



THE IRRATIONALITY OF CONSUMERS CHOOSING PLANE TICKETS – CASE STUDY OF GENERATION Z REPRESENTATIVES IN THE CZECH REPUBLIC

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Abstract *Economic models can be used to describe consumer behaviour or to predict expected behaviour of the consumers. In order for the application of the selected economic model to describe realistically the issue under study, it is necessary that the individual components of the economic model are able to reliably identify and possibly even quantify main characteristics of the studied problematique. In the last few years, one of the basic theses based on which several economic models are built upon has been "questioned" within the scientific community, namely the one that portrays human as always rationally behaving individual. The goal of this article is to verify the validity of rational choice theory, based on as sample of university students in the Czech Republic that are currently enrolled at the Faculty of Transport Engineering, University of Pardubice. To validate the theory of irrationality in the context of consumer behaviour, an experiment in the field of air transport will be used, monitoring consumer decision making while choosing the plane tickets.*

Keywords *rational choice theory; passengers, air transport, decision making, irrational decisions*

1 INTRODUCTION

In the last few years, there has been a vigorous economic development in almost all sectors of the national economy worldwide. One of the indirect consequences of this rapid economic development is social transformation. This transformation can be perceived in the context of predominance of different societal values, different way of thinking, different approach to information due to the rapid development of information and communications technologies, etc. (Perrons, 2004; Derudder, 2006; Leskova et al., 2018). The emergence of the younger generation, which gradually shifts from economically dependent to the category of economically active also plays a crucial role in the societal shift. For this generation, clear influence of information and communications technologies on the formation of their value system has been demonstrated. This influence has been demonstrated from both, the constructive point of view, which can be seen as a positive influence, and from the point of view of destruction – negative influence (Kiseleva et al., 2018). Impact of information and communications technologies on development of society was demonstrated by comprehensive data analysis from the United Nations' E-Government Survey (survey of the development of information and communications technologies) and the Global Innovation Index (survey of national cultural values). The result of the analysis indicates that information and

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communications technologies are important drivers of cultural convergence, which pushes national cultures around the world to two cultural values: higher individualism and lower power distance (Salehan et al., 2018).

Today number of works can be found by authors whose studies discuss social development as a result of the development of the already mentioned information and communications technologies or as a result of other phenomena typical of the present period (Klun, 2017; Jurova, 2017; Carrigan et al., 2020). These works started to appear in the early 1990s, with the majority of the works being presented in the early 21st century. In this context, it should be noted that most of the economic models commonly used to describe consumer behaviour or to predict individual behaviour are based on a concept of the new classical economy of the 1970s and the 1980s. One of the main theoretical concepts of the new classical economy is the so-called hypothesis of rational expectation which is based on the theory of rational choice. The hypothesis of rational expectation already partially respects the fact that one may not always be rational in the context of his/her behaviour. However, it allows for the subjects to have false expectations (as a result of surprises caused by shocks), which explains the existence of economic cycles. The subjects, however, will not allow for the systematic repetition of their erroneous behaviour. All of the economic subjects together, according to the hypothesis of rational behaviour, will create the right rational expectations (Lucas, 1972; Muth, 1961).

Based on the conclusions explained above, a certain discrepancy can be perceived between economic models, which are being applied by default to the decision-making process predicting consumer behaviour and the conclusions of today's authors that are pointing out to the fact that an individual living today is a part of a different society – it is influenced by a number of different circumstances, events and occurrences in comparison to those in the 1970s and the 1980s. A new economic field, the behavioural economics, was formed to bridge above noted discrepancy. The main objective of experts dealing with this issue is to try to logically explain why consumers do not behave as predicted by the classic economic models. One of the main theoretical concepts of behavioural economics is the concept of 'irrationality'. In reality, people do not behave according to the theory of always optimizing homo oeconomicus, but rather they behave systematically irrationally. This characteristic is even easily predictable (Kahneman, 2011). A number of experiments and research data have shown that even the most important human decisions have irrational roots without people knowing it, even further, without wanting or willing to admit it. As a part of the decision-making process, an individual is influenced by a number of hidden irrational factors that may originate in early stages of life. These factors range from emotions and prejudices to manipulation by marketing and advertising practices (Ariely, 2009; Nikitin et al., 2018; Vils et al., 2017).

