

ASSESSMENT OF WARSAW UNIVERSITY OF LIFE SCIENCES – SGGW STUDENTS’ BEHAVIOURS UNDER RISK

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ABSTRACT

In this study, the authors made an attempt to verify the certainty effect and the rebound effect articulated in the 1970s by D. Kahneman and A. Tversky. The research was carried out on a sample of 500 students of economic and technical specializations at Warsaw University of Life Sciences. The authors formulated research hypotheses on how field of studies or gender influence decisions taken under risk. The outcomes were considerably similar to the results of D. Kahneman’s and A. Tversky’s research, which confirmed that the certainty effect and the rebound effect existed. One disapproved the hypothesis on gender influence and confirmed the hypothesis on the influence of the field of studies on taking decisions under risk. It was found that raising the amount of potential loss has an impact on the willingness to take risk so that the loss can be avoided.

Key words: certainty effect, rebound effect, behavioural finance, rationality of choice

JEL codes: G41

INTRODUCTION

Presenting a human as a rational being (*homo economicus*), who follows logical principles in his actions, is one of the basic premises of classical economics. It assumes that maximizing one’s own satisfaction is the main determinant of making decisions. Thanks to people’s aiming at satisfying their individual needs, an economy can function as a whole because it is those needs that push people to act and work. A. Smith thought that profit was the main motive to act [Smith 2012].

Subsequent researchers started, however, to extend the meaning of benefits driving people to take up activities. J.S. Mill played a key role here. He is believed to be the author of the *homo economicus* idea. He drew on the approach of D. Bernoulli [Bernoulli 1954], who noticed that profit was not always the determinant of taking particular decisions by society members – it

was utility. He claimed that 1,000 ducats have a different utility for a poor man, a rich man or a prisoner who needed exactly this sum of money to regain his freedom. That is why Bernoulli introduces the principle of diminishing utility of income (which was in opposition to the assumptions taken before). Thus, while taking a decision under risk, an individual does not maximize the value possible to gain, but utility. However, it was J.S. Mill, who recognized the paradigm of the economical human as an assumption of scientific economics. *Homo economicus* in classic economics possessed the following characteristics:

- pursuing a specific economic goal,
- possessing the full knowledge on the conditions and effects of the decisions taken,
- using this knowledge to take the right actions aiming at achieving the goals [Szarzec 2015].

This research was extended by J.M. Muth [Muth 1961]. Using enterprises as an example, he stated that

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their predictions concerning an economic situation are more precise than simple economic models and information is such a scarce good that it is both searched for and immediately used by the market actors. He introduced the term of rational expectations, and all deviations of projections which are different from “rational expectations” are stochastic, so after being aggregated, they cancel out. As a result, assumptions were made that a human possessed perfect knowledge on both economic theories and all the available information, which allowed him to appropriately forecast the future and consequences of his actions. In economic discussions, the authors started assuming that there were no irrational, emotional actions or actions based on incomplete knowledge “connected to human factor” [Jurek and Rybacki 2014].

These assumptions, however, started to be more fiercely criticized in the middle of the 20th century. The gap between the human’s model in economic theory and other social sciences (psychology, sociology) was noticed by a Noble Prize winner, H. Simon [1955], who created the concept of approximate rationality, limited internally (mentally) and externally (environmentally). He noticed that decisions taken by people cannot always be fully rational. He gave an example of a chess game, where the level of decision complexity does not allow players to fully predict the consequences of subsequent moves, or achieving an acceptable price while selling a house when one does not have knowledge what offers will be placed in the future. The

internal attitude of a particular individual (which sometimes changes with time) plays a significant role when a decision is taken [Herbert 1955]. These discussions were the base of the psychological current of economics, where the works of D. Kahneman and A. Tversky were of special importance [Kraciuk 2015].

MAKING DECISIONS UNDER RISK ACCORDING TO D. KAHNEMAN AND A. TVERSKY

The abovementioned scientists carried out research on making decisions under risk [Kahneman and Tversky 1979]. In their publications, they opposed to the approach of a rational *homo economicus* who follows the economic theory in his everyday life, takes decisions in line with the expected utility hypothesis, which was the base of game theory being developed at that time [von Neumann and Morgenstern 2007]. The researchers ran a survey among university students and employees. The survey concerned making a hypothetical decision with a specific probability (A or B) in particular situations (lotteries). During the research, the median of salary at the place where the survey was conducted amounted to 3,000. The participants were informed that there was no right answer and the survey was only to investigate choices under risk.

