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ECONOMIC RATIONALITY OF STUDENTS AT POZNAŃ UNIVERSITIES. DOES PLACE OF ORIGIN MATTER?

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Abstract. In this paper, economic rationality is measured using the tools of behavioral economics, and the extent to which factors such as field of study, place of origin, gender, interest in economics and economic situation affect this rationality is determined. The authors hypothesize that among these factors, place of origin may be of particular importance due to, among other things, differences in the quality of education between urban and rural areas. In order to verify this hypothesis, Poisson regression and data from a survey conducted on a sample of 232 students of universities in Poznań were used. The developed model proved that the influence of both field of study and interest in economics was statistically significant. Moreover, in some cases place of origin and economic situation (if one's situation is classified as the worst) were also significant factors. The findings from the survey allowed us to identify the profile of the least economically rational student: a person from a town of up to 250,000 inhabitants, in a field of study within the humanities, in the worst financial situation.

Keywords: behavioral economics, heuristics, economic rationality

INTRODUCTION

Economic disparity between rural and urban areas of Poland persists. The GINI index shows that greater inequalities occur in cities; however, when median incomes are compared, which in the case of significant inequalities can be more reliable than the mean, one can see a clear upward trend in earnings in favor of cities over smaller towns (according to data of Statistics Poland (GUS) "Income situation of city residents", figure 11). The income disparity between rural and urban areas is gradually decreasing nevertheless. Comparing 2006 with 2019, it can be seen that income parity (in %) has increased from 69.8% in 2006 to 77.9% in 2019 (GUS, 2007, 2020).

Scientific studies and reports indicate, among other things: lower quality of life in rural areas than in cities, a lower level of expenditure, and inferior quality of household goods in rural homes. The inhabitants of rural areas also make lower subjective assessments of their quality of life. Sources indicate that the direct reason for this is lower income in rural areas than in urban areas (Chmielewska and Zegar, 2018).

What is more, Murawska (2018) addressed the meaning of income inequality as evidenced by the GINI index between rural and urban residents. The author postulates that this should not be based solely on income, but should also take into account social factors, housing conditions, and technical infrastructure. This revealed that, while the income inequality is a fact, the size of housing is on average bigger in rural areas. Additionally, environmental conditions are better in rural areas, which enjoy lower particulate pollution and more extensive forest cover. Murawska (2018) notes that differences in living standards between rural and urban areas are slowly decreasing, but they are still present and significant. According to the NBP (2017) "Wealth of households in Poland 2016 survey report", a clear differentiation of net

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wealth, per household, is associated with the class of the place of residence. Households in rural areas have, on average, significantly greater wealth (PLN 363,400) than urban households (PLN 231,900). Inhabitants of large cities (over 200,000 inhabitants) are clearly more affluent (PLN 254,000) than inhabitants of smaller urban centres (PLN 217,700). Households living in rural areas located around the largest cities have by far the most assets (PLN 453,700). Households located in other rural areas also have significantly higher assets on average (PLN 347,800) than those in large urban centres. Brzeziński (2017) reports that in Poland, even if wage and income inequality is relatively high, wealth inequality is low compared to other European countries. Chmielewska (2020), based on GUS data for 2006–2019, described the influence of lower quality of life, which determines women's decisions to leave the countryside and move to cities. Women account for a larger percentage of rural-to-urban migrants (Chmielewska, 2020).

In the context of the COVID-19 pandemic, one can also observe a greater pessimism concerning poverty risk for rural residents than for urban residents (Kalinowski and Wyduba, 2020).

Research by Raczkowska and Wrzesińska-Kowal (2018) indicated that there is a strong correlation between income inequality as measured by the GINI coefficient and relative poverty in rural areas. Interestingly, however, no relationship was observed between the analyzed variables for farmers as an occupational group.

To summarize, lower income, wages, and quality of life in rural areas may be the result of various factors. Among them, material and environmental factors play a crucial role. This generally worse material situation in rural areas can lead to a lower quality of education and, as a result, reduced economic rationality. Via this mechanism, place of origin can impact economic rationality, which is the subject of this study.

