

Looking for Agreement: an Experiment on Distributive Justice

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Abstract

We explore distributive justice and perception of fairness using survey data concerning fresher and senior students of economics and sociology. We analyse the impact of context and education on their preferences over a hypothetical distribution of resources between individuals, presenting a trade off between efficiency and equality. With context giving minimal information, economics students are less likely to favour equality; studying economics influences the preferences of the subjects, increasing this difference. However, when the same problem is inserted into a meaningful context, the difference disappears. Four distribution mechanisms are analysed: egalitarianism, maximin, utilitarianism and utilitarianism with a floor constraint.

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1 Introduction

One of the most interesting aspects that arise from dictator and ultimatum experiments is that fairness seems to be a strong concern. Experimental results on the ultimatum game clearly show that a large fraction of players offer a “fair” allocation and that “unfair” offers are systematically rejected. Furthermore, while economists tend to evaluate allocations purely quantitatively, these experimental data also suggest that whether an allocation is seen as “fair” can depend on the context in which it is presented and the way it is framed. Second, the data from dictator experiments suggest that there is significant heterogeneity in what people consider fair, with many people giving nothing as well as many splitting the available resources equally.

The main motivation for the present study is this evidence. In order to analyse these phenomena, though, we will not use a game theoretical approach. This paper is an experimental investigation of perception of fairness and attitudes towards distributive justice. Our aim is twofold. First, to analyse whether context influences preferences over a hypothetical distribution of resources between individuals, and to what extent these preferences differ across the subjects. Second, to examine the impact of education on perception of fairness; it’s our opinion, indeed, that analyses of preferences over distributions often neglect the primary importance of such an impact, while they would probably get different results if their subjects were not economics students (see, for instance, Engelmann and Strobel, 2004). We surveyed both fresher and senior undergraduate students of economics and sociology. We submitted to them different versions of a problem involving the distribution of resources between two individuals, in which we asked them to choose the distribution that they considered the most fair. The two individuals obtain a different utility from the resources and there is, therefore, a trade off between efficiency, which involves handing more resources to the more productive individual, and equality, which might demand an equal division even if that would not maximise total output. We will refer to this problem as the distribution problem. We found that, with a context giving minimal information, economics students were less likely to favour equality than sociology students and this difference was more marked in senior students. Thus, studying economics seemed to have influenced the preferences of the subjects over the distribution of resources, while we found no significant difference between the choices of sociology freshers and seniors. However, when the same question was rephrased to give a meaningful context, there was now significant agreement over which allocation was fairest and there was no significant difference between economics and sociology students.

Let us consider the first of our aims. As we will explain in Section 2, the starting point of this paper is the consideration that, when distributing something, we do not only consider *what* we are dividing, but also *why* we divide it. Although this opinion might look common sense, as we will discuss later in more detail, such a point of view is not usually taken into account by economic theories.

We investigated four versions of the distribution problem, each characterised by a different context. In the first version no explanation of the difference between the two individuals is provided, while the second and the third versions present two distinct explanations: in one, the second individual is less productive because he is handicapped, in the other, because he works less hard. The same possible allocations are present in all versions of the problem: an egalitarian, a utilitarian and a maximin allocation. Context had a significant effect on what the subjects thought it was fair: the maximin allocation

was preferred when the difference was due to a handicap; in case of a different effort the utilitarian distribution was chosen. People tend to favour the less productive individual when different results are due to external causes (for instance a handicap), but they will punish him if the cause is internal (for instance for putting less effort). The two situations are perceived differently and imply distinct reasons for distributing. People tend to distribute according to need when abilities are different, and according to merit when there is difference in effort. The fourth version presents no explanation of the difference between the two individuals, but a floor is introduced in terms of minimum utility necessary for each individual. The tension here is that the efficient allocation does not give the minimum survival utility to the less efficient individual. As well as the previous allocations, a fourth allocation is permitted, deriving from the application of utilitarianism with a floor.

When no explanation of the difference between the individuals is provided the subjects involuntarily insert the distribution problem into a determined context, filling the lack of information according to their personal attitudes and background. The preference for a particular allocation under this condition will reveal the relative concern of the subject for either the efficiency or the equality of the distribution. We will refer to such a preference as the ideology of the subject.

Our second purpose is to investigate the influence of education on perception of fairness. Several experiments have been conducted to check whether economists behave differently. Yet, all of these studies are aimed to check and to analyse different behaviours in terms of propensity to co-operate (through prisoner's dilemma games), to free ride (for instance, in the provision of public goods) or in the degree of selfishness. Differences in perception of fairness have been only marginally analysed (Marwell and Ames, 1981) and their analysis has not been sufficiently developed since. Differences in judgement are as relevant as differences in behaviour, depending on the situation and the circumstances. In daily life not only people behave according to their morality, but they are also asked to judge situations in which they are not directly involved. Economists participate in boards, are members of councils, vote and legislate. The question we face is whether they judge differently and to what extent this difference is due to lack of information about the circumstances of the problem.

In conducting our analysis, we will proceed as follows. Finding that an ideological difference does exist we will show that a significant agreement can be reached clarifying the context of the distribution. Further, we have to investigate the reason of this difference. As aroused from the literature that compares economists and non-economists, the (possible) differences can be due to two causes. They may be the result of a self-selection process or they may be the result of training in economics. These two conjectures have been called the selection and learning hypothesis (Carter and Irons, 1991). Comparing the answers of fresher students of the two courses will show the existence of a selection effect. Comparing the answers given by fresher and senior students of the same course, we will find that a learning effect only exist for economics students.

In Section 2 we will consider the extent to which fairness can be modelled by economic theories and present the distribution mechanisms examined in our analysis. Section 3 reports the results of the most prominent experiments directed to compare economists and non-economists. In Section 4 we will discuss the experimental design

and the hypotheses that we are going to test. Section 5 displays the results. Section 6 concludes.

2 Theories of Fairness and Distribution Mechanisms

There is strong evidence that people are concerned about fairness. Experimental studies of mutual gift giving indicate that efficiency concerns can be dominated by fairness concerns (e.g., see Güth, Kliemt and Ockenfels, 2003). Traditional economic models, in which people are assumed to be self-interested and to care only about their personal payoffs, cannot explain such phenomena. In recent years different attempts to modify neoclassical rationality assumptions have been made. Particularly influential have been the theories presented by Fehr and Schmidt (1999) and by Bolton and Ockenfels (2000). Both these studies are attempts to build a single model that can explain situations in which people behave according to the rational/self-interested model as well as circumstances in which people show concern for other agents' payoffs. These theories suppose that, in addition to pure selfish subjects, there are subjects who dislike inequality. Therefore, they assume utility functions depending both on the absolute and relative payoffs of the agents.

Modifying the utility function enables to model altruistic behaviour or inequality aversion. Yet, allocations will still be evaluated from a purely quantitative perspective. The predictions of these models will only depend on the numerical aspects of the situations to which they are applied. Distinct situations may be characterised by the same numerical representation, but completely different contexts. Let us assume a two player game. The first agent has an initial monetary endowment and her utility function also depends on the payoff of her opponent. Giving up part of her money to the other player increments the first player's utility. Let us think of two situations, both numerically identical. In the first case, the amount of money given to the second player will be used to buy food that will allow this agent not to starve. In the second case, the same amount of money will be used to buy drugs. Let us imagine that in both situations the utility of the second player will increase of the same amount. It seems natural that player 1 might behave differently in the two situations. Yet, a quantitative approach cannot discern between the two cases. Because of this limit, economic theories cannot investigate the influence of the context on the perception of fairness.

Philosophical theories have probably faced the problem more successfully. The natural question that arises is why people are concerned with equality. The centrality of this question is pointed out by Sen who argues that "a common characteristic of virtually all the approaches to the ethics of social arrangements that have stood the test of time is to want the equality of *something* - something that has an important place in the particular theory" (Sen, 1992). Income-egalitarians claim equal incomes, and welfare-egalitarians demand equal welfare levels, but also utilitarians ask equal weights on the utilities of all the individuals and libertarians insist on equal rights and liberties. According to Ronald Dworkin, the common aspect to all the theories of distributive justice is indeed equality (Dworkin, 1977). In this way we have to interpret Barry's words: "In Plato's time as in ours, the central issue in any theory of justice is the defensibility of unequal relations between people" (Barry, 1989).