The validity of a concept of irrationality can be predominantly demonstrated in the decision-making process, i.e. the selection process among several options. Because humans live in a constant state of a decision making, it is necessary to pay close attention to the importance of irrationality (Ariely, 2009). The concept of irrationality in a human decision-making process is developed further to the so-called 'irrationality' heuristics – mental shortcuts that person performs during decision making to speed up the process and simplify his/her decision making (Tversky and Kahneman, 1974). While heuristics speed up decision making, as has been demonstrated by numerous experiments, it is also worth mentioning that heuristics also generate higher probability to err during the decision-making process. Basically, it is possible to distinguish three types of heuristics – representativeness, anchoring/adjustment, and availability. The first type is representativeness – the more the event/object/person resembles a prototype of a given category, the more likely a person determines that an event/object/person belongs to this category. A typical example of this type of heuristics can be an experiment of coin flipping. Of the six-coin flips, which order the P P O O P O or the P P P P O O (P=heads, O=tails) be more likely? Both events have the same probability of occurring. However, it was proven that people more likely voted for the first option, the P P O O P O, due to greater variability (randomness) of the result than in the latter case (Tversky and Kahneman, 1974). The second type of heuristics is 'anchoring' and 'adjustment'. This type of heuristics works with the so-called mechanism of 'imprinting', where the first impression of a particular

phenomenon is imprinted deep into a person's memory and becomes an anchor (reference point) for him/her. This anchor later serves as the default value for assessing phenomena of the same kind. A typical example is Dan Ariely's experiment, when a group of students was presented with a list of subjects that should be auctioned in an improvised auction.

Then the students were asked to write the last two numbers of their birth identification number for each object on the list and next to it the maximum possible amount they would be willing to pay. The result confirmed the heuristic of anchoring. For example, for a keyboard the students with a high double digits birth ID number such as (80-99) were willing to pay on average \$56, while the students with low end numbers (00-19) would pay only \$16. The experiment demonstrated that when a person is anchored in the context of price setting (in this case by entering a higher or lower numbers before determining the actual price) the particular anchor has an effect on the suggested price level (Banaji and Greenwald, 2016). The third type of the heuristic theory is the one of availability, where events and phenomena are judged by individuals based on how easy it is for them to remember something that they consider relevant. An example is a conducted experiment in which most people claim that there are more words in English beginning with "R" than those containing the letter "R". This is because words beginning with the letter "R" are easier to remember (Tversky and Kahneman, 1973).

Relevant to the aforementioned topics, the main objective of this article is to verify the validity of rational choice theory, based on a sample of university students in the Czech Republic that are currently enrolled at the Faculty of Transport Engineering, University of Pardubice. These respondents between 19 and 25 y/o (representatives of Generation Z) who from the early age were exposed to a number of hidden influences due to the rapid development of information and communications technologies, to which the representatives of older generations were not (at least to such an extent) subjected. Since there are currently almost no studies examining the validity of the theory of irrationality in the transport sector, following experiment will confirm the validity/invalidity of implementing theory of irrationality while consumers are choosing to purchase plane tickets.

2 CASE STUDY

To reach the goal of this article, it is necessary to implement several steps that will be described in detail in this chapter. For individual steps to be implemented, it is necessary to use selected mathematical and statistical methods, which will be also described in this chapter.