The innovation of the proposed research stems from the use of behavioral economics methodology and theory in the process of data acquisition and explanation. This relatively young discipline of economics has recently been gaining popularity, including in the context of research conducted on Polish society. Studies related to so-called "payday loans" in the context of behavioral economics and state regulation (Mączyńska, 2018) and the potential of using behavioral economics to reform the pension systems (Szczepański, 2017) can serve as good examples. Researchers argue that behavioral approaches are more relevant to the assessment of such situations than standard methods and can provide a fresher picture when compared with conventional methods of measuring competence. In particular, we refer here to economic rationality. A good formulation of this concept was offered by R. Thaler, who countered the justification that economics functions "as if" actors were fully rational (a reference to Friedman's comparison of market actors to professional pool players): "My main point was that economics is supposed to be a theory of everyone, not only experts. An expert billiard player might play as if he knows all the relevant geometry and physics, but the typical bar player usually aims at the ball closest to a pocket and shoots, often missing" (Thaler, 2015, p. 71).

In order to verify the hypothesis of a different degree of economic rationality between people from urban and rural areas, a group of students from public universities in Poznań was surveyed. Their economic rationality was verified using a series of questions about their behavior in hypothetical situations, testing such behavioral economics concepts as the S-shaped value function, system 1 and 2, mental accounting, the impatience effect, and trust games. The survey also included a series of questions to identify alternative determinants of rationality such as gender, hometown, background, wealth, field of study, year of study, interest in economics, and employment status. These serve as control variables in the study.

The data obtained facilitated the construction of an econometric model based on Poisson regression. This model was applied because the relevant explanatory variable, describing the level of economic rationality, has a count character, therefore traditional linear regression by classical least squares is inadequate and could return loaded estimation results. This method has been applied in economics before, for example in insurance market research (Wolny-Dominiak, 2011). In the context of motor insurance, Poisson regression has also been used to assess which definition of the geographical dimension gives the best results when explaining the incidence of claims (Gala, 2018).

The approach above will fill the research gap on the relevance of place of origin to variation in economic rationality. Previous studies of economic rationality have explained it with reference to the knowledge possessed by the subject that would allow them to minimize risk.

Risk also increases for consumers when their trust in the products offered decreases (Małysa-Kaleta, 2018).

Potential benefit versus cost is also indicated to be relevant. In the case of students, the rational thing to do, according to the author, is to choose a field of study that will guarantee a well paid job. Thus, students should take into account the situation in the labor market and potential competition, hence knowledge is again involved (Gumieniak, 2019).

Economic rationality can also be applied, among other things, in the economic analysis of law to evaluate the actions of actors. Grott (2020) points out that according to the economic theory of crime, the rationality of the criminal is manifested in the ability to automatically update their imagined probabilities of events. These perceptions should assume the maximization of expected utility while taking into account the input of any new information. An actor will undertake a crime when the expected utility from the crime exceeds the utility from legal activity. The calculation takes into account the risk of incurring punishment, the moral aspect (moral value m) of the criminal. Incentives that reduce the attractiveness of crime are therefore primarily the probability of receiving punishment and the severity of the punishment. However, the author herself criticizes this theory due to insufficient focus on the subjective aspect of utility to the actor, which results from their emotionality and worldview (Grott, 2020).

MATERIAL AND METHODS

This research was conducted within the theory of behavioral economics. The starting point of reasoning in behavioral economics is the counterfactuality of the rational expectations theory, fundamental to mainstream economics.

Evidence of the differences in educational outcomes between urban and rural areas can be seen in the standardized test results of eighth graders. According to data from Statistics Poland, over the past three years children from rural areas have always had lower average test scores than children from cities with populations over 100,000 by at least several percentage points. This phenomenon is independent of whether Polish, mathematics or foreign languages are taken into account (CKE, 2021). Therefore, it can be assumed that this is not a matter of an area of knowledge or its selection, but a general phenomenon. Assuming that exam results to some extent reflect the level of knowledge and that economic rationality is to some extent related to it, the following research hypothesis can be formulated: Students of Poznań universities coming from smaller towns make less rational economic decisions.