Why should we allocate resources unequally among the individuals? An important property of symmetric distribution mechanisms¹ is the *equal treatment of equals* (Yaari and Bar-Hillel, 1984), according to which two individuals who are identical in every respect should receive equal shares. We can even interpret this property in a rather different way and state that two individuals whose observed characteristics do not appear different should receive the same amount. On this interpretation, characteristics of individuals between whom a given bundle is to be divided provide the grounds for departure from equality. Considerations, which provide possible justifications for departure from equality, can be found in philosophical literature². These considerations always refer to characteristics that differentiate the individuals, which have been classified in terms of broad categories (differences in needs, abilities, effort, productivity, contribution, endowments, etc.). In other way, we are not only sensitive to the subject of what constitutes division but also to the reason why to divide. This is the point of view assumed in this paper. Differences between individuals, which determine justifications for departure from equality, may or may not be explained, clarifying the context of the distribution problem. Different explanations can be provided, determining distinct contexts. The same distribution may be regarded as a just or unjust allocation depending on the context of the distribution problem (see, e.g., Yaari and Bar-Hillel, 1984). Similarly, a distribution mechanism may be considered more suitable in certain situations than in others.

Let us consider the distribution mechanisms that will be examined in our analysis. Besides the Egalitarian solution we are going to consider three other distribution mechanisms, whose application determines particular departures from equality. Let us examine these distribution principles.

Many different forms of utilitarianism exist, but we can outline two components that define this theory and characterise all of its forms. As pointed out by Sen and Williams, utilitarianism “can be regarded as the intersection between two different kinds of theory. One is the theory of the correct way to assess or assign value to states of affairs, and it claims that the correct basis of assessment is welfare, satisfaction, or people getting what they prefer. This theory, one component of utilitarianism, has been called *welfarism*. The other component is a theory of correct action, which claims that actions are to be chosen on the basis of the states of affairs which are their consequences: this has been called *consequentialism*. Utilitarianism in its central forms, recommends a choice of actions on the basis of consequences, and an assessment of consequences in terms of welfare. Utilitarianism is thus a species of *welfarist consequentialism* – that particular form of it which requires simply *adding up* individual welfares or utilities to assess the consequences, a property that is sometimes called *sum-ranking*” (Sen and Williams, 1982, p. 3-4).

Rawls’s (1971) theory of justice was conceived as an alternative to utilitarianism, in all of its forms, and has become a powerful contestant to utilitarian theory in recent years. As argued by Rawls, his “aim is to present a conception of justice which generalizes and carries to a higher level of abstraction the familiar theory of the social contract” (Rawls, 1973, p. 11). Rawls proposes two principles of justice that are meant to rule the basic structure of society, the way in which the major social institutions distribute fundamental rights and duties and determine the division of advantages of

¹ A distribution mechanism is said to be symmetric if the order in which the two individuals are listed is immaterial.

² See, e.g., Rescher (1966).

social cooperation. The above principles would result from a social contract made by rational individuals behind a thick “veil of ignorance”, which would guarantee the impartiality of the parties. While the first principle rules the scheme of liberties each person has the right to, the second principle determines which social and economic inequalities are acceptable. We wish to clear up a mistake that is commonly made. The second principle has often been confused either with the difference principle or with the maximin rule³. The difference principle, on the contrary, only provides a particular interpretation of the principles of justice⁴, and the maximin rule is not a principle of justice that would be chosen below the “veil of ignorance”, but is the rule of choice under uncertainty that, according to Rawls, people would adopt in the original position and that would lead to the two principles. As argued by Rawls, “it is useful as a heuristic device to think of the two principles as the maximin solution to the problem of social justice. There is an analogy between the two principles and the maximin rule for choice under uncertainty.” (Rawls, 1973, p. 152). The maximin rule does not rule economic inequalities, but prescribes to rank alternatives under uncertainty by their worst possible outcomes. What we are interested in is the maximin equity criterion, “I should emphasize that the maximin equity criterion and the so-called maximin rule for choice under uncertainty are two very different things.” (Rawls, 1974). This criterion is the distribution mechanism that we are going to consider in our analysis. It is identifiable with the first part of the second principle that is defined as following:

“Social and economic inequalities are to meet two conditions: they must be (a) to the greatest expected benefit of the least advantaged members of society (the maximin equity criterion) and (b) attached to offices and positions open to all under conditions of fair equality of opportunity.” (Rawls, 1974).

This criterion is clearly opposed to the utilitarian that only cares about the average utility.

Finally, utilitarianism with a floor is a mechanism that prescribes the maximisation of the average utility with a floor constraint. Preferences for distributions prescribed by the application of this principle have been tested in several experiments (Frohlich, Oppenheimer, and Eavy, 1987a, 1987b; Lissowski, 1992).

As argued by Sen, “any evaluative judgement depends on the truth of some information and is independent of the truth or falsity of others. The informational basis of a judgement identifies the information on which the judgement is directly dependent ... The informational basis of judgements of *justice*, thus, specifies the variables that are directly involved in assessing the justice of alternative systems or arrangements” (Sen, 1992, p.73). Rawls’s theory of justice’s informational basis does not coincide with the utilitarian. In the utilitarian theory the informational basis consists only of the utilities of the individuals in the states of affairs under evaluation. Rawls’s theory, on the contrary, ranks the different states of affairs according to the distribution of primary goods, that

³ See, e.g., Gaertner et al (2001): “Rawls’s second principle of justice, known as the difference principle or maximin rule, requires to focus on the worst-off (group of) individual(s) in society when considering alternative economic policies and prescribes that policy as the best one which maximizes the welfare of the worst-off.”

⁴ “I have already mentioned that since the phrases “everyone’s advantage” and equally opened to all” are ambiguous, both parts of the second principle have two natural senses. Because these senses are independent of one another, the principle has four meanings. Assuming that the first principle of equal liberty has the same sense throughout, we then have four interpretations of the two principles.” (Rawls, 1973, p. 65).

are defined as anything any rational person wants and will want regardless of his plan of life or his place in the social scheme⁵. It is therefore extremely complicated to empirically compare the two theories. This is the reason why we are going to consider all of the distribution mechanisms we discussed from a welfarist point of view, the maximin criterion as well. Sen (1992) defines the set of welfarist theories as those theories that take utilities as the only relevant personal features and differ between them in the choice of combining characteristics. Among these theories, Sen recalls the utility-based maximin, as that distribution mechanism that prescribes to maximise the utility of the least advantaged individual. This is the interpretation that we are going to assume and will enable us to proceed to our empirical analysis.

3 Are Economists Different?

Marwell and Ames (1981) conducted the first study that compared economists and non-economists, through an experiment that called for private contributions to public goods. Groups of subjects were given initial endowments of money that could be allocated in two different accounts, one “public”, the other private. Money deposited in the private account was returned to the subject at the end of the experiment. Money deposited in the public account was pooled, multiplied by a factor greater than one and distributed equally among the players. They found that first-year graduate students in economics are much more likely than others to free ride. Marwell and Ames conjectured that there might be two reasons for why economists might actually behave differently. Yet, they did not check the extent to which this difference is due to the selection or to learning hypothesis (or to both of them). Interestingly, in their work they collected a wide range of information regarding the different perceptions, expectations and explanations for the behaviour of the subjects. Two questions were asked. First, what is a fair investment in the public good? 75 percent of the non-economists answered “half or more” of the endowment, and 25 percent answered “all”. The other question asked whether they were concerned about fairness in making their own investment decision. Almost all non-economists answered “yes”. The answers of the economics students were more difficult to analyse. More than one-third of them either refused to answer the first question or gave uncodable responses. As Marwell and Ames wrote, “it seems that the meaning of 'fairness' in this context was somewhat alien for this group”. Those who did answer found that little or no contribution was fair. With regard to the second question, economist students were much less concerned with fairness when making their decisions. As mentioned earlier, to our knowledge this is the only attempt to also investigate the perception of fairness of economists and non-economists.