2.1 Survey design

The main theoretical concept of this research will be heuristics, namely heuristics of anchoring and adaptation, according to the methodology described in Dan Ariely's experiment (see first chapter). The theoretical concept will be practically applied to situation of decision making while buying plane tickets (flight routes mentioned below were selected randomly):

- Prague – New York
- Prague – Rome
- Prague – Sydney

Another method used in this research is an experiment that was carried out to obtain data for subsequent testing of established hypotheses. Respondents – the students from the first to the third year of the bachelor's degree program at the Faculty of Transport Engineering at the University of Pardubice and students of the first and the second year of the master's degree program at the same faculty and university – were approached to help with implementation of the experiment. The experiment took place as follows:

- Selected respondents will be asked (without any prior information) to write down on the form the last two numbers of their birth ID number to set the anchor.
- They will be then asked to uncover remaining part of the form, so they can answer the following questions: 1) How much would you be willing to pay for a plane ticket Prague –New York? 2) How much would you be willing to pay for a plane ticket Prague–Rome? 3) How much would you be willing to pay for a plane ticket Prague – Sydney?

The form corresponds with the theoretical concept of the heuristic type of anchoring and adaptation, respectively, when the last two numbers of the birth ID numbers of the selected respondents established the anchor for each respondent.

Using the data obtained from this survey, the following hypotheses will be verified:

H01: Respondents with lower anchor will pay the same price as respondents with a higher anchor for the plane ticket Prague – New York.

HA1: Respondents with a lower anchor will pay a significantly lower price than respondents with a higher anchor for the plane ticket Prague – New York.

H02: Respondents with lower anchor will pay the same price as respondents with a higher anchor for the plane ticket Prague – Rome.

HA2: Respondents with a lower anchor will pay a significantly lower price than respondents with a higher anchor for the plane ticket Prague – Rome.

H03: Respondents with lower anchor will pay the same price as respondents with a higher anchor for the plane ticket Prague – Sydney.

HA3: Respondents with a lower anchor will pay a significantly lower price than respondents with a higher anchor for the plane ticket Prague – Sydney.

2.2 Methods

All three aforementioned null hypotheses compare the means of two datasets, for which a two-sample t-test is used. The t-test generally tests one variable (in this case the ticket price) for two independent datasets (one dataset is a group of respondents with a low anchor, the second dataset is a group of respondents with a high anchor). In order to use the t-test, the assumptions of data normality and the equality of the variances of the datasets must be met. The normality of the data is tested e.g. using the Shapiro-Wilk test, the variance equality can be tested as part of the above mentioned two-sample t-test.

If one of the prerequisites is not met, the two-sample t-test cannot be used. An alternative nonparametric analogy to the two-sample t-test, such as, the Mann-Whitney U-test can be used instead. If the test statistic of the Mann Whitney test is obtained in absolute value greater than the quantile from the tables of the normal normalized distribution, the null hypothesis can be rejected, and an alternative can be accepted. Alternatively, this conclusion can be drawn based on the p-value, which also indicates the significance of the results. If the p-value is less than 0.05, it means that rejecting the null hypothesis is the correct conclusion with a 95% probability.

2.3 Results

The experiment was carried out September 23rd-26th 2019. In total, 220 students who attend full-time form of study at the Faculty of Transport Engineering at the University of Pardubice participated.

The resulting sample of the responses sorted by year of the studies of each student is shown in Table 1.

Tab. 1 Characteristics of the sample of responses obtained; source: authors

Year of study	Total responses received	Discarded responses	Number of responses for further processing
First	95	10	85
Second	31	3	28
Third	37	0	37
Fourth	42	8	34
Fifth	15	1	14
Total	220	22	198

The most common reason for discarding selected responses was the unfilled part of the last two numbers of the birth ID number and the indication of the price of the plane tickets in a different currency than in CZK (e.g. EUR or US dollar). For further consideration, only the responses falling into a group with low end numbers of birth ID number (low anchor value), between 00-19 and into a group with high end numbers of birth ID number (high anchor value), between 80 and 99, were selected. In each of these two groups there was approximately the same amount of responses: in the low anchor value group a total of 36 responses, and a total of 35 responses in the high anchor value group. Tables 2 and 3 demonstrate the basic descriptive characteristics of the sample of responses being considered. The data in the tables are rounded to the nearest three decimal places.