In Lottery 1, expected value A amounts to 3,200 and B – 3,000. From the point of view of a fully rational individual, it is right to take the risk and choose option B (Table 1). In the research, only 20% of peo-

Table 1. Respondents’ behaviour in the profit or loss lottery

Possibility of making a profit and its probability		Choice (A or B)	Possibility of making a loss and its probability		Choice (A or B)
Lottery 1	A. 4 000 – chance of profit 80%	20%	Lottery 5	A. 4 000 – risk of loss 80%	92%
	B. 3 000 – chance of profit 100%	80%		B. 3 000 – risk of loss 100%	8%
Lottery 2	A. 4 000 – chance of profit 20%	65%	Lottery 6	A. 4 000 – risk of loss 20%	42%
	B. 3 000 – chance of profit 25%	35%		B. 3 000 – risk of loss 25%	58%
Lottery 3	A. 3 000 – chance of profit 90%	86%	Lottery 7	A. 3 000 – risk of loss 90%	8%
	B. 6 000 – chance of profit 45%	14%		B. 6 000 – risk of loss 45%	92%
Lottery 4	A. 3 000 – chance of profit 0.2%	27%	Lottery 8	A. 3 000 – risk of loss 0.2%	70%
	B. 6 000 – chance of profit 0.1%	73%		B. 6 000 – risk of loss 0.1%	30%

Source: The author’s own work based on Kahneman and Tversky [1979, p. 278].

ple chose this option. Lottery 3 also gives interesting outcomes. The expected value in both cases amounts to 2,700. However, the vast majority of the respondents chooses the safer option, where there is the 90% chance to win a lower profit. The situation changes completely in case of very small chances to gain a profit. Then the respondents take a greater risk to win a higher profit. In case of a risk of making a loss, the respondents' behaviours are totally different. They agreed on a potentially higher loss if the chance to make it was lower.

Considering the outcomes of the research, the investigators noticed that the choices made by the respondents were not right from the point of view of a rational *homo economicus*. They articulated the following phenomena:

1. Certainty effect – people overestimate the results with high probability at the sacrifice of occurrences with low probability. In result, human's actions are not taken according to the value of expected utility.
2. Rebound effect – people try to reduce risk when they can gain profits, and they take excessive risk when it gives them a possibility to avoid a loss.

The existence of these effects became the base of the development of behavioral economics, which stands in opposition to classic economics. The results of the research are still used in many various branches of economics, such as insurance [Wicka and Świstak 2017] or developing real estate prices [Brzezicka 2016]. All the time research widening the study by D. Kahneman and A. Tverski is also being conducted [Czapliński and Panek 2005]. It was observed here that in Polish conditions, the rebound effect has been challenged. Poles not only very strongly avoid the risk when they have a chance to gain profit, which became a proverb “a bird in the hand is worth two in the bush” (literally: “a sparrow in your hand is better than a pigeon on the roof”), but they also choose a certain, yet a lower loss. Domestic research also indicates other contradictions in the certainty and rebound theory in comparison to research results [Czuderna 2016]. Czuderna noticed that these effects are not absolute, but they are related to the profit/loss level, and that the power of the rebound effect had been lower than the power of the certainty effect. These results indicate the need for running further research in this area.

RESEARCH METHODS

Outcomes of the research concerning behaviours of the Warsaw University of Life Sciences students in 2017

The authors of this thesis ran their research in line with the methods proposed by D. Kahneman and A. Tversky with modifications consisting in:

3. Expressing loss/profit in PLN, in 2016, the median of gross salary in Poland amounted to PLN 3,510.67, which gives the net salary of PLN 2,512 [GUS 2016].
4. Adding one row with Lotteries 5 and 10. In the lottery, the probability of occurrence A – loss PLN 30,000 was set as 90%, and occurrence B – profit PLN 60,000 as 45%. Lottery 10 refers to the risk of loss, occurrence A – loss PLN 30,000, probability 90%, occurrence B – loss PLN 60,000, probability 45%.
5. Introducing the respondents' particulars with gender, major, year of studies.
6. It was not assumed that students should not participate in taking decision workshop during their studies.