Carter and Irons (1991) investigated the behaviour of students of economics and students of other disciplines in an ultimatum bargaining game, finding that economics students behaved more self-interestedly than other students. Interestingly, they tested the selection and the learning hypothesis, finding that “economists are born, not made”. Apparently, therefore, studying economics does not create rational, self-interested *homines economici*, but subjects who are particularly concerned with economics incentive self-select into economics. Using a prisoner’s dilemma game, Frank, Gilovich and Regan (1993), found that economists behave in more self-interested ways and are much more likely to defect from coalitions. Further, their data support the learning

⁵ “For simplicity, assume that the chief primary goods at the disposition of society are rights and liberties, powers and opportunities, income and wealth.” (Rawls, 1973, p. 62).

hypothesis. According to them, “exposure to the self-interest model does in fact encourage self-interested behavior” and inhibit co-operation.

Yezer, Goldfarb and Poppen (1996) strongly criticised the results obtained by Frank, Gilovich and Regan (1993) from a methodological point of view. They claimed that the evidence of that paper only implies that economics students display uncooperative behaviour in specialised games or surveys. They conducted a “lost-letter” experiment, in which envelopes containing currency are dropped in classroom before the beginning of the lectures⁶. The return rate on lost letters is used as a measure of co-operation. According to their results, the “real life” behaviour of economist students is actually more co-operative than that of subjects studying other disciplines. Similarly, Frey and Meier (2001) claim that “it is possible that students play the equilibrium played in their economics classes, but don’t apply it to real life situations”. Further, their results indicate that the particular behaviour of economists is only due to self-selection. On the basis of Yezer’s results, Zsolnai (2003) suggests that, being honesty and co-operation two different qualities there might be no contradiction between them and claims that economists’ behaviour is characterised by respect for property rights and self-interest motivation simultaneously. Finally, Hu and Liu (2003) find evidence that economics students are more likely to co-operate in prisoner’s dilemma games.

In sum, the results are inconclusive and depend on the different settings. Further the experiments that have been designed are aimed to test whether economics students behave more in accordance with predictions of rational/self-interest model of economics. Yet, despite the different approach assumed in this work, it will be useful, in the course of our analysis, to compare the above results with ours, taking into account the different perspectives assumed.

4 Methods

In March 2002, a total of 1333 students of the University of Milan took part in the experiment. 661 of them were sociology students, 345 freshers and 316 seniors. The remaining 672 were economics students, 354 freshers and 318 seniors. In each of the four groups women and men were present in approximately equal number. Participation was voluntarily and there was no show-up fee paid. Each student was given a sheet containing on the front the base problem and on the back, at random, one of the remaining three problems. Thus, each of the four groups was divided into three classes, according to the kind of the second question. Students were asked to read the question on the front and only after answering that they could read and answer the one on the back. It was not possible to change the answer to the first problem after reading the second one. The total time for conducting the experiment, including our instructions, varied between 20 and 25 minutes, due to the difference in class sizes.

⁶ The “lost-letter” dilemma was part of a survey conducted by Frank, Gilovich and Regan (1993) to test the honesty of economists and non-economists. Subjects were asked to imagine that they had lost an envelope containing money and to estimate the likelihood that a stranger would return it. Further they were asked to indicate the likelihood that they would return it to a stranger. Interestingly, their results indicate that economists are less honest than non-economists, in contrast with the results obtained by Yezer, Goldfarb and Poppen in a “real-world” experiment. The only explanation for such a discrepancy seems to be that Economics students are not more selfish, but simply more truthfully and acceptant about their behaviour.

The four questions are reported in the Appendix. We will refer to them as question 1, question 2a, question 2b and question 2c. All of the respondents answered question 1. 464 students answered question 2a; of them, 124 were economics freshers, 115 economics seniors, 134 sociology freshers and 91 sociology seniors. Question 2b was submitted to 451 respondents: 129 economics freshers, 109 economics seniors, 95 sociology freshers and 118 sociology seniors. Finally, a total of 418 students answered question 2c; of them, 101 were economics freshers, 94 economics seniors, 116 sociology freshers and 107 sociology seniors. As already pointed out, the four problems are formally identical. Resources are to be distributed between two individuals. Robinson and Friday live on two different islands. Robinson lives on island A and Robinson lives on island B. On each island one can till 12 plants. Utility deriving from the goods is increasing and marginal utility is constant. The two characters obtain different levels of utility from the goods, and are only interested in the utility they get.

“The only reason why both Robinson and Friday would like to cultivate these plants is because they produce fruit and the higher amount of fruit they obtain, the more their welfare would be; every additional fruit produces an equal value, which is identical for both people.”

The respondents are asked to choose a solution among the ones that are provided so that the distribution is just, recalling that there is no possibility of redistributing the plants after the allocation. In question 1 no explanation of the difference between the individuals is provided.

“Friday obtains 120 fruits per year from every plant on island B, **but he cannot obtain** any fruit from island A’s plants.
On both islands Robinson obtains 20 fruits per plant.”

In question 2a and question 2b the difference between the individuals is explained. In the former the two individuals differ in their physical abilities.

“**Both Robinson and Friday put the same amount of work** into tilling the plants; the only way to move from one island to the other is to swim. Friday can obtain 120 fruits per year from every plant of island B, **but he cannot swim** and he cannot till any plant on island A. Robinson is a perfect swimmer and he can therefore till plants on both islands, **but due to a wound** caused by the shipwreck he cannot obtain more than 20 fruits per year from every plant of island A and island B.”

In question 2b Robinson and Friday put different efforts in tilling their plants.

“Robinson and Friday can till plants and move from one island to the other in the same way, but **they do not put the same amount of work** into tilling the plants. Friday can obtain 120 fruits per year from every plant of island B, **but he doesn’t want to go** on island A and he will not produce fruits on this island. To Robinson moving from one island to the other is all the same, **but he does not put as much amount of work into tilling his plants as Friday**

and he doesn't produce more than 20 fruits per year from every plant, both on island A and B."

In question 2c no explanation is provided, but a minimum level of utility is introduced: the individuals cannot survive under this floor.

"The **minimum quantity** needed by every one of them in order to survive is 300 fruits per year."

The distributions are provided in terms of resources as well as in terms of utility; the sum of utility obtained by the individuals is shown too. Three solutions are provided to question 1, 2a and 2b.

1	Plants island A	Plants island B	Fruits
Robinson	12	0	240
Friday	0	12	1440
		Total production of fruits	1680
<input type="checkbox"/>			

2	Plants island A	Plants island B	Fruits
Robinson	12	8	400
Friday	0	4	480
		Total production of fruits	880
<input type="checkbox"/>			

3	Plants island A	Plants island B	Fruits
Robinson	9	9	360
Friday	3	3	360
		Total production of fruits	720
<input type="checkbox"/>			

The first solution derives from the application of the utilitarian principle, the second one is the maximin solution, while the third one is the Egalitarian. The Utilitarian solution is the fairest in terms of resources, (R: 12-0; F: 0-12): each individual receives all of the plants of his island. Yet, this distribution is the most unequal in terms of utility: (R: 240; F: 1440). Social welfare, though, is maximised. The Rawlsian distribution is much more unequal in terms of resources, (R: 12-8; F: 0-4): Robinson receives 8 of the 12 plants of island B, besides the 12 plants of island A. Welfare distribution is much more equal, though, (R: 400; F: 480). The cost of this greater equity is a much less total welfare. Finally, the Egalitarian distribution gives every individual a utility of 360, distributing the plants as follows: (R: 9-9; F: 3-3). Total welfare is much less than according to the other allocations. Only two of these distributions are Pareto-efficient, the Utilitarian and the Rawlsian, while the Egalitarian solution is not efficient: it is possible to improve the condition of both the individuals (applying maximin criterion, for instance, both the individuals would be better off).

Besides these distributions a fourth solution, according to utilitarianism with a floor, is provided to question 2c.

4	Plants island A	Plants island B	Fruits
Robinson	12	3	300
Friday	0	9	1080
		Total production of fruits	1380

□

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Plants are divided as follows: (R: 12-3; F: 0-9). Robinson gets 300 fruits, just enough to survive, and Friday gets a utility of 1080. This distribution is also Pareto-efficient and, in terms of utility, stands between the Rawlsian and the Utilitarian. The latter is the only one that does not guarantee the survival of both the individuals.

