

## Research Article

Peter Gordon Roetzel\*, Lina Roetzel

# “Tis Early Practice only Makes the Master”: Nature and Nurture in Economic Thinking During School Time – A Research Note on Economics Education

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**Abstract:** In this article, we contribute to the longstanding debate among economists regarding the question of “nature or nurture” with respect to economics students’ attitudes toward various allocation mechanisms for a scarce resource. While previous research starts the debate by beginning with first-year economics students, we aim to evaluate pre-first-year individuals, i.e., school pupils. Drawing on the seminal works of Haucap, J., & Just, T. (2010). Not guilty? Another look at the nature and nurture of economics students. *European Journal of Law and Economics*, 29(2), 239–254 and Frey, B. S., Pommerehne, W. W., & Gygi, B. (1993). Economics indoctrination or selection? Some empirical results. *The Journal of Economic Education*, 24(3), 271–281, we investigate a sample of 697 pupils ranging from the 5th to the 13th grades to determine whether pupils are “born economists” (nature), develop economic thinking (nurture), or both. We find that young individuals start to think differently in early grades and that their thinking and attitudes are shaped differently throughout their school careers, thereby providing support for the effects of both nature and nurture. Our findings show that school time impacts fairness judgments, particularly regarding price mechanisms. Regarding learning or indoctrination, we find that economics-inclined pupils are positively affected by lessons in economics in school, while pupils who are economics-averse draw completely diametric conclusions from economics lessons, thereby exhibiting increased disapproval of price allocation over the course of these classes and increased approval of the first come, first served and governmental action mechanisms.

Moreover, we find strong effects of gender and migration background in this context. This study is the first to elucidate the development of economic thinking in 5th–13th grade pupils. Our results are important for economists, educators, and researchers because they can serve as a starting point for subsequent investigations in this under-researched field.

**Keywords:** economists, fairness, learning, selection, attitudes, economics education

## 1 Introduction

“Tis early practice only makes the master” (Friedrich Schiller/ Wilhelm Tell).

When does an individual start to become different from other individuals in terms of economic thinking? The intense discussion in the previous literature regarding whether such differences arise from “nature or nurture” (Haucap & Just, 2010, p. 239) starts with provocative insights regarding the uncooperative or socially undesirable behavior of economics students. For example, some scholars report less cooperative behavior (Marwell & Ames, 1981) or higher levels of corruption (Frank & Schulze, 2000), while other studies find prosocial behavior (McCannon, 2014), higher levels of cooperation (Yezer, Goldfarb, & Poppen, 1996), or an aversion to lying (Lundquist, Ellingsen, Gribbe, & Johannesson, 2009). Thus, most research on economics education starts with investigations of education at universities.

This article investigates whether the learning hypothesis holds for individuals when they are in *school*, i.e., before they begin studying at university. We want to explore whether the learning or indoctrination hypothesis holds in school. We aim to explore pupils’ views regarding price increases and other allocation mechanisms by using the experimental design proposed by Frey, Pommerehne, and Gygi (1993) and Haucap and Just (2010) to investigate a German comprehensive school that educates children

\* **Corresponding author: Peter Gordon Roetzel**, Department of Accounting, University of Applied Sciences Aschaffenburg, Aschaffenburg, Germany, e-mail: peter.roetzel@th-ab.de

**Lina Roetzel:** Hochschule fuer Polizei und Verwaltung Wiesbaden, Germany

ranging from the 5th to the 13th grades. Our article offers the first insights into how attitudes toward different allocation mechanisms are shaped during children's school careers and thereby provides potential avenues for further research.

While the “nature or nurture” discussion might be interpreted as a purely theoretical discussion conducted by some economists sitting in their ivory towers, the extant literature highlights the relevance of fairness perceptions regarding allocation methods in practice; i.e., fairness perceptions represent a key factor in contract design (Brockner, 2002), innovation (Janssen, 2004), and the acceptance of monetary incentives in the health industry (Roetzel & Kokott, 2008). Moreover, the exploration of the foundations of economic thinking in high school education might deepen our knowledge of the ways in which individuals develop their economic understanding. Previous studies conducted at the university level that draw on the nurture aspect implicitly assume an unspecified level of economics education and do not challenge this assumption (Haucap & Just, 2010). Other studies on economic thinking focus on a higher level of detail, e.g., Walstad and Rebeck (2001), investigate the “Test of Economic Literacy (TEL)” by reference to U.S. high school children but exclude the nature vs. nurture debate and focus on how efficiently high school children learn the details of micro- or macroeconomics.

The task of deepening our understanding of how economic thinking is developed in school is relevant for three reasons. First, this task is linked to a stream of research that indicates that investigating the behavior of children and adolescents provides important insight into how economic behavior develops into characteristic patterns in life. Economic thinking can develop in different ways, e.g., in terms of fairness preferences, risk attitudes, rational choice behavior, or competitive preferences (Sutter, Zoller, & Glätzle-Rützler, 2019 for a survey of economic results). Policy-makers might need information at different levels, as indicated by questions such as “Do pupils need more (or less) economics understanding in school?” at the strategic level, “Which elements should be added/removed?” at the operational level, and “What are the societal and economic impacts of (too little) understanding of economics?” at the societal level. Our research aims to investigate how economic thinking develops with the goal of improving our understanding of the mixed results reported by studies on economic thinking at university. Moreover, previous research indicates that economic preferences (as a noncognitive skill) might affect individuals' social and economic success, particularly in labor markets (Heckman, Stixrud, & Urzua, 2006; Sutter et al., 2019).

This study is the first to elucidate the development of economic thinking in 5th- to 13th-grade pupils. Our results

are important for economists, educators, and researchers because they might serve as a starting point for subsequent investigations in this underresearched field.