Tab. 2 Basic descriptive characteristics of the sample of responses examined in category (00-19); source: authors

	Prague – New York	Prague – Rome	Prague – Sydney
Average	8 218	2 914	12 428
Minimum	1 200	500	1 300
Lower quartile	4 749	1 000	6 000
Median	7 000	2 000	9 000
Upper quartile	10 000	3 750	15 000
Maximum	30 000	15 000	40 000

Tab. 3 Basic descriptive characteristics of the sample of responses examined in category (80-99); source: authors

	Prague – New York	Prague – Rome	Prague – Sydney
Average	10 346	3 125	13 413
Minimum	2 000	600	2 500
Lower quartile	7 500	2 000	8 000
Median	10 000	2 500	13 000
Upper quartile	15 000	4 000	18 000
Maximum	20 000	8 000	30 000

To get a better idea of differences in prices of the tickets between the two groups of respondents (low anchor value vs. high anchor value), median values are demonstrated in Figure 1.

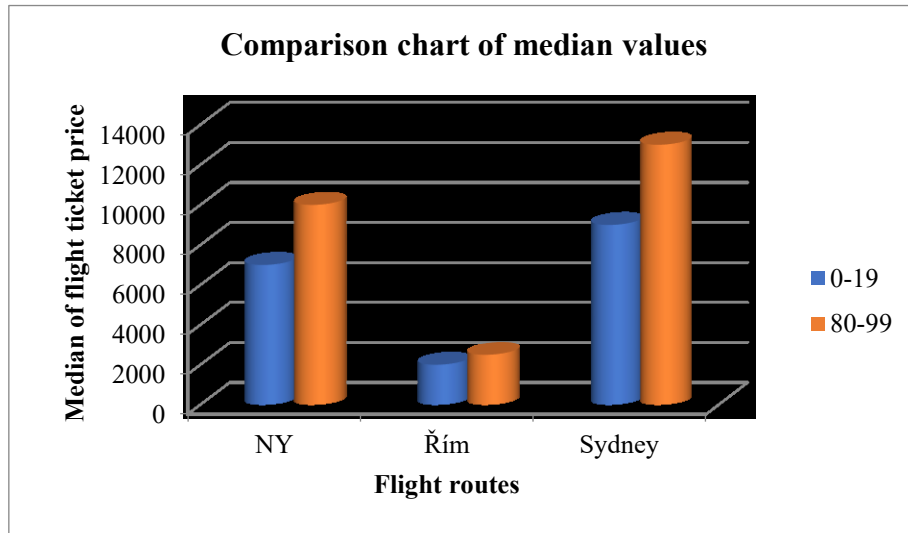


Fig. 1 Comparison chart of median values; source: authors

Figure 1 shows a noticeable difference in the median value of plane ticket prices for Prague – New York and Prague – Sydney. For the flight Prague – Rome, a trend of higher median value for respondents with a higher anchor value should be mentioned, but this difference is not as pronounced as for the other two destinations.

Before the data sets are subjected to statistical testing, it is necessary to verify that there are no outliers or extreme values in our data sets, which could possibly distort the final values of outcomes of statistical testing to validate the aforementioned hypotheses. These outliers and extreme values can be found using boxplots – the graphical visualization of the obtained numerical data using their quartiles. The box is drawn from Q1 to Q3 with a horizontal line drawn in the middle denoting the median. All numeric values outside the boxed are known as outliers or extreme values and, in this case, are deleted from the data sets (see Figure 2, 3 and 4).