4.1 Hypotheses

We explore five hypotheses.

- 1) Selection hypothesis. We are interested in testing whether students choosing to study economics and students choosing to study sociology differ in their ideology. In order to test this hypothesis we are going to compare the answers of freshers of economics and sociology to question 1.
- 2) Learning hypothesis. We are going to test whether education influences ideology. To test this hypothesis we are going to compare the answers to question 1 given by freshers and seniors of the same course.
- 3) We are going to test is whether different kind of education increase ideological differences. This hypothesis will be tested by comparing the answers to question 1 given by senior students of economics and sociology.
- 4) We are going to test whether contexts affect the preferences of the respondents. To test this hypothesis we are going to consider each class separately and to test the hypothesis of no change in the answer to the first and the second question.
- 5) Finally, we are going to test whether clarifying the context or introducing a minimum utility allows reaching an agreement between the groups. We will test this hypothesis by comparing the answers of the four groups to questions 2a, 2b and 2c.

5 Results

Before proceeding to test the above hypotheses we have to make sure that in each group the three different versions of the questionnaire have been randomly distributed among the respondents. For each group, we have to check that the answers to the first question follow the same distribution in everyone of the three classes.

For each one of the four groups, let us apply the Chi-square test to test the subsequent hypothesis; the null and alternative hypotheses are the following:

- (1) H_0 : the proportion of subjects in each of the option categories is the same in each of the three classes.
 H_1 : the proportion of subjects in each of the option categories differs across the classes.

For every group we cannot reject the null hypothesis ($p < 0.05$). This allows us to proceed to any type of inferential analysis of the data and to test the hypotheses presented above.

In presenting our results we will proceed as follows. First, we will focus on the difference between economics and sociology students, testing the selection and learning hypotheses. Then, we will analyse the effects of clarifying the context of the distribution and the extent to which this facilitates an agreement between the parties.

5.1 Ideology

Let us consider the answers to question 1 given by the fresher students of economics and sociology. This will allow us to test the selection hypothesis. The results are presented in Figure 1. In all the figures we will refer to, E, R, U, UF will indicate, respectively, Egalitarian, Rawlsian, Utilitarian and Utilitarian with a floor.

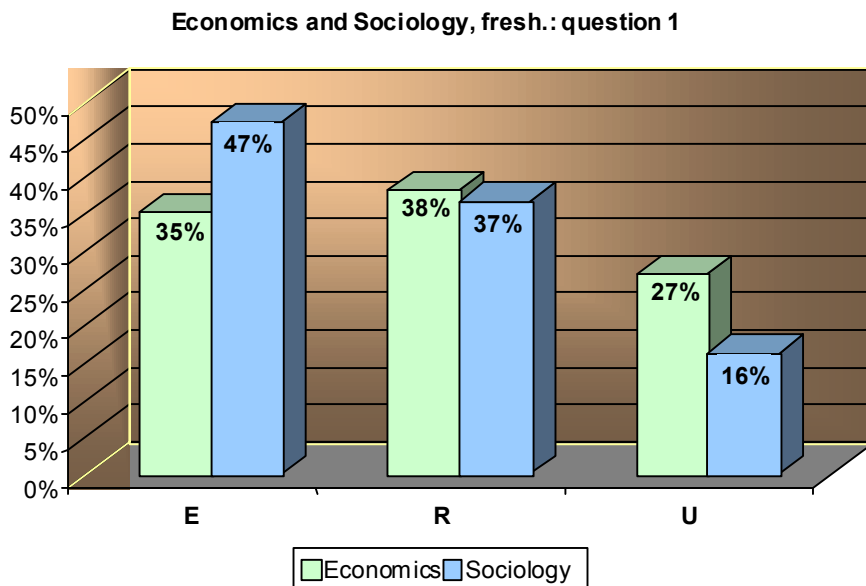


Figure 1

We can easily notice a consistent difference between the two distributions, the preferences of the economics students being more equally distributed between the three options. In both the groups there are a similar percentage of subjects choosing the Rawlsian principle, 38% of the economics students and 37% of the sociology ones. However, while almost half of the sociologists prefer the Egalitarian solution and only 16% the Utilitarian these percentages are much closer among the economists, respectively 35% and 27%.

Let us apply the Chi-square test to test our first hypothesis. The null and the alternative hypotheses are the following:

(2) H_0 : the choice of a particular option is unrelated to the university course.

H_1 : the choice of a particular option is related to the university course.

We reject the null hypothesis ($p < 0.05$). This leads to:

Result 1: *A selection effect does exist. Sociology students are more concerned with equality than economics students and best prefer the Egalitarian distribution despite being inefficient.*

5.2 Education: Equity and Efficiency

Let us now test the learning hypothesis. We are going to analyse whether education influences ideology by comparing the answers to question 1 given by fresher and senior students of the same discipline. Figure 2 shows that the answers of the economics seniors are much more differentiated than those of their younger colleagues.

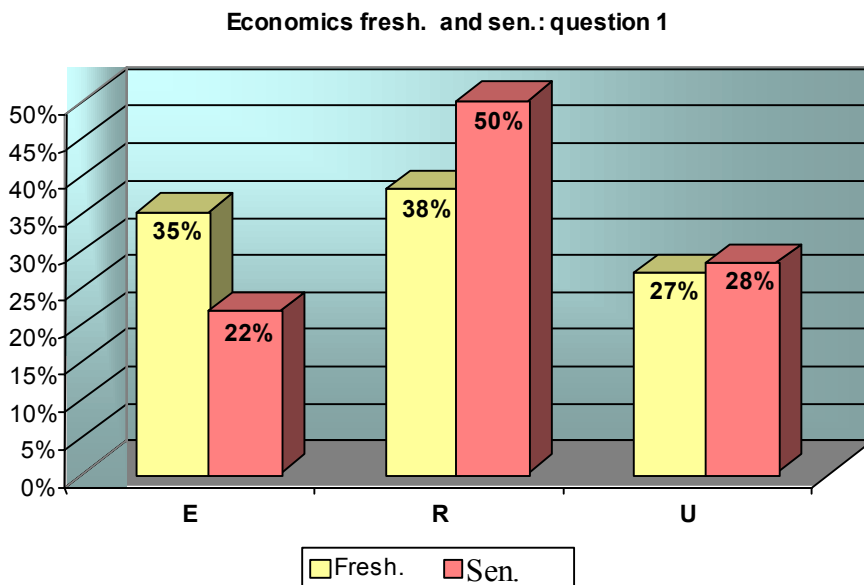


Figure 2

The percentage of preferences for the Utilitarian allocation is almost identical in both the groups, while, passing from the freshers to the seniors, the preferences for the Egalitarian distribution diminish from 35% to 22% to the advantage of the maximin principle. The best explanation of such a trend is that after three years of economic education students learn the value of efficiency. According to such a thesis 4 out of 10, among the students choosing the Egalitarian solution, abandon this inefficient allocation to adopt the Rawlsian one. Meanwhile who chooses maximin or the Utilitarian option does not change her preference. On the other hand, interestingly, figure 3 shows that the distributions of preferences of sociology freshers and seniors are almost identical.

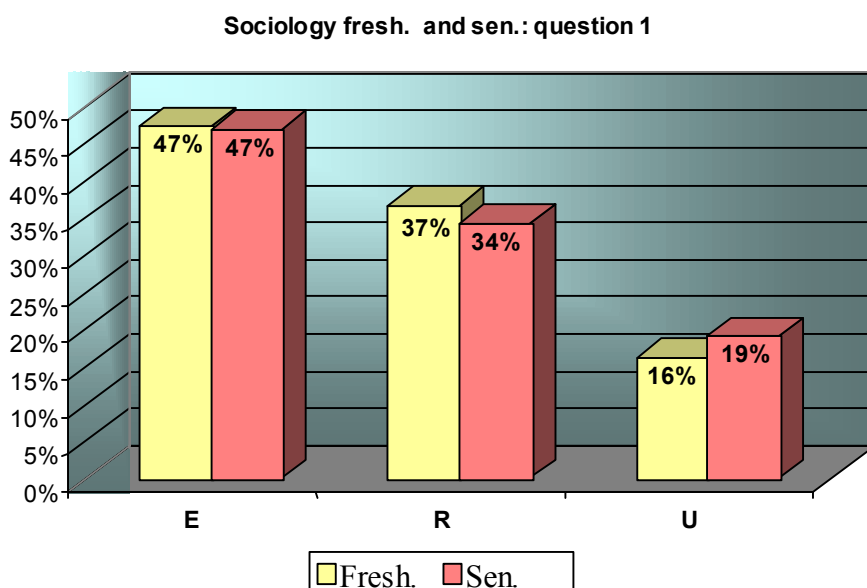


Figure 3

Let us test the second of our hypotheses, by applying the Chi-square test. The null and the alternative hypotheses are the following:

- (3) H_0 : the choice of a particular option is unrelated to the university year.
 H_1 : the choice of a particular option is related to the university year.