The debate regarding the reasons why economics students may differ is rooted in the different implicit assumptions made by the two widespread hypotheses underlying the “nature or nurture” debate, i.e., assumptions regarding whether individuals *learn* to think and judge as economists or whether their preferences are already significantly distinct. On the one hand, the self-selection hypothesis argues that “economists are born, not made” (Carter & Irons, 1991, p. 174). Contrary to the learning hypothesis, the self-selection hypothesis assumes that economics students exhibit a willingness to behave in accordance with “orthodox economic theory after exposure to formal economics education” (Cipriani, Lubian, & Zago, 2009, p. 456). This finding is in line with a stream of literature that supports the self-selection hypothesis (Carter & Irons, 1991; Frey et al., 1993; Kroncke & Mixon, 1993; Meier & Frey, 2004). On the other hand, the learning (or indoctrination) hypothesis suggests that economics students do not exhibit many differences from other students; rather, studying economics encourages them through nurture to become different by “indoctrinating” them with the principles of economics and driving them to favor price mechanisms. This hypothesis, which reflects an “innate” (Cipriani et al., 2009, p. 456) willingness to apply the price system, is supported by a previous study (Rubinstein, 2006). This view argues that individuals' values can shift – at least partly – due to their reception of economics education and thus contradicts the thesis that values are determined in youth (i.e., before college/university) (Hess & Torney, 1967). The authors who support the latter position argue that values are determined in one's first 13 years of life and remain largely stable thereafter. This claim leads to the assumption that all pupils (or, more generally, all individuals) are able to understand the implied difference between values and conviction. Individuals might not be able to differentiate conceptually between distributional (fair) and allocative aspects of efficiency and might mix them. Thus, we have no information regarding whether individuals truly rely on fairness or efficiency arguments.

While this crystallization hypothesis is called into doubt by the stream of research associated with the learning hypothesis (Haucap & Just, 2010), scholars debate whether economics education and the approach to economic analysis taught at schools and universities focus excessively on the price system as the primary solution to allocation problems. The empirical economics literature supports this hypothesis (Scott & Rothman, 1975; Soper & Walstad, 1983). For a survey of much of the literature on the differences between economists and other individuals, see Kirchgässner (2005).

Another almost unrelated stream of psychology literature focuses on the impact of school education on attitudes (Dennis, Amodio, & O'Toole, 2015; Jennings & Niemi, 1974; Oskamp & Schultz, 2005). The main finding of interest with respect to the "nature or nurture" debate is that school days have an essential effect on the sustainable manifestation of attitudes and thought patterns. When researchers take school time into consideration instead of disregarding the time before students began to study economics, interesting questions arise. The self-selection hypothesis assumes that economists have stable preferences. Economic thinking may largely be shaped during school time, while the extant literature simply analyzes "full-fledged" individuals. In contrast, the learning hypothesis assumes that from a certain starting point, economists are trained, not born. One cannot necessarily assume that this starting point is the beginning of the university career; however, it might begin even earlier.

The extant research reports mixed results regarding the effect of gender on fairness perceptions, which might be influenced by age. Fairness perceptions begin to develop during infancy (Sommerville, 2022). Müller and Renes (2021) find that age, gender, and education have significant effects on distributional fairness among German adults. In a study of American children in the United States, Yucel, Drell, Jaswal, and Vaish (2022) find no significant effects of gender on distributional fairness. The cultural background of children might also be relevant with regard to their fairness perceptions, as Rochat et al. (2009) provide evidence indicating that perceptions of distributional fairness differ among children with different cultural backgrounds. Similar to the findings regarding gender effects on fairness perception, other studies on cultural background report no effect of migration background on distributional fairness (Tisch & Gutfleisch, 2022).

This debate regarding economic thinking is linked to the debates concerning economics education and the performative impact of economics education on the values, attitudes, and perceptions associated with economic phenomena and the issues of individuals. The extant research on teaching in the context of economics education puts into question the prevailing consensus regarding the teaching of economics and investigates how students' attitudes are affected by moral aspects or critical thinking (Marangos, 2019; Negru, 2010). Acceptance of the economics education curriculum decreased during the global financial crisis, while students' criticism of the current state of economics education increased (Manning, 2019; Pühringer & Bäuerle, 2019). The link between the curriculum used in economics education, which is mostly discussed in the context of university courses, and the "real world" is an important factor in the acceptance of economic methods and instruments (Pühringer & Bäuerle, 2019; Tafner & Casper, 2023).

The rest of this paper is structured as follows. Section 2 explains the survey design and the data obtained, while Section 3 presents and analyses our results. Section 4 briefly discusses framing effects, and section 5 concludes the paper.

## 2 Survey Design and Data

### 2.1 Procedure

To check the robustness of the findings reported by Frey et al. (1993) and Haucap and Just (2010), we replicated the survey of Haucap and Just (2010). To compare the results we found in this setting to those of the mentioned studies, we used their survey and asked pupils to respond to the following comparative fairness perception model, which was employed in the two previous studies:

*At a sightseeing point that is reachable only on foot, a well has been tapped. Bottled water is sold to thirsty hikers. The price is 1 euro per bottle. Daily production is 100 bottles.*

*On a particularly hot day, 200 hikers want to buy a bottle. As a consequence, the supplier has the following options for distributing the bottles.*

*Among the following means for distributing the water among the hikers, please indicate how fair you perceive these options to be:*

- (a) *A price increase to 2 euro per bottle*
- (b) *Selling the water at 1 euro per bottle on a "first come, first served" basis*
- (c) *Selling the water at 1 euro per bottle following a random procedure (i.e., selling the water to all persons whose surnames begin with A through M)*
- (d) *The local authority buys the water for 1 euro per bottle and distributes it according to its own judgment*
- (e) *Selling half-sized bottles for 0.5 euro per bottle to all hikers (one-half of a bottle per hiker)*

We include the rationing mechanism suggested by Haucap and Just (2010). This set of questions required the respondents to compare the fairness of five allocation mechanisms: price, first come, first served (FCFS), random, governmental, and equal allocation (rationing). The core question in this case pertains to how a scarce resource (water bottles) should be allocated. A great advantage of this comparison is that each respondent is asked about his or her general preference structure and is not forced to apply this structure to an individual case involving personal emotions.

Frey et al. (1993) provide empirical evidence indicating that a pure price allocation is rejected by the majority of the population. Other allocation methods, such as FCFS allocation, are either much more frequently accepted or less frequently rejected. Concerning innovative ideas, the empirical study of Roetzel and Kokott (2008) shows that a preference

for the price allocation method is related to a strong preference for monetary incentives, whereas a preference for FCFS reflects a strong preference for noncompetitive wage premia. Information regarding employee preferences provides important insights into how to design incentives for innovation ideas in a social network.

Fairness perceptions regarding the five allocation options included in the water bottle question (i.e., (a) price allocation, (b) FCFS, (c) random allocation, (d) governmental allocation, and (e) rationing) were measured on a four-point Likert scale ranging from 1 for “completely fair” to 4 for “completely unfair.”

Due to concerns expressed by the school leadership, our survey design could not contain questions regarding the children’s personal situation, e.g., parental income, parental social status, or actual school performance. We were faced with a trade-off between limiting our survey size and range of questions or passing on the opportunity to conduct the survey. Thus, we decided to administer a survey with limited questions. The school leadership has a very strong desire to protect children from experiencing negative feelings. We believe that a survey with this limited size is sufficient, and we omitted only some additional questions.