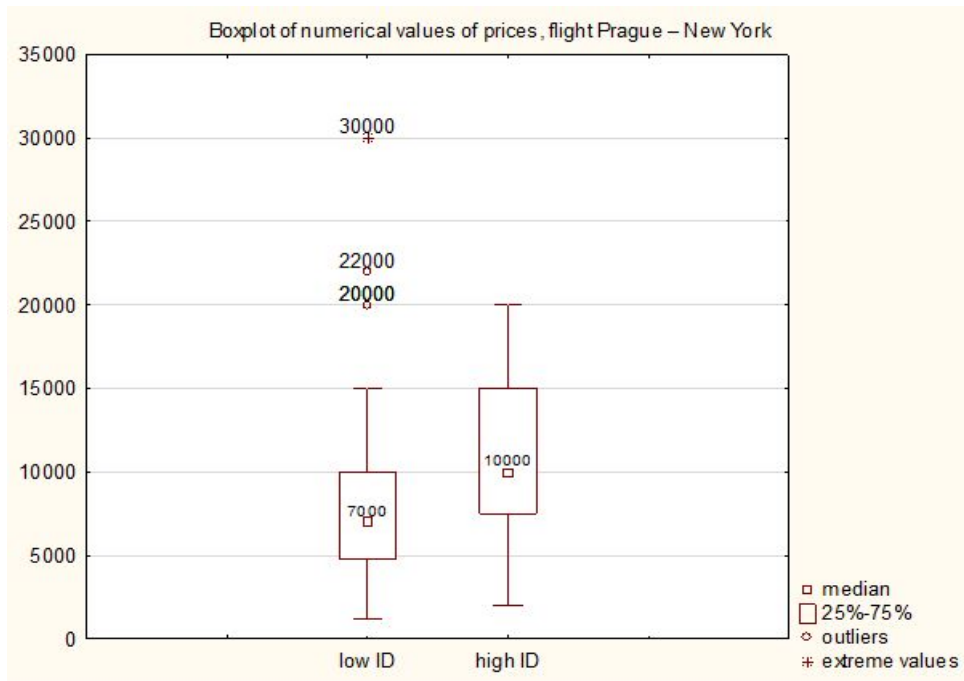


Fig. 2 Boxplot of numerical values of prices, flight Prague- New York; source: authors

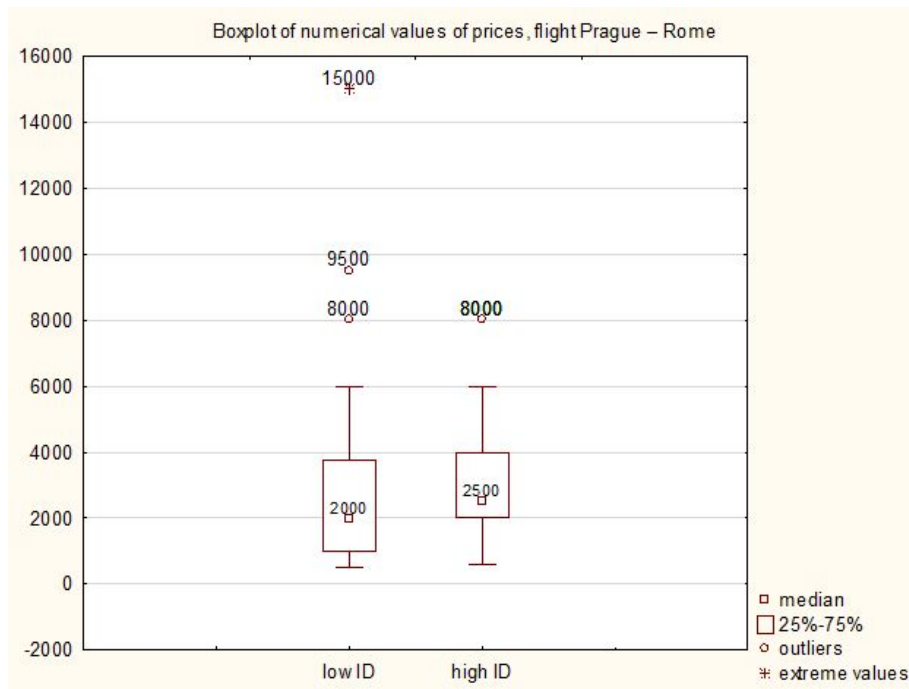


Fig. 3 Boxplot of numerical values of prices, flight Prague- Rome; source: authors

