognitive errors) and finally disposition effect as one of the best described anomalies in investor's behavior. The second branch of literature on behavioral finance deals with such problems as stock market anomalies i.e. departures from the standard assumption about market efficiency (Fama 1998). As examples of stock market anomalies we can point out e.g: stock market seasonality, under- and overreaction of the market to the news and equity premium puzzle (DeBondt, Thaler 1987; Daniel et al., 1998; Mehra, Prescott 1985).

**Figure 1.** Division of the literature on behavioral finance



### DISPOSITION EFFECT

The disposition effect was introduced to the behavioral finance literature by Shefrin and Statman in 1985. The authors described it as: “the general disposition to sell winners too early and ride losers too long<sup>1</sup>”. Basically the disposition effect concentrates on the reluctance to realize losses even when the precepts of normative theory (concerning capital gain tax, portfolio rebalancing, transaction costs) prescribe realization.

Disposition effect means that at any point in time, winners are sold more readily than losers (Zuchel 2001).

The paper of Shefrin and Statman (1985) started a large literature on the subject. The most popular study of disposition effect was conducted by Odean (1998). On the basis of 10 000 accounts in the period 1987 to 1993, he demonstrated that investors sell winners more readily than losers in the sense that they realize gains relatively more frequently than losses<sup>2</sup>. Investors did so in spite of the factors that might have affected their trading decisions such as higher trading costs of low priced stocks or portfolio rebalancing considerations.

Another interesting study of disposition effect was presented by Weber and Camerer (1998) in form of an experimental analysis. The scientists studied the portfolio decisions of students, who had to buy and sell shares of six risky assets. Asset prices fluctuated in each period<sup>3</sup>. The results of their analysis showed that contrary to Bayesian optimization, subject did tend to sell winners and kept losers.

More recent papers, e.g. Dhar, Zhu (2002), present an individual level analysis of the disposition effect. The authors using demographic and socio-economic data found empirical evidence that wealthier and individual investors in professional occupations exhibit less disposition effect. They conclude that investors’ sophistication about financial markets and trading experience is responsible in part for the variation in individual disposition effect.

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<sup>1</sup> The terms winners / losers refer here to stocks with a current price that is higher / lower than the initial purchase price.

<sup>2</sup> Odean calculated the Proportion of Gains Realized (PGR) and the Proportion of Losses Realized (PLR) and proved that for the entire year the PGR is higher than the PLR.

<sup>3</sup> Prices of the risky assets were generated by a random process and were not determined by the trading actions of subjects, in order to isolate the disposition effect from the process of price information.

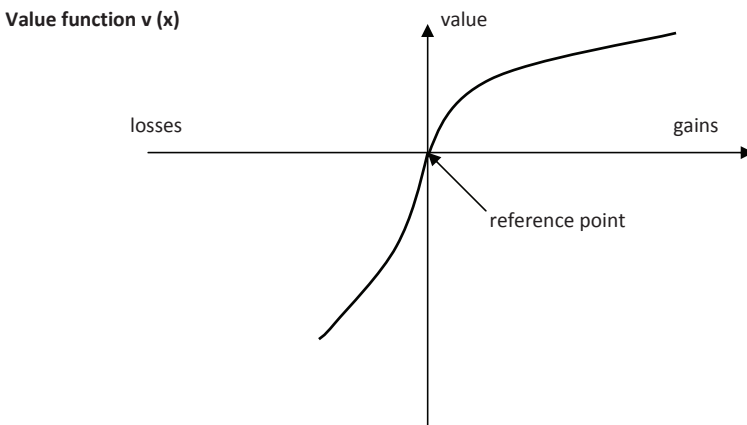
It seems that the problem *whether* there is a disposition effect has been solved. However the question *why* there is such an effect remains still open.

The first who sought the answer were the founders of the bias. Shefrin and Statman (1985) presented a positive theory “of selling winners and riding losers” based on following elements.