## 2.2 Participants

We surveyed 697 pupils at a comprehensive school in western Germany. We deliberately chose a comprehensive school because in Germany, each federal state has different objectives for its school system. We chose the largest federal state in terms of the number of citizens (North-Rhine Westphalia), and we chose a comprehensive school due to its continuity throughout the 13-year class system (known as G9: 9 years after primary school). Changes made to the education system led to a range of learning issues among pupils, and the majority of federal states returned to the old system. To minimize potential biases resulting from students’ corresponding higher stress levels in our analysis, we chose a comprehensive school that uses the “traditional” G9 (13 grades). As mentioned, due to concerns expressed by the school leadership, our survey design could not contain questions regarding the children’s personal situation, e.g., parental income, parental social status, or actual school performance.

Comprehensive schools in Germany are secondary schools for pupils between the ages of approximately 11–19 years. This type of school represents an alternative to the three-pillar German school system (gymnasium). This type of school does not select students on the basis of their academic achievement or performance. While a gymnasium may expel students who underperform

academically, comprehensive schools provide courses at different levels. If pupils exhibit sufficient performance, they might obtain their high school diploma at comprehensive schools. North-Rhine Westphalia uses a centralized school leaving examination (“Zentralabitur”). Previous research has raised the question of potential selection biases (Boliver & Swift, 2011), which we cannot control because our study design focuses on comprehensive schools and no other school types are included in our sample.

The chosen school is located in a town with more than 30,000 inhabitants. The household income per capita in this town is 23.120 EUR (compared to 22.294 in North-Rhine Westphalia overall and 22.899 in Germany in general). The percentage of the town’s population with a migration background is 29.1% (compared with 30.1% in North-Rhine Westphalia overall (IT. NRW, 2019)).

In the curriculum stipulated by the federal state in which the school is located, the curricula for secondary education I (“Sekundarstufe I,” Level 2 ISCED) address the following competence goals of pupils: they should have the competence necessary to assess market pricing, the effects of regulatory measures (such as government interventions) and the allocation of resources (Ministerium für Schule und Weiterbildung NRW [Ministry of Education North-Rhine Westphalia], 2015a; § 29 SchulG [Education Act of North-Rhine Westphalia]). The first phase of economics education that is relevant at this level of competence starts in the 5th grade. The curricula for secondary education II (“Sekundarstufe II,” Level 3 ISCED) aim to develop a deeper understanding of markets, supply chains, and commodity markets in students and requires them to understand complex economic activity, economic crises, causes, and countermeasures regarding economic inequality (Ministerium für Schule und Weiterbildung NRW [Ministry of Education North-Rhine Westphalia], 2015b; § 29 SchulG [Education Act of North-Rhine Westphalia]). The chosen experimental task focuses on a very simple level and is suitable for the elementary, intermediate, and senior levels. Note that the Ministry of Education North-Rhine Westphalia publishes a core curriculum (“Kernlehrplan”) that identifies minimum competencies in economics as compulsory. If the level of competence for an individual class is not established by the core curriculum, the school’s internal teachers/staff meet to adopt an internal school curriculum.

## 3 Results

The survey results are summarized in Table 1, which includes the results for all respondents as well as for

various subgroups. In line with Haucap and Just (2010), we find strong approval of rationing among students, while random allocation is viewed as the least fair measure, closely followed by the price mechanism. We find that FCFS is the second-best allocation mechanism according to pupils across all grades.

We find no significant overall difference across genders, but our results indicate that the approval of some allocation methods differs significantly between female and male pupils. Regarding FCFS, a comparison of means indicates that male pupils tend to identify FCFS as being fairer than female pupils, with a difference across all grades of 14.21% (Table 1, Panel A). We also find weakly significant evidence

indicating different judgments between male and female respondents regarding random allocation (Table 1, Panel C).

Regarding migration background, the main disagreements emerge with regard to the fairness of price allocation and rationing. Pupils with a migration background perceive price allocation as being fairer ( $M = 16.7\%$ ,  $S.D. = 0.37$ ) than their classmates without a migration background ( $M = 10.2\%$ ,  $S.D. = 0.30$ ),  $t(695) = 2.237$ ,  $p < 0.05$ . Regarding rationing, however, pupils with a migration background perceive uniform allocation by rationing as being more unfair ( $M = 75.0\%$ ,  $S.D. = 0.43$ ) than pupils without a migration background ( $M = 88.5\%$ ,  $S.D. = 0.31$ ),  $t(695) = 4.282$ ,  $p < 0.01$  (Table 1, Panel B).

**Table 1:** Summary statistics

| Panel A: Respondents who judge a mechanism as "completely fair" or "acceptable" by gender and grade |   |      |                          |                    |                          |          |                          |            |                           |                     |                           |               |        |  |
|---|---|------|--------------------------|--------------------|--------------------------|----------|--------------------------|------------|---------------------------|---------------------|---------------------------|---------------|--------|--|
|   |   | N    |                          | Price increase (%) |                          | FCFS (%) |                          | Random (%) |                           | Local community (%) |                           | Rationing (%) |        |  |
|   |   | Male | Female                   | Male               | Female                   | Male     | Female                   | Male       | Female                    | Male                | Female                    | Male          | Female |  |
| Grade   | 5   | 47   | 48                       | 12.77              | 27.08                    | 38.30    | 31.25                    | 8.51       | 10.42                     | 44.68               | 37.50                     | 87.23         | 77.08  |  |
|   | 6   | 73   | 47                       | 16.44              | 6.38                     | 57.53    | 44.68                    | 8.22       | 4.26                      | 49.32               | 34.04                     | 89.04         | 91.49  |  |
|   | 7   | 61   | 50                       | 3.28               | 10.00                    | 50.82    | 46.00                    | 13.11      | 8.00                      | 45.90               | 46.00                     | 78.69         | 72.00  |  |
|   | 8   | 59   | 41                       | 13.56              | 4.88                     | 59.32    | 41.46                    | 15.25      | 0.00                      | 47.46               | 48.78                     | 91.53         | 80.49  |  |
|   | 9   | 57   | 40                       | 15.79              | 5.00                     | 63.16    | 40.00                    | 12.28      | 2.50                      | 43.86               | 52.50                     | 92.98         | 90.00  |  |
|   | 10  | 39   | 41                       | 25.64              | 9.76                     | 61.54    | 46.34                    | 5.13       | 4.88                      | 58.97               | 53.66                     | 79.49         | 85.37  |  |
|   | 11  | 12   | 19                       | 0.00               | 10.53                    | 75.00    | 42.11                    | 8.33       | 15.79                     | 66.67               | 31.58                     | 83.33         | 100.00 |  |
|   | 12  | 16   | 29                       | 6.25               | 3.45                     | 75.00    | 48.28                    | 6.25       | 6.90                      | 62.50               | 51.72                     | 93.75         | 79.31  |  |
|   | 13  | 6    | 12                       | 16.67              | 0.00                     | 66.67    | 58.33                    | 0.00       | 16.67                     | 66.67               | 41.67                     | 100.00        | 91.67  |  |
|   | Comparison of means between male and female respondents (across all grades)   |      | $d = 0.035$ , $p > 0.10$ |                    | $d = 0.142$ , $p < 0.01$ |          | $d = 0.038$ , $p < 0.10$ |            | $d = 0.048$ , $p > 0.10$  |                     | $d = 0.038$ , $p > 0.10$  |               |        |  |
|   | Comparison of means between pupils with an interest in studying economics or a related course and pupils without such an interest |      | $d = 0.098$ , $p < 0.01$ |                    | $d = 0.077$ , $p > 0.10$ |          | $d = 0.026$ , $p > 0.10$ |            | $d = -0.036$ , $p > 0.10$ |                     | $d = -0.011$ , $p > 0.10$ |               |        |  |