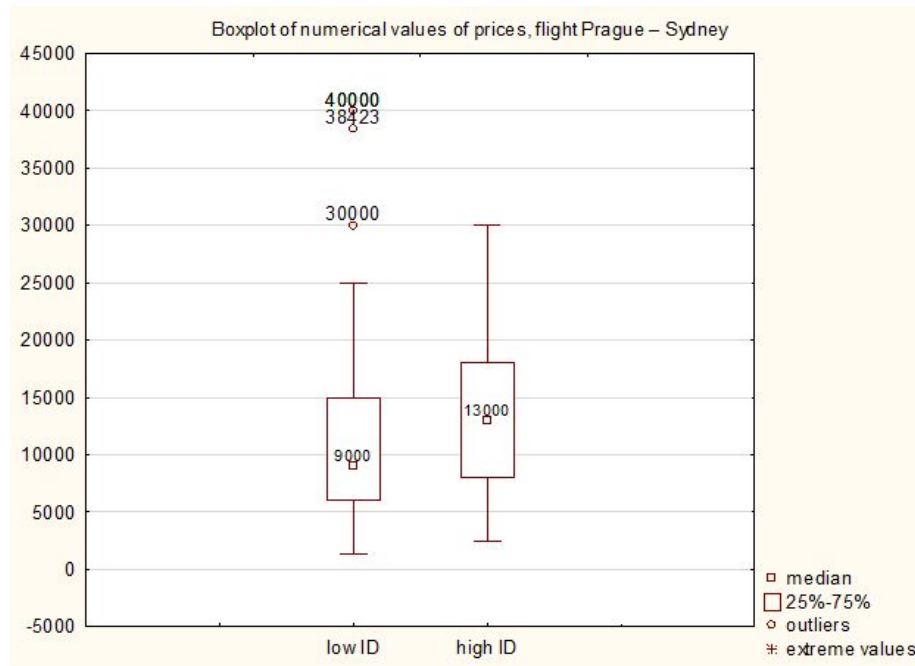


Fig. 4 Boxplot of numerical values of prices, flight Prague- Sydney; source: authors

Based on the outputs shown in Boxplots in Figure 2, 3 and 4, it is obvious that the outliers and extreme values must be removed from the data sets (see Table 4).

Tab. 4 Outliers and extreme values in particular flights source: authors

	Outliers (low anchor value)	Outliers (high anchor value)
Prague – New York	20 000, 20 000, 22 000, 30 000	-
Prague – Rome	8 000, 9 500, 15 000	8 000, 8 000, 8 000
Prague – Sydney	30 000, 38 423, 40 000, 40 000	-

Now it is possible to demonstrate selected basic descriptive characteristics of the final sample of responses, which will then undergo statistical testing to verify the validity of the hypotheses (see Tables 5 and 6).

Tab. 5 Basic descriptive characteristics of the final sample of responses examined in category (00-19); source: authors

	Prague – New York	Prague – Rome	Prague – Sydney
Average	6 370	2 994	9 944
Minimum	1 200	500	1 300
Lower quartile	4 250	1 000	5 250
Median	6 500	2 000	8 250
Upper quartile	8 500	3 000	11 000
Maximum	15 000	6 000	25 000

Tab. 6 Basic descriptive characteristics of the final sample of responses examined in category (80-99); source: authors

	Prague – New York	Prague – Rome	Prague – Sydney
Average	10 346	2 668	13 413
Minimum	2 000	600	2 500
Lower quartile	7 500	1 900	8 000
Median	10 000	2 000	13 000
Upper quartile	15 000	3 400	16 500
Maximum	20 000	6 000	30 000