At first they suggested that the bias could be explained in context of the prospect theory (Kahneman, Tversky 1979). The S-shaped value function, concave in the domain of gains and convex in the domain of losses, reflects risk aversion in the gains region and risk-seeking behavior in the loss region (see Figure 2). Decreasing sensitivity of the value function means that the investor is happier having gained the first penny than after having earned the second one. And similarly the lost of the first penny hurts more than the loss of the second one. When we translate it into the context of disposition effect, this means that investors are eager to sell winners because they are not very sensitive to further gains and they hold on losers because they are not very sensitive to further losses (Zuchel 2001).

Secondly, the value function in the domain of losses is steeper than in the domain of gains. It means that losses hurt us twice as much as gains. The sadness that one experiences in losing the money appears to be greater than the pleasure of gaining the same amount of money. This strong loss aversion explains the willingness to hold on losing stocks.

**Figure 2.** Value function  $v(x)$



The second explanation of the disposition effect was mental accounting, i.e. a tendency to segregate the different types of gambles into separate accounts, and applying prospect theoretic decision rules to each account by ignoring possible interaction. Any time when the stock is purchased a new mental account is opened. A running score is then kept on this account indicating gains or losses relative to the reference point which is usually the asset purchase price. Investors tend to have difficulty in closing a mental account at a loss. They prefer paper losses to actual loss realization because they do not want to give up the hope of making money on this particular investment.

Another interesting explanation of the disposition effect is the regret theory (see: Bell 1982) and the fact that investors may resist the realization of losses because it could prove that their judgment of an investment was wrong. Such regret could be even greater by having to admit the mistake to others. Shefrin and Statman suggest that “the quest for pride and the avoidance of regret lead to a disposition to realize gains and defer losses”.

Reluctance to realize losses could be also seen as a self-control problem, i.e. a conflict between a rational part (*the planner*) and a more primitive, emotional and myopic part (*the doer*). The problem is to exhibit sufficient self-control to close accounts at a loss.

Belief in mean reversion, i.e. negative autocorrelation of returns in the long horizon, could be another explanation of the disposition effect. Siebenmorgen and Weber (2004) conducted an experiment and found that most of the participants believed in mean-reverting returns. Such belief that losers will soon outperform the winners and vice versa could very easily serve as an explanation of the disposition effect.

The last but not least theory that could explain the bias in investors' behavior comes from the psychological literature on entrapment, escalation of commitment and sunk cost effect. It seeks an answer to the question why and under what conditions people irrationally stick to or even intensify losing courses of action. “Decision makers become entrapped in a previous course of action because of their unwillingness to admit – to themselves or others – that the prior resources were allocated in vain. Put simply people do not like to admit that their past decisions were incorrect, what better way to reaffirm the correctness of those earlier decisions than by becoming even more committed to them” (Brockner 1992).

### **RESEARCH METHODOLOGY OF THE EXPERIMENTAL STUDY OF DISPOSITION EFFECT AMONG POLISH BUSINESS UNDERGRADUATES**

There have been few researches exploring the disposition effect in Poland (Szyszka, Zielonka 2007; Staszewski 2008; Kubińska et al. 2012). The problem of measuring the disposition effect in Poland is that there is no distinction between the short-term and long-term tax rates (concerning capital gain tax). Therefore the disposition effect cannot be measured in the same way as e.g. in United States where investors' reluctance to realize losses is at odds with optimal tax-loss selling for taxable investments (Odean 1998). Another obstacle in measuring the disposition effect in Polish reality is the absence of such tools like e.g. CRSP/COMPUSTAT database offered by Center for Research in Security Prices in United States, which can be used to analyze the historical data of stocks, mutual funds and indexes (Frazzini 2006).

For these reasons the exploration of disposition effect in this study was done in the form of an experimental analysis. One of the best known analyses of disposition effect in experimental design was done by Weber and Camerer (1998), Weber and Zuchel (2001).

### **RESEARCH PROCESS**

The experiment was conducted among Polish business undergraduates from Warsaw School of Economics. The experimental design was based on previous studies of Weber, Zuchel (2001). A total of 253 students were examined in the period between years 2012–2014. Students were the undergraduates from business faculties, on average in their 3-rd year of study. The experiment was a pen and paper experiment and took about 20 to 30 minutes. The experiment was meant to be some kind of simulation of investors' behavior on the stock exchange.