| Panel B: Cross-table for migration background and gender |     |        |                    |       |          |            |                     |               |
|--|-----|--------|--------------------|-------|----------|------------|---------------------|---------------|
| Migration background                                     |     | N      | Price increase (%) |       | FCFS (%) | Random (%) | Local community (%) | Rationing (%) |
|  |     |        | Mean               | Mean  | Mean     | Mean       | Mean                |               |
|  | No  | Male   | 292                | 12.00 | 55.50    | 10.60      | 51.00               | 89.00         |
|  |     | Female | 249                | 8.00  | 43.40    | 7.20       | 45.80               | 88.00         |
|  | Yes | Male   | 78                 | 17.90 | 62.80    | 9.00       | 43.60               | 80.80         |
|  |     | Female | 78                 | 15.40 | 41.00    | 3.80       | 41.00               | 69.20         |

| Panel C: Cross-table for study preference and gender   |        |     |                    |       |          |            |                     |               |
|--|--------|-----|--------------------|-------|----------|------------|---------------------|---------------|
| Preference for studying economics or a related subject |        | N   | Price increase (%) |       | FCFS (%) | Random (%) | Local community (%) | Rationing (%) |
|  |        |     | Mean               | Mean  | Mean     | Mean       | Mean                |               |
|  | Male   | 56  | 23.21              | 62.50 | 14.29    | 50.01      | 83.93               |               |
|  | Female | 28  | 14.29              | 46.43 | 3.57     | 32.14      | 85.71               |               |
| Preference for studying something else                 | Male   | 314 | 11.46              | 56.05 | 9.55     | 49.36      | 87.90               |               |
|  | Female | 299 | 9.36               | 42.47 | 6.69     | 45.82      | 83.28               |               |

To investigate the drivers and different factors that appear to shape pupils' judgments regarding the fairness of the five allocation mechanisms, we run binary logit regressions (Table 2). Prior literature notes that gender differences should be considered when investigating attitudes toward economics (Croson & Gneezy, 2009; Haucap & Müller, 2014). Thus, we investigate gender differences in fairness perception while differentiating between grades and controlling for migration background. In line with the binary logit regression used by Haucap and Just (2010), we focus on the share of respondents who consider the respective allocation mechanism to be “at least acceptable” or even “completely fair.” We included class, gender, migration background, and reported intention to go to university as explanatory variables. To correct for heteroscedasticity, we estimate robust standard errors using White's method.

Drawing on the test for “nature” used in previous research, i.e., self-selection effects, we ask pupils whether they want to study economics or related courses of study (business administration). A binary logistic regression ( $\chi^2(8) = 27.056, p < 0.001$ ) reveals no single effect on pupils who want to study an economics-related subject at university.

To test for “nurture” effects, we perform a binary logistic regression ( $\chi^2(8) = 27.056, p < 0.001$ ), whose results show that economics education in schools affects female and male pupils in different ways over time. While grade has no direct effect, we find a significant interaction between grade and gender, in which context disapproval regarding price allocation increases more strongly among female pupils than among male pupils. Moreover, we find an interaction between grade and the student's preference for studying economics or a related course of studies, indicating that pupils who intend to study economics or a related course of studies increase their approval of price allocation over time. These two interactions basically support the learning or indoctrination hypothesis but in different ways; while school time and economics lessons seem to reduce approval rates among female pupils, they seem to increase approval rates among economics-inclined pupils, i.e., pupils who want to study economics later. The latter finding supports both the self-selection and learning hypotheses.

Additionally, our findings indicate a single significant gender effect in terms of judgments regarding price allocation. Moreover, we find a significant effect of migration