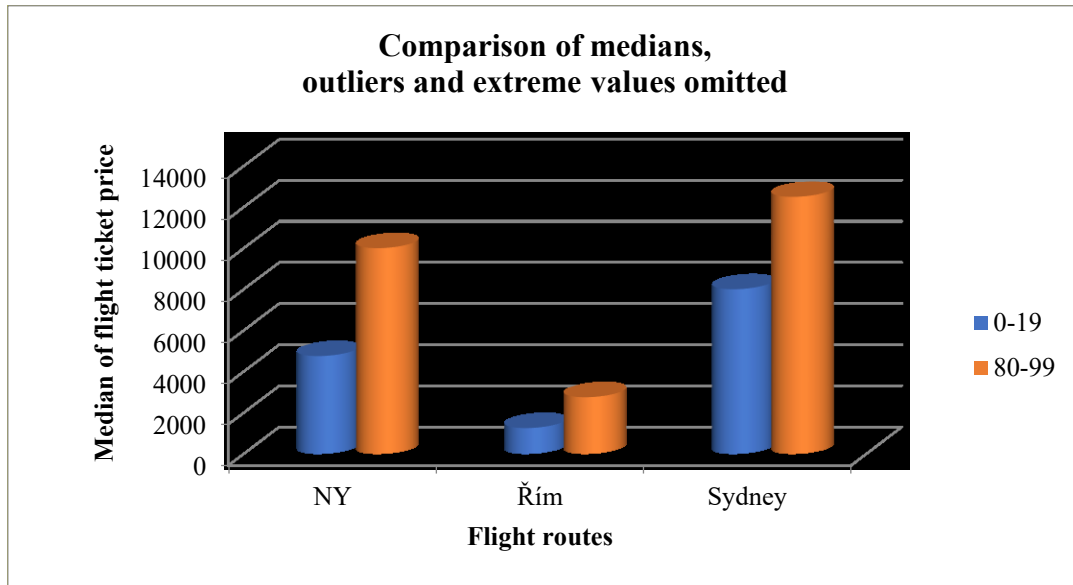


Fig. 5 Comparison of medians, outliers and extreme values omitted; source: authors

Table 7 shows the results of statistical testing using the Mann-Whitney U-test.

Tab. 7 Results of statistical testing of the hypotheses; source: authors

	Test statistics value	P value	Statistically significant at an alpha level of 0.05
Prague – New York	-3.584	<0.001	Yes
Prague – Rome	-1.699	0.09	No
Prague – Sydney	-2.398	0.02	Yes

Based on the results from the statistical testing, it is possible to make following statements about the validity of the hypotheses. For the flight Prague – New York, the null hypothesis is rejected, and the alternative hypothesis is accepted; the respondents with a lower anchor priced the plane ticket Prague – New York at a significantly lower price than respondents with a higher anchor. For the flight Prague – Rome the null hypothesis is not rejected; the respondents with lower anchor tickets Prague –Rome did not price the plane ticket at significantly lower price than respondents with a higher anchor. The null hypothesis is rejected for the flight Prague – Sydney and the alternative hypothesis is accepted; the respondents with a lower anchor priced the plane ticket the Prague–Sydney at a significantly lower price than respondents with a higher anchor.

3 CONCLUSION

The objective of the article was to verify the validity of the theory of rational decision-making (specifically when deciding on the purchase of plane tickets), on a sample of university students in the Czech Republic who are currently enrolled at the Faculty of Transport of Jan Perner, University of Pardubice. These are people between 19 and 25 y/o (representatives of Generation Z) who have been exposed throughout their lives to a number of hidden influences due to the rapid development of information and communications technologies, to which the representatives of older generations were not (at least to such an extent) subjected. During the proceeding of the experiment, the focus was on confirming/refuting the assumption that a person in the decision-making process could still be considered a so-called homo oeconomicus.

In the last few years, the validity of the concept considering a human homo oeconomicus has become increasingly questioned within the scientific community. This is especially important because the contemporary society (people who are part of today's society) is confronted with a vast amount of influences the previous generations have not been confronted with (and if so in limited amount). This fact could lead to more pronounced manifestations of irrationality. The rapid development of information and communications technologies is the main force behind the change of influences on an individual. These influences are often hidden, and one does not even realize their importance during the decision-making process. In the last few years, this area of studies has been increasingly in focus of the researchers. In this context, however, it should be noted that the efforts of studies demonstrating the impact of hidden factors on the decision-making process do not undermine the validity of classical economic theories that are still used to predict future developments in a wide range of sectors of the national economy. The attempt of these studies is to refine the predictions of classical economic models based on knowledge about the influence of hidden factors in a person's decision-making process.