The experimental scenario informed participants that they have to invest the virtual money in the value of 900 PLN. The experiment was divided into two stages at the beginning of which participants could buy or sell stocks (maximum number of holding stocks in portfolio was 10). Participants were asked to make a decision (at the second stage) in case of two scenarios: first situation was -the price goes up, the second situation was- stock price goes down. After making a decision and writing it on a paper the price of stock changed randomly. Students could calculate their final gain. The best students were awarded.

The main hypothesis which meant to be verified was the issue of existence the disposition effect on individual level. The factors and parameters in experiment were given in a way that, from rationale perspective, on each stage of experiment it was more effective to take a risk and maximize the number of stocks holding. The expected value of the investment, on each stage, was higher than zero<sup>4</sup>. According to the Expected Utility Theory one should maximize its utility and keep maximal number of stocks on each stage (10 units). However if participants were prone to take a lower risk in case of prior gains (sell more stock in case of price rise) as compared to prior losses, they would experience the disposition effect. The key issue was to measure the number of stocks holding by students on each stage.

## RESULTS

The average number of holding stocks at first stage was around 7 (compare table 1). At the second stage: - in case of price rise the average number of stocks holding was around 5, - in case of price drop the average number of stocks holding was around 8. It meant that participants sold their stocks when the price went up, and held their stocks when the price dropped. As mentioned above such behavior was inconsistent with rationale behavior according to which investors should hold 10 units of stocks on each stage.

**Table 1.** The number of stocks holding

Factors	First stage	Second stage Price rise	Second stage Price drop
Average number of stocks holding	6,92	5,46	8,12
Median	7	6	10
Standard deviation	2,31	3,68	3,10

Source: own calculation.

A (non-parametric) Wilcoxon test was used to test the main hypothesis. The test is used when the observations do not come from a normal distribution and the sample size is small (Zuchel, Weber 2001). The results presented in table

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<sup>4</sup> With 50% probability the stock price could rise by 40 PLN, and with with 50% probability the stock price could drop by 30 PLN.



2 show that the difference in average number of stocks holding on the second stage in case of a price fall and a price rise is significant ( $p=0,001$ ).

**Table 2.** Average number of stocks holding at the second stage of experiment in case of price rise and price drop

Situation	Difference in number of stocks holding	Wilcoxon test (p-value)*
II stage price rise – II stage price drop	-2,66	0,001
II stage price rise – I stage	-1,46	0,003
II stage price drop – I stage	1,20	0,008

\* p-values are based on two-sided Wilcoxon test and on the asymptotic distribution of the test statistic.

Source: own calculation.

The difference in number of holding stocks on each stage results mainly from the participants' behavior in the domain of gains. A prior loss leads to increased risk-taking and this effect is insignificant ( $p=0.008$ ). A prior gain leads to risk-aversion, and this effect is significant ( $p=0.003$ ). Results of the above study confirms that the difference in behavior after gain and loss is mainly driven by risk-aversion in the domain of gains. Such explanation is consistent with the model of prospect theory.

### FINAL REMARKS AND CONCLUSIONS

In this article the author described and show a way to measure the disposition effect under experimental conditions. The experiment conducted among Polish undergraduates show that participants were prone to take a lower risk in case of prior gains (sell more stock in case of price rise) as compared to prior losses.

This study provides important insights into the field of behavioral finance and in particular into the global analysis of disposition effect. There have been some studies concerning and confirming the disposition effect in Poland but only some of them were held in experimental design (see Kubińska et al. 2012).

However the findings of this study should be understood as exploratory as the objects of the sample were only business students, not professional investors.

Some questions concerning the tendency to disposition effect among individuals remain open. It would be interesting to explore the real reasons that lead people to such behavior. Are the motives of investors homogenous worldwide? Does the culture affect the behavior of investors? Is disposition effect still the behavior anomaly or just a routine pattern of investors' attitude towards investment?

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