**Table 2:** Binary logistic regressions

|                                  | Price increase       |        | FCFS                |        | Random              |        | Local community   |        | Rationing            |        |
|----------------------------------|----------------------|--------|---------------------|--------|---------------------|--------|-------------------|--------|----------------------|--------|
|                                  | Beta                 | Exp(B) | Beta                | Exp(B) | Beta                | Exp(B) | Beta              | Exp(B) | Beta                 | Exp(B) |
| Constant                         | -2.090***<br>(0.690) | 0.124  | -1.074**<br>(0.452) | 0.342  | -1.528**<br>(0.749) | 0.217  | -0.693<br>(0.441) | 0.500  | 1.745***<br>(0.706)  | 5.728  |
| D_GENDER                         | 1.935**<br>(0.955)   | 6.922  | 0.135<br>(0.603)    | 1.145  | -1.229<br>(1.102)   | 0.293  | 0.040<br>(0.594)  | 1.041  | -0.629<br>(0.852)    | 0.533  |
| D_MIGBACK                        | 0.696**<br>(0.284)   | 2.005  | 0.106<br>(0.197)    | 1.112  | -0.325<br>(0.383)   | 0.723  | -0.293<br>(0.196) | 0.746  | -1.035***<br>(0.245) | 0.355  |
| CLASS                            | -0.019<br>(0.085)    | 0.981  | 0.167***<br>(0.056) | 1.182  | -0.085<br>(0.096)   | 0.918  | 0.094*<br>(0.054) | 1.099  | 0.072<br>(0.086)     | 1.075  |
| D_STUDY_ECON                     | -1.633<br>(1.369)    | 0.981  | 0.458<br>(0.997)    | 1.581  | -1.880<br>(1.774)   | 0.153  | 0.417<br>(1.005)  | 1.518  | 1.413<br>(1.380)     | 4.106  |
| CLASS * GENDER                   | -0.285**<br>(0.125)  | 0.752  | -0.093<br>(0.073)   | 0.911  | 0.107<br>(0.133)    | 1.113  | -0.028<br>(0.071) | 0.973  | 0.025<br>(0.107)     | 1.025  |
| CLASS * D_STUDY_ECON             | 0.340**<br>(0.163)   | 1.405  | -0.024<br>(0.125)   | 0.976  | 0.294<br>(0.216)    | 1.341  | -0.065<br>(0.125) | 0.937  | -0.260<br>(0.165)    | 0.771  |
| D_GENDER * D_STUDY_ECON          | -0.273<br>(0.744)    | 0.761  | -0.267<br>(0.552)   | 0.765  | -1.329<br>(1.226)   | 0.265  | -0.804<br>(0.574) | 0.447  | 0.740<br>(0.762)     | 2.097  |
| D_MIGBACK * D_STUDY_ECON         | -0.739<br>(0.843)    | 0.478  | 0.372<br>(0.654)    | 1.450  | 0.049<br>(1.252)    | 1.050  | 0.916<br>(0.657)  | 1.099  | 0.735<br>(0.837)     | 2.085  |
| -2 Log-Likelihood                | 473.821              |        | 938.744             |        | 396.293             |        | 952.135           |        | 552.167              |        |
| Pseudo-R <sup>2</sup> Nagelkerke | 0.074                |        | 0.052               |        | 0.026               |        | 0.023             |        | 0.062                |        |

Heteroscedasticity consistent standard errors are shown in parentheses, \*, (\*\*), [\*\*\*] Significant at the 90%, (95%), or [99%] level, respectively. Gender is a dummy variable that is coded as 0 for male pupils and 1 for female pupils. Migration Background is a dummy variable that is coded as 0 for no migration background and 1 for migration background. Class is a nominal variable that is equal to the grade level (5th–13th). Studying economics is a dummy variable that is coded as 0 for no preference for studying economics or a related course of studies (business administration) and 1 for yes.

background on the probability of approving price allocation, indicating that pupils with a migration background judge price allocation more positively than pupils without a migration background. To increase the robustness of this finding, we additionally develop a binary regression model that includes a three-way interaction among gender, migration background, and grade; however, we find significant results in this context.

Regarding FCFS allocation, we find a highly significant positive effect on grade, indicating that pupils become accustomed to FCFS over time. In the 5th grade, 38.3% of male pupils and 31.25% of female pupils perceive FCFS allocation as "at least acceptable" or even "completely fair." In the highest grade, students' approval rates increase to 66.67% (male) and 58.33% (female). This increase is independent of gender or migration background. In terms of random allocation, we find no effect of any explanatory variable. Similar to FCFS allocation, we find a positive and significant effect on grade, indicating that pupils' approval of government action tends to increase.

The results of the binary regression reveal a negative and highly significant effect of migration background on the probability of approving of rationing. This finding indicates a trend contrary to that associated with price allocation. While pupils with a migration background judge the price mechanism as more favorable than their classmates without a migration background, they disapprove of rationing.

In Table 3, we compare our findings with those reported by Haucap and Just (2010) (HJ) and Frey et al. (1993) (FPG). We find distinct differences between the judgments made by pupils in the 13th grade (who intend to study economics the following year) and the first-semester student results reported by HJ and FPG. Regarding price allocation, the vast majority of pupils disapprove of a price mechanism, and only 5.6% assess this mechanism as fair. At the university level, prior research reports that 41% (HJ)/65% (FPG) of first-year students in economics classes rate the price mechanism as a fair allocation

method. We check this finding by reference to a larger subsample of pupils in senior classes (11th–13th). Of these students, 5.32% (94 pupils) judge such a price increase as fair, whereas pupils in senior classes with a migration background exhibit higher rates of fairness assessment (6.3%) than pupils without a migration background (5.1%). The subgroup of pupils indicating that they prefer to study economics or a related course of studies after school report an approval rate of 20.24%.

Our results show that the very high approval rate of rationing first shown in HJ is supported. In the 13th grade, 94.4% of pupils judge this allocation method to be fair, compared to the rate of 93.9% reported in HJ. We find a strong tendency toward rationing across all grades.

In terms of pupils' judgments regarding the fairness of the other four allocation mechanisms, we find results similar to those reported in HJ and FPG regarding the random, local community, and rationing (HJ only) mechanisms. Regarding FCFS, our findings indicate slightly lower levels of approval than those reported in HJ (–12.6% deviation compared to other/general population) and FPG (–14.9% deviation compared to other/general population).

Drawing on the "nurture" aspect, i.e., the learning hypothesis, we find that pupils' judgments regarding the fairness of the FCFS and local community allocation mechanisms are shaped during their studies at school. At the end of their school careers, pupils report approval rates similar to those of first-year students. Thus, our findings show that these approval rates are developed during school time and are not stable before students begin studying economics. The increasing rate of approval of state intervention among pupils is the opposite of what one would expect when pupils learn about economic mechanisms. Although pupils should develop an understanding of complex economic activity, economic crises, and the causes of and countermeasures against economic inequality, the increasing approval rate suggests that an understanding of the perils of state intervention