Following the results of statistical testing of the validity of the established hypotheses, it can be confirmed that in two model cases (flights Prague – New York and Prague – Sydney) the influence of heuristic of anchoring and adaptation was confirmed. In the case of the flight Prague – Rome, the influence of the heuristic type was not confirmed. Based on these findings, it can be argued that a person is sometimes influenced by hidden factors in the decision-making process when buying tickets – in this case, the influence of an anchor. Referring to the current state of knowledge within the discipline of behavioural economics, it is possible to explain why the influence of the anchor in the framework of the realized experiment was not confirmed in all three model cases. Heuristic of anchoring and adaptation is one of the phenomena through which the so-called cognitive bias comes about. Cognitive bias can then generally be defined as a summary of phenomena resulting in limitation of human rationality in decision-making process. Other phenomena of cognitive bias in addition to anchoring and adaptation heuristics include base rate neglect, hindsight bias, confirmation bias etc. (Battersby, 2016; Dimara et al., 2018).

In this case using the knowledge about the current state from the confirmation bias to the area of heuristic of anchoring and adaptation (both of these phenomena are part of cognitive bias), it will be possible to clarify why, in the model case Prague – Rome, the influence of anchoring and adaptation heuristic has not been confirmed.

Based on the writings of authors working on the given issue, it is possible to define several factors that demonstrably reduce the effect of confirmation bias. Smith and Kida (1991) mention in their work that knowledge and experience from everyday life has the biggest impact on reduction of the influence of the confirmation bias. The authors came to this conclusion based on the results of laboratory experiments, where they monitored the behaviour of auditors carrying out tasks similar to their normal work activities and compared it to their behaviour while carrying out tasks completely different from their normal work activities. The auditors showed significantly fewer cognitive illusions in decision-making and reasoning in the performance of tasks resembling their normal work activities, and the confirmation bias essentially disappeared from their decision-making. Another factor that reduces the effect of confirmation bias is friendly environment (Klayman, 1995). The influence of this factor was confirmed by the experiments, in

which due to the friendly relationship between the experiment implementer and the respondent, the respondents asked the investigator further questions beyond the task to be addressed. As a result of this situation, the validity/invalidity of hypotheses have been numerously verified in the decision-making process of the respondents, thereby ultimately reducing the impact of confirmation bias. Related to the conclusions of this article, it can be noted that it is the "knowledge and experience" factor that can explain why, in the model case Prague – Rome, the influence of heuristics of anchoring and adaptation has not been confirmed.

It is possible to believe that the respondents (students of full-time study of the Faculty of Transport Engineering at the University of Pardubice) who participated in this experiment had been having more experiences with buying plane tickets to European destinations rather than traveling outside of Europe, and perhaps because of this, the influence of anchor heuristic and adaptation has not been confirmed in this single European flight, namely Prague – Rome.

The use of the results of this article is particularly evident in the environment of undertakings offering tickets on the internet portals designated for this purpose. The conclusions of this article, as well as the conclusions of the works of other authors dealing with the influence of confirmatory distortion, can be used precisely in the process of pricing by undertakings offering tickets. These businesses can use up-to-date ICT tools on different shopping portals using pricing techniques to distort the feeling about the price a consumer is willing to pay.

To guarantee maximum degree of objectivity of the results, it is necessary to mention certain limits of the article. The most obvious distortion stems from the chosen sample, in this case the respondents who were included in the experiment. These were representatives of generation Z in the Czech Republic, specifically students currently enrolled at the Transport Faculty of Jan Perner, University of Pardubice. For this reason, it is not possible to generalize the conclusions of the article to the entire population of the Czech Republic, i.e. representatives of all generations. Consequently, there is an opportunity for further research, which could focus on verifying the validity of the theory of rational decision-making precisely among the representatives of older generations. It is possible that representatives of older generations may be more immune to the influence of confirmatory bias, precisely because representatives of older generations have not been influenced to such an extent by information and communications technologies throughout their lives.

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