The research was done in 2017–2018 among 500 students of Warsaw University of Life Sciences studying in different faculties and majors: finance, economics, management, logistics, construction, production management and engineering. The survey was conducted among all the students of a particular year. The years were selected on purpose so that they would include certain specializations (with a different scope of economics and finance classes) and levels of studies (bachelor's and master's ones). The survey was done with the use of anonymous interview questionnaire. The participants were asked to imagine that they were facing a hypothetical decision concerning potential profit or loss. They were informed that there were no right answers in the questions and the survey objective was to find out people's behaviors under risk. By adding Lottery 5 and 10, the authors wanted to find out an additional factor of taking decisions under risk, connected to a radical increase of a profit/loss, which was not included in D. Kahneman and A. Tverski's research. This made it possible to find out the influence of potential profit and loss levels on decisions.

The following research hypotheses were assumed:

1. The Warsaw University of Life Sciences students, who represent Generation Y, take similar decisions under risk to those taken by students of western universities in the 1970s.
2. Taking a decision under risk depends on gender and economic major.
3. The growth of win value influences the willingness to take additional risk.

The following terms were assumed in the study:

1. Risk decisions: for Lotteries 3, 4, 5, they are answers B, where there is a smaller chance of higher value win. For Lotteries 8, 9, 10, they are answers B, where there is a lower probability of making a higher loss.
2. Right decisions: from the point of view of a higher expected value, for Lotteries 1, 2, they are answers A, for Lottery 6, 7, they are answers B. In other lotteries, the expected value for occurrences A and B is the same, so one cannot talk about right decisions here.

The survey was to some extent a repetition of D. Kahneman and A. Tverski's study. Yet the latter research was done 40 years ago among people from another cultural field. In the meantime, huge changes in the society took place, which especially covered young people. They are called Generation Y. Among characteristics of this generations, there are the lack of patience and greater willingness to risk [Baran and Kłos 2014].

This study aims to find out the influence of gender, study specialization and win/loss value on students' decisions taken under risk. The results of the survey were compared to the outcomes gathered in the research by D. Kahneman and A. Tverski to find out potential changes that took place in this area.

RESULTS

The general results of the research are presented in the Table 2.

While comparing the current outcomes to the results obtained by D. Kahneman and A. Tversky, one can state that after 40 years, the research brought very similar results. The differences are not bigger than 7–8%.

Only in 35.99% of the answers, the students chose solutions according to the expected value, and in 58.10% of the cases, they took risky decisions. One should distinguish taking risk for the possibility of gaining profits and making losses.

As far as profits are concerned, in case of high probability, the respondents much more often chose the safer solution (Lotteries 1 and 3), which confirms the certainty effect. On the other hand, a high value of a potential win (Lottery 5) encouraged students to take additional risk. The respondents preferred the option where they could win PLN 60,000 with only 45% probability to the almost certain win of PLN 30,000. What is also important, in case of the choice between two options with low probability (Lottery 4), they definitely more often selected the possibility of higher profit, which proves overestimating the chance of a very little probable occurrence.

As far as the risk of loss is concerned, the respondents' reactions are much more unequivocal. In each lottery with the same expected value (Lotteries 8, 9, 10), the respondents took additional risk not to make a potential loss. It was a high value of a potential loss that finally raised risk aversion a little (comparison of Lotteries 8 and 10, which differ only in the level of a potential loss).

There were some differences observed for particular genders (Table 3).

Table 2. General results of the research (%)

Specification	1	2	3	4	5	6	7	8	9	10
A	26.61	72.58	80.24	18.95	82.26	89.31	65.93	14.92	35.69	19.35
B	73.39	27.42	19.76	81.05	17.74	10.69	34.07	85.08	64.31	80.65

Source: The author's own work.

Table 3. Results depending on gender (%)

Men	1	2	3	4	5	6	7	8	9	10
A	32.52	71.36	78.64	18.45	84.47	87.38	66.99	16.50	32.52	17.96
B	67.48	28.64	21.36	81.55	15.53	12.62	33.01	83.50	67.48	82.04
Women	1	2	3	4	5	6	7	8	9	10
A	22.49	73.70	81.66	19.38	80.97	91.00	65.40	13.84	38.06	20.42
B	77.85	26.64	18.69	80.97	19.38	9.34	34.95	86.51	62.28	79.93

Source: The author’s own work.