**Table 3:** Comparisons among this study (Frey et al. (1993) (FPG) and Haucap and Just (2010) (HJ))

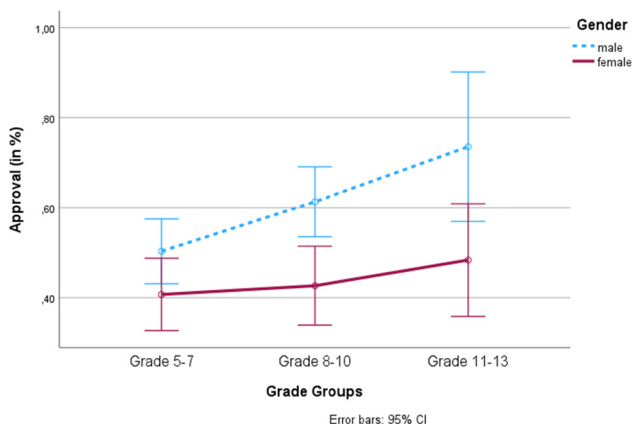
|       | Price increase |        |         | FCFS           |        |         | Random         |        |         | Local community |        |         | Rationing      |        |
|-------|----------------|--------|---------|----------------|--------|---------|----------------|--------|---------|-----------------|--------|---------|----------------|--------|
|       | This study (%) | HJ (%) | FPG (%) | This study (%) | HJ (%) | FPG (%) | This study (%) | HJ (%) | FPG (%) | This study (%)  | HJ (%) | FPG (%) | This study (%) | HJ (%) |
| FYE   |                | 41.0   | 65      |                | 77.7   | 68      |                | 7.8    | 18      |                 | 43.4   | 38      |                | 95.8   |
| OGP   |                | 28.4   | 27      |                | 73.7   | 76      |                | 11.9   | 13      |                 | 50.0   | 42      |                | 93.9   |
| PALL  | 11.6           |        |         | 50.4           |        |         | 8.5            |        |         | 47.2            |        |         | 85.5           |        |
| P13   | 5.6            |        |         | 61.1           |        |         | 11.1           |        |         | 50.0            |        |         | 94.4           |        |
| PECON | 20.2           |        |         | 57.1           |        |         | 10.7           |        |         | 44.1            |        |         | 84.5           |        |

FYE: First-year students in economics classes; OGP: Other/general population; PALL: Pupils across all grades; P13: Pupils in the 13th grade; PECON: Pupils with a preference for studying economics or a related subject.

**Table 4:** Summary statistics for grade groups by gender

| Panel A: Respondents who judge a mechanism as “completely fair” or “acceptable” by gender and grade |       |        |                    |        |          |        |            |        |                     |        |               |        |       |
|---|-------|--------|--------------------|--------|----------|--------|------------|--------|---------------------|--------|---------------|--------|-------|
|   | N     |        | Price increase (%) |        | FCFS (%) |        | Random (%) |        | Local community (%) |        | Rationing (%) |        |       |
|   | Male  | Female | Male               | Female | Male     | Female | Male       | Female | Male                | Female | Male          | Female |       |
| Grades  | 5–7   | 181    | 145                | 11.05  | 14.48    | 50.28  | 40.69      | 9.94   | 7.59                | 46.96  | 39.31         | 85.08  | 80.02 |
|   | 8–10  | 155    | 122                | 17.42  | 6.56*    | 61.29  | 42.62*     | 11.61  | 2.46*               | 49.03  | 51.64         | 89.03  | 85.25 |
|   | 11–13 | 32     | 62                 | 5.88   | 5.01     | 73.53  | 48.33*     | 5.88   | 11.67               | 64.71  | 43.33*        | 91.18  | 88.33 |

\*indicates that female participants exhibit a significantly different level of approval of the same allocation mechanism than male participants in the same grade group (Bonferroni, 95% level of significance, two-sided).

**Figure 1:** Approval rate for FCFS across grade groups by gender.

and government failure might not be distinct among students. On the one hand, this finding indicates a kind of “anti-nurture” effect in the case of students’ understanding of economics. On the other hand, either pupils might have been affected by the economic crisis in 2008 or their teachers may have adopted a critical attitude in this context.

To reduce idiosyncrasies, we aggregate the classes into three-year groups (i.e., 5th–7th (junior level), 8th–10th (intermediate level), and 11th–13th (senior level)). We are aware of the trade-off between the ability to obtain more robust results and the loss of variance (Hair, Black, Babin, & Anderson, 2014). We find gender differences within the three-year groups (Table 4), especially in terms of FCFS. Thus, we observe two significant main effects but no interactions (Figure 1).

## 4 Discussion

This study investigates the fairness perception of pupils regarding five allocation methods: price, FCFS, random allocation, state intervention, and rationing. We find that rationing is generally viewed as the fairest allocation

mechanism among pupils across all grades, while the price mechanism is viewed as the least fair allocation mechanism. FCFS is viewed as the second-best allocation mechanism. Male and female pupils exhibit some significant differences in terms of their fairness perceptions about these allocation mechanisms, with male pupils generally viewing FCFS as being fairer than female pupils; pupils with and without migration backgrounds also exhibit certain differences in opinion in this context. Economics education in schools appears to affect female and male pupils differently, with female pupils becoming less approving of price allocation over time, while pupils who intend to study economics later increase their approval of price allocation. Overall, these results suggest that factors that extend beyond personal preferences can influence perceptions of fairness regarding allocation mechanisms.

From an objective perspective on allocation, in four of the five allocation methods included in this study, some kind of discrimination is present. Price allocation discriminates against the half of consumers who exhibit less willingness to pay. Governmental intervention discriminates against the half of consumers who are not arbitrarily subsidized. Rationing discriminates against everyone. However, the lottery or random allocation is free of discrimination. However, a lottery is perceived as the least fair allocation method by pupils, and rationing is perceived as the fairest allocation method. This result indicates that rational fairness and lack of discrimination might not be associated with distributional fairness by pupils.

We extend previous findings concerning the “nature or nurture” debate (Carter & Irons, 1991; Cipriani et al., 2009; Frey et al., 1993; Haucap & Just, 2010; Haucap & Müller, 2014; Meier & Frey, 2004; Scott & Rothman, 1975; Soper & Walstad, 1983) by showing that some of these nature and nurture effects can be demonstrated among pupils. We find significant effects regarding three types of allocation: price, FCFS, and local community. However, all three learning effects lead students to *disapprove*



of economic mechanisms; across all grades, students' approval of the price mechanism decreases, while their approval of FCFS and state intervention by the local community increases.

The approval of the price mechanism might depend on the manner in which students' understanding of money is developed, which in turn might be related to their level of pocket money. In particular, the scarcity of money might be affected by parental income and level of pocket money.

The comparison of our results with previous findings should be viewed in light of the fact that (social-)economic courses at school and economic courses at universities differ in terms of at least three dimensions. First, economic courses at universities exhibit a stronger focus on formal analysis than courses at school. Second, the differentiation between macroeconomics and microeconomics is much stronger in courses at universities than in courses at school. The balance between macroeconomics and microeconomics might even be very different across universities. Moreover, as each university has an individual curriculum for its economics courses, schools also have internal curricula if the core curriculum provided by the Ministry of Education of North-Rhine Westphalia does not specify individual levels of class competence. Third, the teacher's education and practices might have different impacts between teachers at school and lecturers at universities. Moreover, specific teachers might have an impact, i.e., a teacher-specific effect. If such a teacher-specific effect exists, it would imply that the economic thinking of pupils might be more affected by who is teaching what and, to a lesser extent, the content of the curriculum.