We reject the null hypothesis ($p < 0.05$) with respect to the economics students, but we cannot reject it for the sociology ones. This leads to

Result 2: *A learning effect only exists for the economics students. Seniors are more concerned with the efficiency of the distribution, provided that the more disadvantaged individual is not damaged.*

Unlike Carter and Irons (1991), we can therefore conclude that economists are not only born, but also made. Yet, we have to bear in mind the difference between their experiment and ours. As in all the experiments discussed in Section 3, Carter and Irons were interested in finding whether exposure to the rational model of economics makes subjects behave in a more self-interested way. Our approach differs in two ways. First, we concentrate our analysis on the perception of fairness of the subjects rather than on their behaviour. Second, their preferences over the allocation of resources cannot be driven by self-interest, because of the way our questions have been designed. The respondent has to decide how to divide the resources between two hypothetical individuals and not between an opponent and herself. This allows studying the perception of fairness of the subjects independently of their selfishness. The result we obtain is that the presence of a learning effect reflects an increasing concern for efficiency and for the trade-off between equity and efficiency. Pareto-efficiency is a fundamental instrument of analysis for economists, but not for sociologists, who do not acquire such a value through their education.

Part of the dispute between Frank and his colleagues and Yezer, Goldfarb and Poppen was on the effect of studying economics, the former (Frank, Gilovich and Regan [1993, 1996]) claiming that training in economics has, among others, negative consequences. Given the approach they adopted, what they consider negative is the antisocial behaviour that might be caused by economic education. Given the approach of our analysis we cannot observe whether or not training in economics inhibits co-operation. What we can check is whether education distorts the prejudices that dictate the preferences for a particular distribution when the context of the problem is not explained. The result is that training in economics does not distort the prejudices that are already present in the subjects before being exposed to the economic theory. Indeed, senior students are not more likely to favour inequality if this implies damaging the more disadvantaged individual. Studying economics simply provides an ulterior tool to judge the distribution problem and to get a solution.

5.3 Does Education Increase Ideological Differences?

We want to check whether ideological differences between the students of the two courses increase with the different education or remain stable. Looking at figure 4 we can see that the difference between the two distributions seems to have increased passing from the first to the last year.

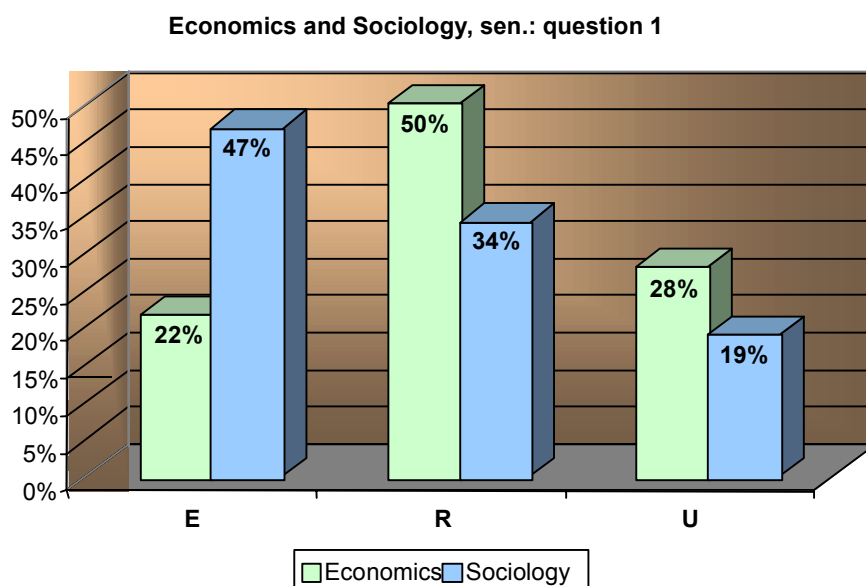


Figure 4

Let us proceed to test the third hypothesis. The null and the alternative hypotheses are the same as in (2). We reject the null hypothesis ($p < 0.05$). Moreover the Cramer coefficient⁷ shows that the different education has increased the ideological difference already existent. This result can be summarised by:

⁷ The Cramer coefficient measures the degree of relation between two sets of variables. The value of this coefficient almost doubles passing from the freshers' sample to the seniors' one, from 0.15 to 0.27, indicating a much stronger relation between the preferences of the senior students and the course attended.

Result 3: *Acquiring different kinds of education does increase ideological differences, making an agreement between the two populations even more difficult to achieve.*

5.4 Does Context Affect Preferences Over Distribution?

We are now going to test the fourth hypothesis. We want to investigate whether context influences the preferences of the subjects over the distribution of resources. We have three classes for each of the four groups, according to the different kind of second question. We are going to compare the answers given by each student to the first and the second question. We will first analyse problem 2a and 2b and then problem 2c.

Concerning those subjects who received question 2a and question 2b, we can test the significance of the change in the answers to the two problems by applying the Stuart-Maxwell test⁸. The null and alternative hypotheses are the following:

- (4) H_0 : there is no change in the preferences of the subjects passing from the first to the second problem.
 H_1 : there is a change in the preferences of the subjects passing from the first to the second problem.

In each case we can reject the null hypothesis ($p < 0.05$). This leads to the following important result:

Result 4: *Clarifying the context of the problem has changed the preferences of the subjects who received question 2a and question 2b, whatever group they belong to.*

Given the significant difference, with reference to both classes of each of the four groups we can look for those single categories for which the differences are significant. We can collapse the original 3x3 tables into 2x2⁹ tables and apply the McNemar test to three different hypotheses. The null and alternative hypotheses are the following:

- (5) H_0 : among those respondents *who change* their preference, the probability that a respondent will switch from Egalitarian (Rawlsian / Utilitarian) to not Egalitarian (not Rawlsian / not Utilitarian) will be the same as the probability that a respondent will change from Egalitarian (not Rawlsian / not Utilitarian) to Egalitarian (Rawlsian / Utilitarian).
 H_1 : there is a differential change in preference.

Let us start considering question 2a. For each group we reject the null hypothesis ($p < 0.05$) concerning the Egalitarian and the maximin allocation. From problem 1 to 2a, the consent for the Egalitarian solution diminishes, while more subjects are in favour of the Rawlsian one. Moreover, with reference to the economics seniors we can reject the

⁸ The Stuart-Maxwell test is a variation of McNemar's test appropriate for case-control comparisons involving 3x3 contingency tables. It can be used to test marginal homogeneity between two raters across all categories simultaneously (see Fleiss [1981] for a general discussion).