To verify the above hypothesis a survey study was conducted. The research group were students of Poznań universities. Due to the Covid-19 pandemic, the survey had to take place in electronic form. A link with the online questionnaire was made available, both privately and on public groups. The study was designed to test whether the group succumbs to heuristic errors, or whether they behave rationally according to the theory of mainstream economics. The test consisted of single-choice questions. Some of the questions were inspired by the work of English-speaking behaviorists R. Thaler, D. Kahneman, and A. Tversky. Every effort was made to adapt them to Polish circumstances. Some of the questions were the author's own. The first part of the questionnaire classifies the respondent according to different criteria such as place of origin, field of study, gender, etc. The second part consists of 13 questions about preferences. Single answers alone do not provide any conclusions in this part. Everyone may exhibit both risk appetite and risk aversion. However, some of the questions correspond with each other. What constitutes an error is inconsistency in answers to those question which are different in form, while maintaining the same logical sense. The order of the problems and issues was chosen randomly to minimize the phenomenon of comparison, which could induce deeper reflection and a search for relationships between questions, making the results less compelling. Nevertheless, there is still a risk that respondents compared similar-sounding problems with each other because they were all available on one card.

The survey was based on the following behavioral economics questions:

- S-shaped value function. This theory assumes that a person does not view their assets holistically. Rather, they make constant comparisons with the current state. As a result, negative values may appear on the utility graph. Moreover, the dissatisfaction caused by the loss of a given amount of resources is more palpable than the joy caused by gaining an equivalent amount (Kahneman, 2011). In our case, if a person answers questions 2 and 12 from the questionnare in the same manner (50% risk of losing 100 zł and 50% chance of no loss + 50% chance of gaining 100 zł

and a 50% risk of gaining nothing OR A certain loss of 50 zł. + Sure profit of 50 PLN.) then they have answered rationally.

- System 1 and 2. According to this theory, a person does not always use their full mental resources and has both an analytical system and an instinctive system. There is a kind of battle going on in everyone's head between present desires, future desires, and a system of control that tries to maximally satisfy both of these (Kahneman and Frederick, 2001, p. 2). Question 6 "Do you consider yourself to be a person who succumbs to the effect of procrastination" relates to this concept.
- Mental accounting. According to this theory, money is not a consistent concept for humans and they divide their budget into separate money categories: in the piggy bank, in the wallet, in the bank account, in the stock market. This differential treatment of different income streams can lead to irrational decisions. Consumers have a conscious system of managing their finances according to their capabilities. With the help of this system they can more easily organize, evaluate and control expenses and separately balance budgets for personal development, entertainment and savings (Maison, 2013, p. 47). In our survey, questions 3 and 10 address this problem by checking reactions to lost money accidentally found in one's pocket and receiving a fine for not having a ticket in public transportation, respectively.
- Impatience effect. "A phenomenon that can be described as "present bias" is the tendency to be more impatient when the wait for a reward is short, and more patient if the reward is more distant in time. Impulse, or the desire to consume quickly, weighs more when there is a short discounting period, and self-control and the choice of a larger payoff takes over when there is a longer discounting period" (Orlik, 2017, p. 70). Questions 8 and 14 together measure this phenomenon. In question 8 participants have to choose between acquiring $2,000 in 2 years or $3,500 in 3 years, and in question 14 they have to choose between acquiring $2,000 now or $3,500 in one year. If a person decides to receive $2,000 or $3,500 on each occasion, regardless of timeframe, then there is no impatience effect.
- Trust games. With reference to the classic prisoner's dilemma, behavioral economists have asked whether people would be willing to punish someone even if they received nothing in return. If so, it would appear that decision makers can be satisfied with their sense of justice alone. They hypothesized that such behavior makes practical sense because even if we no longer deal specifically with the cheater, they might change their behavior toward someone else in the future. This is how social order, which is, after all, necessary in life, is built (Thaler, 2015, pp. 186–188). Questions 7 and 11 measure if the subject is willing to cooperate and trust to acquire more in long term.