Surprisingly, we find that approval rates for price allocation are highest in the early classes. This finding gives rise to several additional interesting questions, such as that of when students begin to approve of price allocation. Child psychology indicates that the earliest understanding of money emerges in middle or late childhood, i.e., between the ages of 6–10 years (Chaplin & John, 2007; Turiel, 2006), implying that one's initial attitude in this context might begin in primary school. Our findings indicate a significant change in attitudes toward and value judgments regarding allocation methods across grades, thereby rejecting the crystallization hypothesis proposed by Hess and Torney (1967). This conclusion is in line with the findings of Haucap and Just (2010), who surveyed first-year students. Our results fill this research gap by showing that a change of mind also occurs in earlier years of life and at a distinctly lower level of economics teaching than the level common in universities. However, we find evidence indicating significant differences across junior classes regarding students' approval of the price mechanism.

These findings must be interpreted in light of the limitations of the present study. We use cross-sectional data to analyze the fairness perceptions of pupils. While this method allows us to differentiate among various grades, it does not allow us to explore within-subject effects over time. Longitudinal studies conducted over a period of several years, ideally from kindergarten to matriculation, would enable researchers to obtain a more detailed picture of how fairness perceptions are developed and the factors that are crucial for their development. Future research might address this issue by conducting such a longitudinal study.

Moreover, we could not evaluate what pupils learned regarding economics at home and what types of attitudes toward economics or the study of economics their parents might have. Note that we did not adapt our questionnaire to the class level, so our data regarding the information regarding economics and/or the study of economics reported by 5th–7th (junior level) pupils must be interpreted *cum grano salis*, in particular because only some of those pupils will continue attending the comprehensive school in the 11th–13th grades (i.e., at the senior level).

Due to the limitations of our survey design, we cannot fully explain the driving forces underlying this difference because we could not investigate what the pupils learned at home or whether and which home factors affected pupils' economic thinking. However, our findings at least support some suggestions. First, the decrease in price mechanism approval might support the hypothesis that some economists are born, not made. Before secondary school, the imparting of economic knowledge is neglected, such that a learning effect from primary school or kindergarten can be rejected. Another explanation for this finding might be the effect of parental supervision and the transfer of parental attitudes to their children. While Haucap and Just (2010) pose this question with regard to the social impact of parents on students, we think that observing the beginning of personality development in childhood might allow us to obtain interesting insights that can enhance our understanding of the shape of value judgments. We also did not survey the relevant control variables, e.g., parental household income of parents and level of pocket money, due to restrictions mandated by the school leadership; nonetheless, our findings might open an avenue for future research on the effects of household factors (parental income, attitudes, and interests) in this context. The socioeconomic covariates could be included indirectly by analyzing different schools in different locations (with different typical socioeconomic strata). We believe this path represents an interesting avenue for future research.

Moreover, we surveyed pupils from a comprehensive school and did not focus on a state or private gymnasium (i.e., high schools that are more academic than

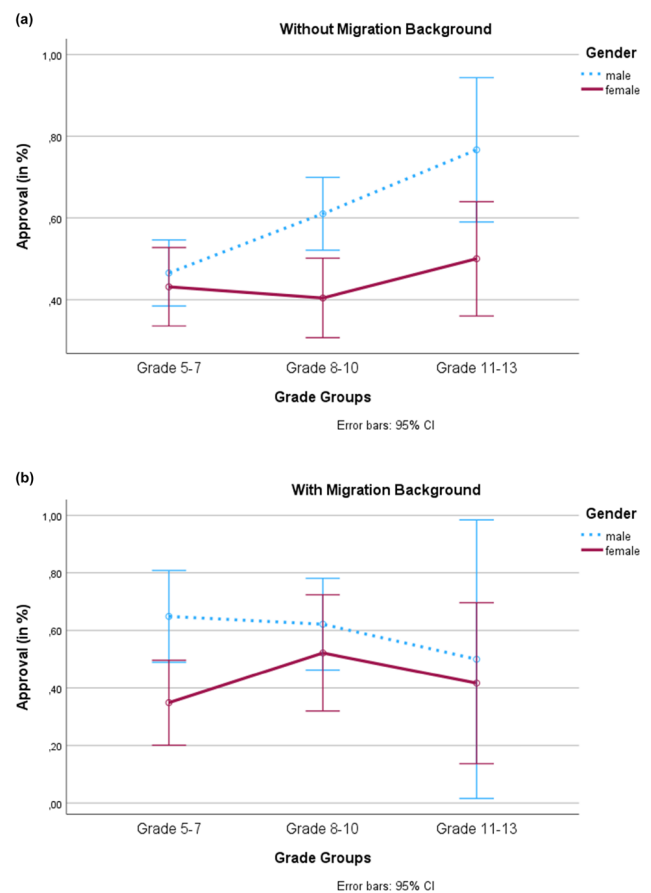
comprehensive schools). Future research might evaluate our findings by reference to a sample of pupils at a state or private gymnasium. Furthermore, we did not investigate teachers' judgments regarding the fairness of the allocation mechanisms. It seems that economics lessons do not generate an understanding of economic activity or the advantages of market mechanisms. In contrast, economic thinking regarding price mechanisms is virtually driven out of the pupils, although we cannot identify the exact driving force underlying this process. One explanation might be that pedagogy faculties belong to what Haucap and Just (2010) call "market-critical faculties" (p. 252). Future research might investigate the role of teachers in the distinct development of economic thinking and the ways in which teachers affect the learning hypothesis. Our findings indicate that migration background plays an important role in value judgments; thus, it would be interesting to analyze the elements that drive these findings (such as country-specific elements, culture, and religion).

Furthermore, our question regarding the preference for studying economics might not be a good indicator of students' interest in economic issues for two reasons. First, this single-item question might not capture students' real interest in economics, but it is easy for the participants to understand. Second, answers to this question might vary depending on age. We asked pupils in junior classes (5th–7th) about their intention to study economics, and we admit that the decisions of pupils in junior classes might change over time. Furthermore, it might be more sensible to ask pupils about their general interest in economic issues directly or design a few questions aimed at checking about their interest in economics; however, this procedure would reduce the question's comparability across participants. Additionally, the intention to study might change even after the pupils finish school depending on their further experiences such as military service, travel overseas, or participation in social work. Thus, their answers and behaviors might be more random or biased than those provided by pupils in senior classes. Future research might address this issue and highlight this early stage of school.