⁹ In these 2x2 tables the answers to the first and to the second question will be categorised respectively as Egalitarian and not Egalitarian, Rawlsian and not Rawlsian, Utilitarian and not Utilitarian.

null ($p < 0.05$) concerning the Utilitarian distribution as well, which is preferred by fewer subjects as a solution to problem 2a. These results can be summarised by:

Result 5: *From question 1 to 2a, the preferences of each group for the Egalitarian distribution have decreased in favour of the maximin solution. The preferences of the economics seniors for both the Egalitarian and Utilitarian solutions have diminished in favour of the maximin one.*

Let us now take into account question 2b. This time, for each of the four groups we reject the null ($p < 0.05$) concerning the Egalitarian and Utilitarian solutions. From question 1 to 2b, the preferences for the Egalitarian distribution decrease, while more people prefer the Utilitarian one. Like before, considering the economics seniors we reject the null ($p < 0.05$) concerning each of the three options. In this case, also the preferences for the maximin solution diminish passing to the second problem. Hence, we can state:

Result 6: *From question 1 to 2b, the preferences of each group for the Egalitarian distribution have decreased in favour of the Utilitarian solution. The preferences of the economics seniors for both the Egalitarian and maximin solutions have diminished in favour of the Utilitarian one.*

As revealed by these results, passing from the first to the second question has significantly lowered the consent for the Egalitarian solution among all the groups. This leads to an important result:

Result 7: *The inefficient allocation is an inadequate solution to the problem, once the circumstances of the distribution are clear.*

Let us finally analyse the answers of the subjects who received question 2c by testing (5)¹⁰. For each group we can reject the null ($p < 0.05$) with reference to the Utilitarian solution, the preferences for this distribution having drastically fallen in every group. Besides, considering the senior students we reject the null ($p < 0.05$) concerning two other mechanisms: the egalitarian with respect to the sociology seniors and the maximin with reference to the seniors of economics. The two groups show much less consent for these principles when answering question 2c. This leads to

Result 8: *From question 1 to 2c, the preferences of each group for the Utilitarian distribution have drastically fallen. Moreover, the preferences of the sociology seniors for the Egalitarian allocation have decreased, while the maximin solution is preferred by fewer economics seniors.*

5.5 Does Clarifying the Context Favour Social Agreements?

Let us conclude our analysis investigating whether clarifying the context of the distribution leads to a common solution accepted by the parties.

¹⁰ While the first problem presents three solutions, four distinct distributions are provided as possible solutions to question 2c. The Stuart-Maxwell test cannot be used to test marginal homogeneity in this case and, furthermore, no appropriate test for case-control comparisons involving 3x4 contingency tables exists. It will only be possible to test (5) by applying the McNemar test.

Let us start examining the answers to question 2a. Observing Figure 5 we notice that, unlike question 1, the absolute majority of each group prefer the Rawlsian solution. The maximin mechanism provides the most widely accepted solution to this problem, getting the absolute majority of preferences in each group. This trend can be understood if we consider the characteristic of the problem and the difference between the characters: both Robinson and Friday put the same effort, but they differ in their physical abilities. Maximising the utility of the more disadvantaged is considered fair by most of the individuals, whatever group they belong to.

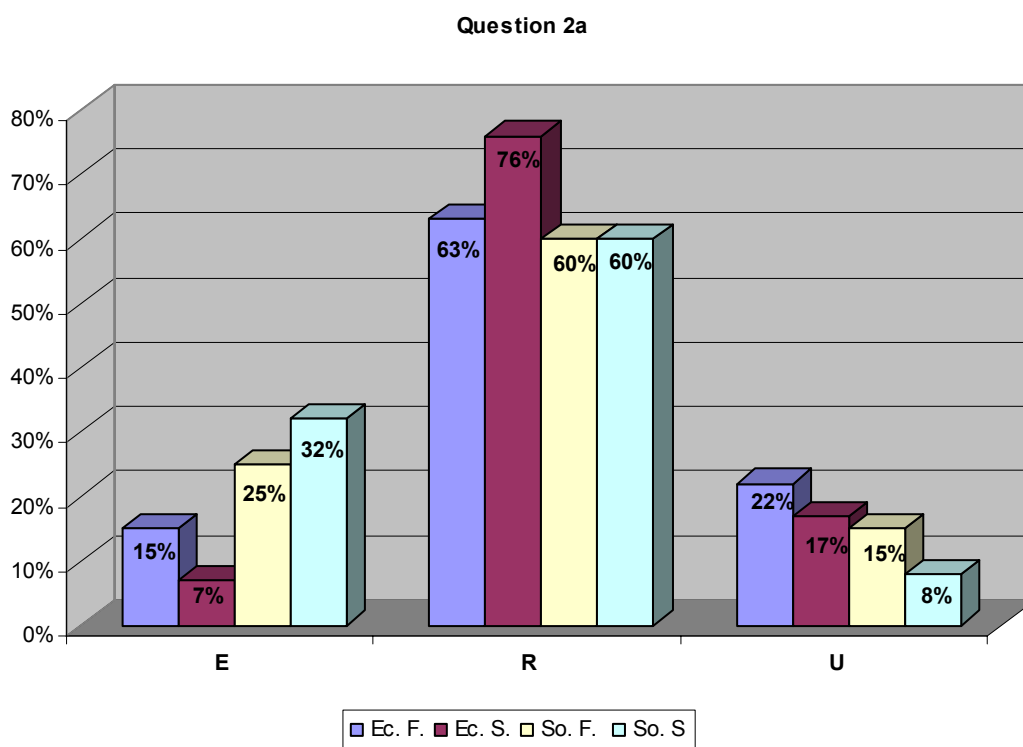


Figure 5

We can proceed to test our last hypothesis, checking whether the preferences of the different groups are distributed according to the same distribution. The null and alternative hypotheses are the following:

- (6) H_0 : the proportion of subjects in each of the option categories is the same in each group.
 H_1 : the proportion of subjects in each of the option categories differs across the groups.

We have to reject the null ($p < 0.05$): although clarifying the context has led to a common solution, the preferences of the four groups do not follow the same distribution. We can proceed with the analysis, though, similarly to what we have done with respect to question 1 and test (6) with reference to four different cases: economics and sociology freshers, economics and sociology seniors, economics freshers and

seniors, sociology freshers and seniors. We reject the null ($p < 0.05$) only concerning economics and sociology seniors. These important results can be summarised by:

Result 9: *The absolute majority of every group prefer the maximin principle as a solution to problem 2a. Besides, the difference due to the selection effect as well as the disagreement between economics freshers and seniors has disappeared.*

Let us now proceed to analyse the answers to question 2b, as reported in Figure 6. The Utilitarian solution is the most preferred by each one of the four classes. This result is even more striking considering that utilitarianism was the least preferred solution to the first problem by three of the four groups and only the second choice of the economics seniors. This choice can be understood taking into account the particular characteristic of the problem: both the characters have the same physical abilities, but they differ in the effort they put. The Utilitarian solution, which rewards the character that puts more effort, is preferred to the other allocations in each group. The answers to this problem are even more homogenous than those to question 2a. The four classes present the same order of preferences: the maximin solution is the second choice, followed by the Egalitarian.

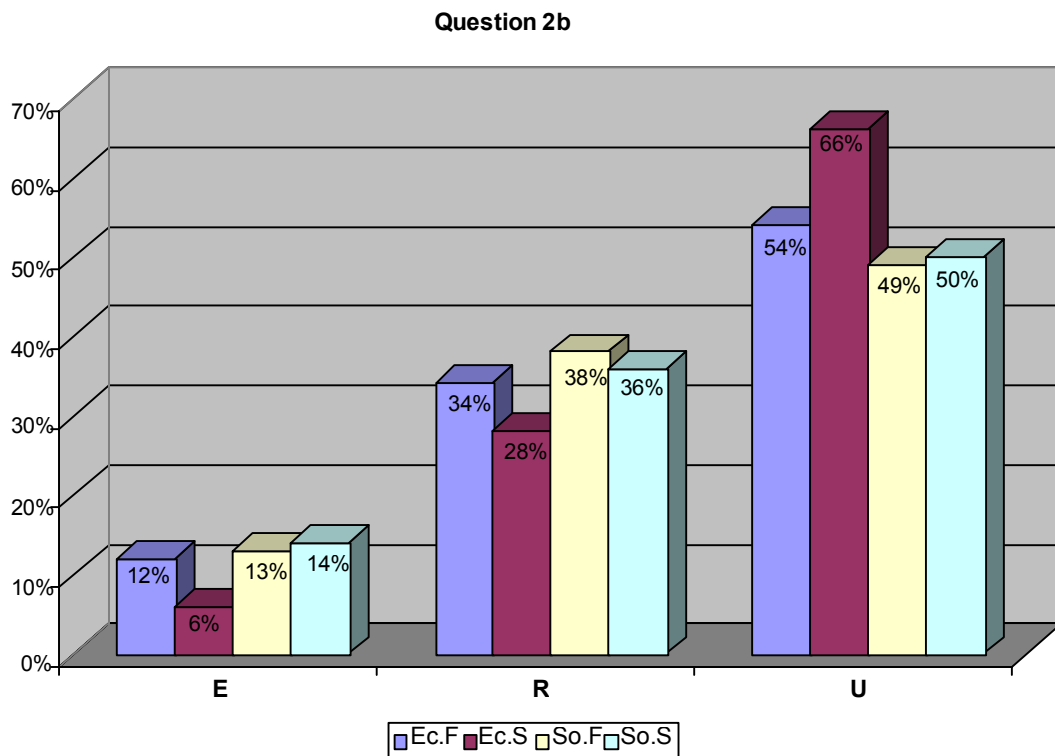


Figure 6

Testing (6) with respect to all the groups, actually, we cannot reject the hypothesis according to which the preferences of the four classes follow the same distribution ($p < 0.05$). This leads to the following fundamental result:

Result 10: *The preferences of the four groups with respect to problem 2b follow the same distribution. The Utilitarian allocation is the most preferred, the maximin solution is the second choice and the Egalitarian is the least preferred.*

Let us finally examine the answers to question 2c, as reported in Figure 7. These data are more difficult to be interpreted. We notice that economics freshers and seniors and sociology freshers most prefer the maximin solution, while among the sociology seniors egalitarianism is still the first choice. The four classes share the same scepticism for the Utilitarian solution. Egalitarianism still proves to be more appreciated by the sociology students, although, in this case, even among them the preferences for this principle decrease passing from the fresher to the senior students, in favour of utilitarianism with a floor. The latter seems to exert a particular attraction on more mature students, whatever course they attend. Testing (6) with reference to the four groups we have to reject the null hypothesis ($p < 0.05$), while the only case in which we cannot reject it ($p < 0.05$) is comparing the answers of the economics freshers and seniors. With respect to them, we can conclude that their preferences follow the same distribution.

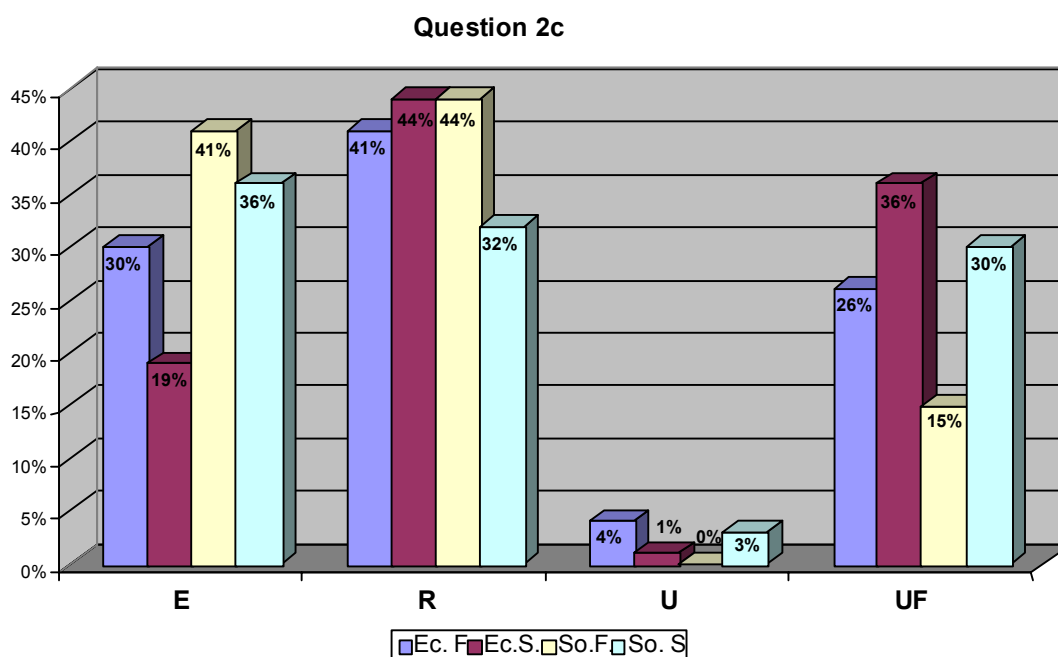


Figure 7

Unlike other experiments (Frohlich, Oppenheimer, and Eavy, 1987a, 1987b; Lissowski, 1992), the introduction of a floor did not enable a solution accepted by all of the parties. Yet we have to recall that an agreement looks closer now than in the first problem. Three classes most prefer the Rawlsian solution and even among the sociology seniors the percentage of preferences for maximin is very close to the first choice. Let us think about the relationship between the Rawlsian mechanism and utilitarianism with a floor. This principle permits to go beyond the typical limits of both utilitarianism and maximin. Maximin can be interpreted as a particular form of utilitarianism with a floor, in which the minimum threshold has not been reached yet. It represents the frontier of utilitarianism with a floor, in which the floor is maximised. The solution we proposed,

on the other hand, is the other frontier of the principle that minimises the floor. Guaranteeing only the survival of one of the characters did not look enough to most of the subjects, who instead preferred maximising the utility of the most disadvantaged. What would have happened if we had raised the minimum floor? A series of social experiments of this kind would lead to an agreement among the parties. We can summarise these results by:

Result 11: *All of the groups, except for the sociology seniors, most prefer the maximin allocation as a solution to question 2c, while the utilitarian distribution is by the far the least preferred by each group. Utilitarianism with a floor is more preferred by senior students.*

6 Conclusions

Studies have been conducted to analyse the impact of “frames” and of the wording of questions on opinions on the welfare state¹¹. To our knowledge, though, this is the first attempt to explore distributive justice analysing the extent to which clarifying the context of a distribution enables an agreement between the parties. Let us summarise the main results we obtained.

The ideology of students choosing to study sociology differs from that of students who choose to study economics, the former group being much more concerned about equality. A selection effect does indeed exist: students self-select themselves into either economics or sociology on the basis of their ideology. Further, acquiring different kinds of education increases difference in ideology, making an agreement between the parties even more difficult to achieve. This because studying economics has a learning effect that is absent among the sociology students. Economics education affects preferences over distribution of resources, by teaching students the value of efficiency, while choices of sociology students are not influenced by their education. These results cannot be directly compared to other attempts to study the differences between economists and non-economists, the existent literature being aimed to study whether students of economics behave in a more self-interested way than students of other disciplines. In any case, unlike the results obtained by Marwell and Ames (1981), our results do not indicate a more problematic perception of fairness typical of economics students. This may be due to the different design of the question.

Clarifying the context of the distribution, by either explaining the differences between the individuals or introducing a floor, significantly influences perception of fairness of the subjects, whatever group they belong to. Whenever egalitarianism is not efficient, the egalitarian principle seems to provide inadequate solutions when the circumstances of the distributions are clear. A remarkable result, when a floor is introduced, is the abandonment of the utilitarian principle, if the solution it prescribes does not enable every individual to reach the minimum utility.

The most notable result is that clarification of the context of the distribution favours an agreement between the parties. The maximin criterion proves to be an adequate solution to the distribution problem when the individuals, between whom the bundle is to be divided, differ in their physical abilities. The utilitarian principle, on the contrary, meets a great success when the individuals put different efforts. The introduction of a floor does not seem to be an equally successful way to achieve a social

¹¹ See, e.g., Kangas (1997).

agreement. Yet, only a particular solution corresponding to the utilitarian principle with a floor constraint has been explored. There are several interesting extensions for future research and a series of social experiments should be conducted in order to point out a plausible threshold that would appear just to the parties. Reality always differs from the theory and that is why it is not possible to achieve social solutions that may actually be practised without empirical verification.

Appendix

Question 1

After a shipwreck Robinson and Friday have landed on two different islands divided by a narrow but deep channel.

On each of the two islands one can till **12 plants**. The only reason why both Robinson and Friday would like to cultivate these plants is because they produce fruit and the higher amount of fruit they obtain, the more their welfare would be; every additional fruit produces an equal value, which is identical for both people.

It has been decided that you are the one who will chose how to distribute the plants between Robinson and Friday.

You've been given the following information, which the two survivors also know:

Robinson lives on island **A** and Friday lives on island **B**

All plants of one island are identical to the ones of the other island. How much fruit they produce depends on the way they are cultivated.