The study results indicate that men’s choices are slightly more governed by expected value than women’s choices (37.38% *versus* 35.12%), which is particularly proved by the answers in Lottery 1. Unexpectedly, one cannot find larger differences between genders as far as willingness to take risk is concerned. In lotteries 3, 4, 5 and 8, 9, 10 (with the same expected value), the decision distributions are very similar. Women took more risky decisions – on average in 57.96% of cases and men in 58.58%. These values do not differ significantly.

The study also compared answers to the questions depending on major. Economics and finance were included in the group of economic studies (Table 4). Students who majored in these fields had already acquired wide knowledge on economic and financial phenomena. Their classes covered behavioural finance, so the students possessed knowledge concerning the phenomena which should be considered while taking decisions under risk. Theoretically, they should be able to recognize the choices they faced correctly and use their knowledge on the calculus of probability, risk

and finance. The other group covered students who majored in management, logistics, construction, environmental engineering, production management and engineering.

The outcomes of the study indicate a small but significant influence of major on decisions taken under risk. Students who major in economic studies are more often governed by expected value (on average 39.34% of answers *versus* 32.55% in case of non-economic majors). They show higher aversions to risky decisions in case of loss risk (72.11% *versus* 81.3% in case of non-economic majors). On the other hand they much more often take risk if they can make additional profits. It is especially visible in Lottery 4.

SUMMARY AND CONCLUSIONS

The study makes it possible to draw the following conclusions:

1. Despite the generation gap, the outcomes are similar to the outcomes achieved by D. Kahneman and A. Tversky, which confirms the first research

Table 4. Results depending on major (%)

Economic majors	1	2	3	4	5	6	7	8	9	10
A	24.70	79.68	82.07	14.74	83.27	88.45	58.57	18.33	43.82	21.51
B	75.30	20.32	17.9	85.26	16.73	11.55	41.43	81.67	56.18	78.49
Other majors	1	2	3	4	5	6	7	8	9	10
A	28.57	65.31	78.37	23.27	81.22	90.20	73.47	11.43	27.35	17.14
B	71.43%	34.69%	21.63	76.73	18.78	9.80	26.53	88.57	72.65	82.86

Source: The author’s own work.

hypothesis. This means that the common belief that Generation Y has greater willingness to take additional risk is wrong.

2. The existence of the certainty effect and rebound effect has been confirmed. However, it should be pointed out that the certainty effect appears in case of occurrences with medium and high probability. In case of occurrences with very low probability, the respondents overestimated the chances of this occurrence.
3. The hypothesis of dependence between decisions and gender has been refuted. There were no significant differences in women's and men's behaviour in this respect.
4. The research hypothesis concerning the influence of education on the decisions taken should be confirmed. People who majored in economic studies were more often governed by expected value than those who majored in other studies. Their willingness to take additional risk was also different from the one in case of students who majored in other studies. This means that the knowledge gathered in the education process, which concerns risk and probability, translates into real (and at least declared) actions. On the other hand, the awareness of this knowledge decreases risk aversion, especially when there is a prospect of achieving profits.
5. The third hypothesis was not proved. The high value of win does not influence the willingness to take additional risk. High value of loss slightly reduces risky decisions.

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OCENA ZACHOWAŃ STUDENTÓW SZKOŁY GŁÓWNEJ GOSPODARSTWA WIEJSKIEGO W WARSZAWIE W WARUNKACH RYZYKA

STRESZCZENIE

W opracowaniu podjęto próbę weryfikacji efektu pewności i odbicia sformułowanych w latach 70. przez D. Kahnemana i A. Tverskiego. Badania przeprowadzono na próbie badawczej 500 studentów kierunków ekonomicznych i technicznych w SGGW w Warszawie. Postawiono hipotezy badawcze o wpływie kierunku studiów i płci na podejmowane decyzje w warunkach ryzyka. Uzyskano bardzo zbliżone wyniki do badań D. Kahnemana i A. Tverskiego, co potwierdziło istnienie efektu pewności i odbicia. Odrzucono hipotezę badawczą o wpływie płci, a potwierdzono hipotezę o wpływie kierunku studiów na podejmowanie decyzji w warunkach ryzyka. Stwierdzono, że zwiększenie kwoty potencjalnej straty wpływa na chęć podejmowania ryzyka celem jej uniknięcia.

Słowa kluczowe: efekt pewności i odbicia, finanse behawioralne, racjonalność wyborów