Our study has implications regarding several issues that are important for theory building, research on economics education, and the shaping of economists' attitudes (i.e., "nurture"). One such implication pertains to the role of the indoctrination hypothesis or learning hypothesis (Haucap & Just, 2010; Scott & Rothman, 1975; Soper & Walstad, 1983). The learning hypothesis suggests that "economists are made, not born" to a certain degree (thus turning the Stigler quote on its head). While the extant literature provides empirical evidence to support the learning hypothesis at universities, our findings show that economics education at school might shape pupils' (or young economists') attitudes in quite the

opposite way. Comparing approval rates between junior and senior classes, our findings indicate that economic thinking in terms of fairness perception regarding allocation methods is virtually driven out of pupils over time. This result, however, raises the theoretical question of the driving force underlying this process. Potential explanations might involve the way in which economics education is delivered or the number of lessons (or class cancellations in this context). In North-Rhine Westphalia, the share of cancellation was 8% in 2017, and 66.3% of replacement lessons were not conducted by a specialist teacher (of economics) (Kerstan, 2017). We think that an important task for research on this topic is to examine how economics education at the school level leads to different forms of economic thinking and perceptions of fairness.

A second implication pertains to what the literature refers to as the selection hypothesis ("nature"). The extant research suggests that first-year students choose their subject of study according to their attitudes; i.e., first-year students with a preference for price allocation choose economics or related courses of study. Our results indicate



**Figure 2:** Approval rate for FCFS by gender and migration background (a) without migration background; (b) with migration background).

Table 5: Summary statistics for grade groups by gender

| Grades | N                |                    | Price increase (%) |                    | FCFS (%)         |                    | Random (%)       |                    | Local community (%) |                    | Rationing (%)    |                    |
|--------|------------------|--------------------|--------------------|--------------------|------------------|--------------------|------------------|--------------------|---------------------|--------------------|------------------|--------------------|
|        | No Migr. Backgr. | With Migr. Backgr. | No Migr. Backgr.   | With Migr. Backgr. | No Migr. Backgr. | With Migr. Backgr. | No Migr. Backgr. | With Migr. Backgr. | No Migr. Backgr.    | With Migr. Backgr. | No Migr. Backgr. | With Migr. Backgr. |
| 5–7    | 246              | 80                 | 10.98              | 17.50              | 45.12            | 48.75              | 8.94             | 8.75               | 43.09               | 45.00              | 86.18            | 72.50*             |
| 8–10   | 217              | 60                 | 11.06              | 18.33              | 51.61            | 58.33              | 8.76             | 3.33               | 52.23               | 41.67              | 89.40            | 80.05              |
| 11–13  | 78               | 16                 | 5.13               | 6.25               | 60.26            | 43.75              | 10.26            | 6.25               | 55.13               | 31.25*             | 93.59            | 68.75*             |

Comparison of means between respondents with a migration background and respondents without a migration background (across all grades)

$d = 0.065, p < 0.05$

$d = 0.020, p > 0.10$

$d = -0.027, p > 0.10$

$d = 0.063, p < 0.10$

$d = -0.135, p < 0.001$

\* indicates that female participants exhibit a significantly different level of approval of the same allocation mechanism than male participants in the same grade group (Bonferroni, 95% level of significance, two-sided).

that students’ approval of price allocation becomes more acute over the course of their classes at school. This finding indicates that even in a situation featuring self-selection, the attitudes of a substantial number of first-year students (who were previously pupils in senior classes) might be affected by learning or indoctrination. We believe that the self-selection hypothesis exists in school but is more literal in form, resembling a delicate plant that sprouts and grows when the students attend economics lessons in each grade. In the cases of pupils who are drawn to economics, their understanding of economic activity is improved. In other cases, i.e., with respect to pupils who disapprove of economic mechanisms, this aversion or disapproval increases over the years. This fact might explain the significant spread of approval of price allocation previously reported in the literature by Frey et al. (1993) and Haucap and Just (2010). Another driving force underlying students’ disapproval of economic mechanisms might be their experiences with the global financial crisis (GFC). Pühringer and Bäuerle (2019) analyzed students’ views of economics education and revealed that students expressed a significant level of criticism of the current state of economics education. This finding might open another avenue for future research regarding whether these effects or the reported level of skepticism might exist among pupils and how their negative experiences with a (financial) crisis or inflation might affect the economic thinking of younger individuals. Moreover, the findings regarding students’ approval rate in their early years might be subject to more error than the results regarding older pupils. In students’ early years, it is probably that some children have not yet developed a clear sense of money (Yeung, Linver, & Brooks-Gunn, 2002).

Another limitation of this study is that we have no additional information about the “migration differential.” There is some indication that a decisive part of the “migration differential” is not due to religion or culture but rather to income differences. As our study includes no detailed income information concerning the pupils’ parents, we highlight this indication. Future research might investigate the effect of income differences as a possible explanation for differences in fairness perceptions (Figure 2 and Table 5).

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**Data availability statement:** The data presented in this study are available on request from the corresponding author.

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## Appendix

### Questionnaire

Class: \_\_\_\_\_

Age: \_\_\_\_\_

Please answer spontaneously and check the answer that you feel is most appropriate. There are no “right” or “wrong” answers. Your personal assessment is what is important to us.

*At a sightseeing point that is reachable only on foot, a well has been tapped. Bottled water is sold to thirsty hikers. The price is 1 euro per bottle. Daily production and stock is 100 bottles.*

*On a particularly hot day, 200 hikers want to buy a bottle. As a consequence, the supplier has the following options for distributing the bottles.*

*Among the following means for distributing the water among the hikers, please indicate how fair you perceive these options to be:*

A price increase to two euro per bottle

| Completely fair          | Acceptable               | Unfair                   | Very unfair              |
|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Selling the water at 1 euro per bottle on a “first come, first served” basis

| Completely fair          | Acceptable               | Unfair                   | Very unfair              |
|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Selling the water at 1 euro per bottle following a random procedure (i.e., selling the water to all persons whose surnames begin with A through M)

| Completely fair          | Acceptable               | Unfair                   | Very unfair              |
|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

The local authority buys the water for 1 euro per bottle and distributes it according to its own judgment.

| Completely fair          | Acceptable               | Unfair                   | Very unfair              |
|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Selling half-sized bottles for 0.5 euro per bottle to all hikers (one-half of a bottle per hiker)

| Completely fair          | Acceptable               | Unfair                   | Very unfair              |
|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Thank you very much for participating in our study.**