It was not possible to find representatives of the selected communities, e.g. medical students, that would at the same time evenly represent all intersections of other categories such as the year of university studies. It proved much more likely that a particular field would be predominant in a certain social grouping. This was the case for respondents from the Medical University, who were mostly in their 5th year of study. For this reason, the detailed analysis assessed whether a given deviation was too correlated with another determining factor, as in the case described above.

When compared to the general Polish data for the year 2020, our data is consistent with the general trend. The greatest difference in the field of study was for natural sciences. In Poland only about 3% of students study natural sciences and in our database 13% of answers were given by natural sciences students (GUS, 2020). According to GUS (2020) 58% of students in the year 2020 were female; in our database the corresponding figure was 59%.

A total of 232 students from universities in Poznań were surveyed. The authors tried to acquire data from different institutions by enabling different students to answer online, on public groups. Women constituted 59% and men 41% of the respondents. The sample was distributed approximately equally when classifying by the place of origin, with a largest deviation of 17% to 22%. The breakdown by field of study is presented in Fig. 1. When participants are broken down by time spent studying, students in the 3rd year of their bachelor's degree form the most numerous population (35.8%), followed by students in the 2nd year of their bachelor's degree (25.4%). The remaining years of university education were represented nearly equally. However, the distribution by wealth situation starting from the poorest was as follows: 14%, 14%, 33%, 20%, 19%. The proportion of students working (49.6%) to those not working (50.4%)

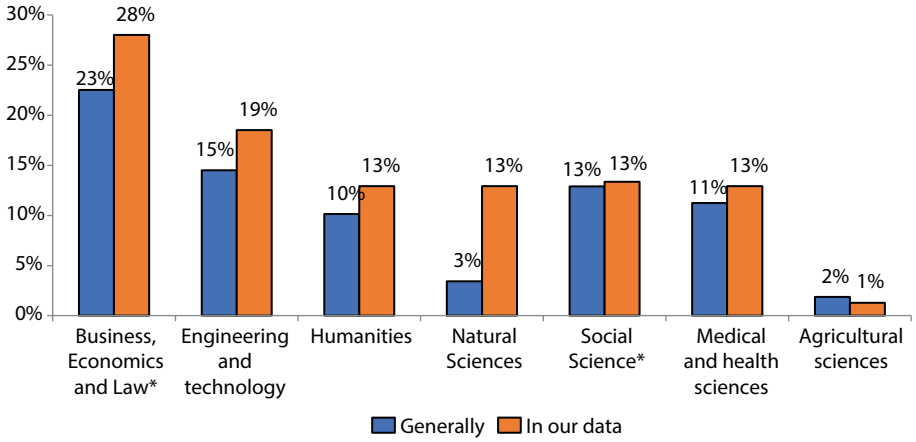

Fig. 1. Distribution of respondents by field of study – comparison
Business, Economics and Law category in the case of authors' database includes only Business and Economics students.
Source: author's original work, GUS (2021)

was almost even. 60% of the respondents said they were not interested in economics. It should be noted, however, that this is the most subjective of the questions.

Student responses were aggregated into an original rationality index with a point scale from 0 to 8. Points are given in accordance to answered questions. 0 means that the respondent did not answer rationally to any of the questions; 8 means that every question was answered correctly. Some scenarios granted a participant a point for a correct answer. Others worked on a comparative basis, so points were given only if both questions in a pair were answered correctly. Points were then summed up resulting in a rationality index. It is not important in a question about a potential reward whether the respondent chooses 2000 PLN or 3500 PLN. What is important is that they behave consistently, i.e. they choose the same value twice. Because of the adopted coefficients, in order to avoid the problem of strict collinearity, with most of the features one of the groups was omitted. The feature not included in the regression equation is implicit, i.e. if students of economics are omitted from the estimation, any coefficients pertaining to other majors will be interpreted comparatively, e.g. medical students have on average X more/less points than economics students in the discussed rationality index (Stanisz, 2007). The use of classical linear regression proved inadequate. The need arose to build models with both individual and collective characteristics (for example, by combining some groupings, which resulted, for example, in the wealth category including only three groups instead of five). For this reason it was decided to use Poisson regression. The Poisson distribution is applicable when there are only positive whole numbers in a set. Originally, the function was used for systems with a large number of events, each of which is rare (Gałuszko et al., 2019, p. 161). The individual preferences and features described in the survey reported here, although they can definitely be repetitive, meet the definition of rarity and most importantly individuality.

RESULTS AND DISCUSSION

The main interest in this paper is whether one's place of origin can prove to be a significant determinant in the model. Therefore, in estimating it, the trait of rural origin was taken as the comparative element. Then, the comparative groups were: gender – men, education – students of economics, wealth – moderately wealthy. With such assumptions, R-squared reached over 51%, which can be regarded as a satisfactory level, considering the fact that most of the variables are of a qualitative nature. A variable is considered significant if its p-value does not exceed 0.05. In this context the feature "City up to 250,000" is questionable. Without applying an approximation to the hundredth part, the p-value is 0.05388.

The results obtained show that gender had no statistically significant effect on economic rationality in the

Table 1. Models of determinants of economic rationality among students of Poznań universities

	Coefficient	Standard deviation	p-value
Intersection	1.60	0.08	1.09E-80***
Gender	-0.05	0.04	0.17
Home town:			
below 50 thousand inhabitants	0.04	0.05	0.48
up to 250 thousand inhabitants	–0.13	0.07	0.05*
up to 500 thousand inhabitants	0.18	0.07	0.01**
over 500 thousand inhabitants	0	0.05	0.96
Field of study:			
engineering	0.10	0.05	0.08*
humanities	-0.22	0.08	0.01**
medical	0.19	0.08	0.02**
natural science	0.27	0.08	0
social science	0.13	0.06	0.03**
Year of university education	0.02	0.02	0.27
Financial situation:			
Significantly worse	–0.37	0.07	9.71E-07***
worse	0.06	0.07	0.41
better	0.01	0.05	0.81
significantly better	–0.01	0.06	0.89
Interest in economics	0.12	0.04	0.01**
Employment	0.06	0.04	0.12
R-squared		0.51	
Chi-squared		79.81	
Phi		0.61	
AIC		118.77	

Source: own elaboration.

study group. All fields of study turned out to be statistically significant in the model, humanities being the only one to have a negative effect on economic rationality. The most rational were students of natural sciences, followed by students of medical sciences, then students of social sciences, and finally students of engineering. Rationality manifested in moderation of consumption (non-impulsive) in favor of saving among Polish students in the context of the Visegrad Group countries has been described by Żak (2020). The humanities faculty standing out in this context may be explained by the specific form of perception of reality among its students, according to the author, in contrast to the neoliberal concept of economic rationality (Raczkowski, 2018).

The size of one's hometown turned out to be significant in two cases: residents of cities with up to 250,000 inhabitants, according to the model, will make less economically rational decisions, while residents of cities between 250,000 and 500,000 inhabitants will be characterized by greater rationality. This may be because students change their residence more often in both directions (from villages and big cities), which could distort the statistical significance of this variable. To prevent this kind of distortion in the future, time of residence could be added as a possibly important additional variable. The negative effect on smaller cities (up to 250,000 inhabitants) is in accordance with the fact that smaller urban areas are generally poorer, which could affect quality of education and knowledge. The economic situation affects only the "much worse" category. According to the model, such a characteristic of the subject will determine lower economic rationality. Similar conclusions were reached by Cappelen et al. (2021), indicating that students from less developed regions with lower income levels are characterized by lower economic rationality.

The relevance of interest in economics is also worth mentioning, since its presence determines better economic rationality scores. A recently published article about a 2017 study on a group of economics students at the University of Negeri Melang in Indonesia confirms the relevance of the so-called "financial literacy" of students and shows its direct impact on economic rationality.

Such "financial literacy" may be directly related to an interest in economics specifically, but it would be necessary to investigate the relationship between these concepts.

According to the given results, the most rational in the economic sense turned out to be people from cities between 250,000 and 500,000 studying natural science subjects who do not come from poor households and are interested in economics. The least rational according

to the index turned out to be people from cities with populations up to 250,000 studying the humanities who come from poor households and are not interested in economics.

These results do not necessarily imply that subjects must accurately predict the future, as "they may make errors when complete information is not available. Such errors are referred to as random errors. However, despite the presence of errors, on average their choices will be correct, or at least not systematically wrong" (Orlik, 2017, p. 20). Behavioral economists, on the other hand, believe that errors are non-random. They have a specific tendency and can be predicted and even sometimes corrected. They usually involve succumbing to a certain illusion or heuristic error. This term means doing something automatically using simplified rules of inference. People as a species use heuristics to make quick judgments that do not require intellectual engagement. This has an evolutionary rationale because using them is economical for the individual, but their drawback is that they can sometimes lead one to the wrong conclusion. Kahnemann and Tversky (1974, p. 1131) identified the following heuristics: representativeness, accessibility, adjustment and anchoring. It is worth noting that behavioral economics is not in opposition to the neoclassical school. It is not designed to prove the other side wrong. Behaviorists do not suggest a revolution, but only propose evolution. They recognize that the perfect human being is a good starting point, which should be expanded to include, for example, emotions. One might also be tempted to say that a human is a more sophisticated being than economists assume because they analyze social interactions and take into account the system of connected individuals, unlike the selfish, sociologically blind, perfectly rational decision maker.

Before proceeding with the calculations, the validity of the distributions and variances was also verified to ensure that the methodology could be considered statistically valid. The normality of the distribution of the explanatory variable was confirmed by the results of the Shapiro-Wilk test ($p = 1.02E\text{-}07$ to $W = 0.944395$). To confirm the test results, ANOVA tests were also performed, the results of which were also considered significant (Kruskal-Wallis Test $p = 0.00000001$, DUNN's Test – in terms of the variable of origin only 3 out of 10 pairs were considered insignificant: up to 50,000 and above 500,000, up to 50,000 and village, above 500,000 and village).

CONCLUSIONS

The survey proved that the behaviorists' hypotheses were mostly correct for the examined population, i.e. students of Poznań universities, and they could be taken into account in more general economic analyses. The following factors turned out to be the most significant: field of study, interest in economics and wealth (only significant in the case of considerably poorer households). Although it has been shown that the place of origin affected the results of the survey, it is not possible to formulate unambiguous conclusions on this basis. The results of people coming from cities with the largest population did not turn out to be significant (the comparative feature for this group was coming from a village). Thus, the conclusion is that other characteristics turned out to be more important, and the significance of the place of origin may be due, for example, to the overlap of people in the humanities with those coming from cities of up to 250,000 people. It follows that this hypothesis formulated in the paper was not confirmed. The factors of major and interest are least affected by determinism. This may indicate the importance of free will and the desire for self-improvement. Unfortunately, the factor most influencing the outcome (negatively) and at the same time with the lowest p-value is poverty. There may also be a problem of sample selection adequacy of the construction of the rationality index as there are many ways of measuring this phenomenon; there is also a risk of omitting statistically important unobserved variables. While the hypothesis was formulated on the basis of test scores in elementary school, the students surveyed who came from rural areas may have had scores that deviated from the averages of their regions. In other words, at later stages of education, it may not matter where a person comes from.

Even though the study was designed with the utmost care, it still has some limitations. First of all, the research sample was highly heterogeneous, and thus it was difficult to select the hypothetical winning or losing amount in such a way that it was meaningful for the more affluent respondents and not abstractly high for the poorer respondents. Second, all potential rewards and human interactions were also hypothetical, so the questions did not involve "How do you feel?" but rather "How do you think you would feel in this situation?" Due to the ongoing Covid-19 pandemic, opportunities to reach students outside of the Poznań University of Economics were limited.

The author's suggestion for a general improvement of economic performance and competence among young adults is to revise the curriculum of the economic subjects that are taken in non-economics majors. Very often, these classes are completely incidental to a particular major. It is therefore inadequate to present economics in its most mathematized form to students in these majors, since it is highly likely that the person choosing such studies has avoided mathematics for most of their life. It would be sufficient for such a person to have their idea of economics as a science of mathematics and money transformed into a vision of economics as a social science of utility (happiness) and choices. It also seems reasonable to extend the offer of economics education in primary and secondary schools, which could increase interest in economics and "financial literacy".

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