Friday obtains **120 fruits** per year from every plant on island B, but he cannot obtain any fruit from island A's plants.

On both islands Robinson obtains **20 fruits** per plant.

There's no possibility of redistributing the plants after the allocation and there's also no chance to exchange any fruit, which is produced.

How would you divide the 12 plants of island A and the 12 plants of island B so that, from your point of view, the distribution would be just?

Choose:

1	Plants island A	Plants island B	Fruits
Robinson	12	0	240
Friday	0	12	1440
			Total production of fruits 1680 <input type="checkbox"/>

2	Plants island A	Plants island B	Fruits
Robinson	12	8	400
Friday	0	4	480
			Total production of fruits 880 <input type="checkbox"/>

3	Plants island A	Plants island B	Fruits
Robinson	9	9	360
Friday	3	3	360
			Total production of fruits 720 <input type="checkbox"/>

Question 2a

After a shipwreck Robinson and Friday have landed on two different islands divided by a narrow but deep channel.

On each of the two islands one can till **12 plants**. The only reason why both Robinson and Friday would like to cultivate these plants is because they produce fruit and the higher amount of fruit they obtain, the more their welfare would be; every additional fruit produces an equal value, which is identical for both people.

It has been decided that you are the one who will chose how to distribute the plants between Robinson and Friday.

You've been given the following information, which the two survivors also know:

Robinson lives on island **A** and Friday lives on island **B**

All plants of one island are identical to the ones of the other island. How much fruit they produce depends on the way they are cultivated.

Both Robinson and Friday put the same amount of work into tilling the plants; the only way to move from one island to the other is to swim.

Friday can obtain **120 fruits** per year from every plant of island **B**, but he cannot swim and he cannot till any plant on island **A**.

Robinson is a perfect swimmer and he can therefore till plants on both islands, but due to a wound caused by the shipwreck he cannot obtain more than 20 fruits per year from every plant of island **A** and island **B**.

There's no possibility of redistributing the plants after the allocation and there's also no chance to exchange any fruit, which is produced.

How would you divide the 12 plants of island A and the 12 plants of island B so that, from your point of view, the distribution would be just?

Choose:

1	Plants island A	Plants island B	Fruits	
Robinson	12	0	240	
Friday	0	12	1440	
		Total production of fruits	1680	<input type="checkbox"/>

2	Plants island A	Plants island B	Fruits	
Robinson	12	8	400	
Friday	0	4	480	
		Total production of fruits	880	<input type="checkbox"/>

3	Plants island A	Plants island B	Fruits	
Robinson	9	9	360	
Friday	3	3	360	
		Total production of fruits	720	<input type="checkbox"/>

Question 2b

After a shipwreck Robinson and Friday have landed on two different islands divided by a narrow but deep channel.

On each of the two islands one can till **12 plants**. The only reason why both Robinson and Friday would like to cultivate these plants is because they produce fruit and the higher amount of fruit they obtain, the more their welfare would be; every additional fruit produces an equal value, which is identical for both people.

It has been decided that you are the one who will chose how to distribute the plants between Robinson and Friday.

You've been given the following information, which the two survivors also know:

Robinson lives on island **A** and Friday lives on island **B**

All plants of one island are identical to the ones of the other island. How much fruit they produce depends on the way they are cultivated.

Robinson and Friday can till plants and move from one island to the other in the same way, but they do not put the same amount of work into tilling the plants.

Friday can obtain **120 fruits** per year from every plant of island **B**, but he doesn't want to go on island **A** and he will not produce fruits on this island.

To Robinson moving from one island to the other is all the same, but he does not put as much amount of work into tilling his plants as Friday and he doesn't produce more than **20 fruits** per year from every plant, both on island A and B.

There's no possibility of redistributing the plants after the allocation and there's also no chance to exchange any fruit, which is produced.

How would you divide the 12 plants of island A and the 12 plants of island B so that, from your point of view, the distribution would be just?

Choose:

1	Plants island A	Plants island B	Fruits
Robinson	12	0	240
Friday	0	12	1440
Total production of fruits 1680			<input type="checkbox"/>

2	Plants island A	Plants island B	Fruits
Robinson	12	8	400
Friday	0	4	480
Total production of fruits 880			<input type="checkbox"/>

3	Plants island A	Plants island B	Fruits
Robinson	9	9	360
Friday	3	3	360
Total production of fruits 720			<input type="checkbox"/>

Question 2c

After a shipwreck Robinson and Friday have landed on two different islands divided by a narrow but deep channel.

On each of the two islands one can till **12 plants**. The only reason why both Robinson and Friday would like to cultivate these plants is because they produce fruit and the higher amount of fruit they obtain, the more their welfare would be; every additional fruit produces an equal value, which is identical for both people.

It has been decided that you are the one who will chose how to distribute the plants between Robinson and Friday.

You've been given the following information, which the two survivors also know:

The minimum quantity needed by every one of them in order to survive is 300 fruits per year.

Robinson lives on island **A** and Friday lives on island **B**

All plants of one island are identical to the ones of the other island. How much fruit they produce depends on the way they are cultivated.

Friday obtains **120 fruits** per year from every plant on island B, but he cannot obtain any fruit from island A's plants.

On both islands Robinson obtains **20 fruits** per plant.

There's no possibility of redistributing the plants after the allocation and there's also no chance to exchange any fruit, which is produced.

How would you divide the 12 plants of island A and the 12 plants of island B so that, from your point of view, the distribution would be just?

Choose:

1	Plants island A	Plants island B	Fruits	
Robinson	12	0	240	
Friday	0	12	1440	
		Total production of fruits	1680	<input type="checkbox"/>
2	Plants island A	Plants island B	Fruits	
Robinson	12	8	400	
Friday	0	4	480	
		Total production of fruits	880	<input type="checkbox"/>
3	Plants island A	Plants island B	Fruits	
Robinson	9	9	360	
Friday	3	3	360	
		Total production of fruits	720	<input type="checkbox"/>
4	Plants island A	Plants island B	Fruits	
Robinson	12	3	300	
Friday	0	9	1080	
		Total production of fruits	1380	<input type="checkbox"/>

References

- Barry, B. (1989). *Treatise on social justice. Volume 1. Theories of justice*, Berkeley: University of California Press.
- Bolton, G., Ockenfels, A. (2000). ERC: A theory of equity, reciprocity, and competition, *American Economic Review*, 90, 166-193.
- Carter, J. R., Irons, M. D. (1991). Are Economists Different, and If So, Why?, *Journal of Economic Perspectives*, 5, 171-77.
- Dworkin, R. (1977). *Equality and preferential treatment: a philosophy & public affairs reader*, Princeton, N.J. : Princeton University Press.
- Engelmann, D., Strobel, M. (2004) Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments, *American Economic Review*, 94, 857-869.
- Fehr, E., Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation, *Quarterly Journal of Economics*, 114, 817-868.
- Fleiss, J. L. (1981). *Statistical methods for rates and proportions*, USA: John Wiley & Sons, Inc.
- Frank, R. H., Gilovich, T., Regan, D. T. (1993). Does studying economics inhibit cooperation?, *Journal of Economic Perspectives*, 7, 159-71.
- Frank, R. H., Gilovich, T., Regan, D. T. (1996). Do economists make bad citizens?, *Journal of Economic Perspectives*, 10, 187-92.
- Frey, B. S., Meier, S. (2001). Selfish and indoctrinated economists?, *University of Zurich mimeo*.
- Frohlich, N., Oppenheimer, J.A., Eavy, C. L. (1987a). Laboratory results on Rawls's distributive justice, *British Journal of Political Science*, 17, 1-21.
- Frohlich, N., Oppenheimer, J.A., Eavy, C. L. (1987b). Choices of principles of distributive justice in experimental groups, *American Journal of Political Science*, 606-36.
- Gaertner, W., Jungeilges, J., Neck, R. (2001). Cross-cultural equity evaluations: a questionnaire-experimental approach, *European Economic Review*, 45, 953-63.
- Güth, W., Kliemt, H., Ockenfels A. (2003). Fairness versus efficiency. An experimental study of (mutual) gift giving, *Journal of Economic Behavior and Organization*, 50, 465-75.
- Hu, Yung-An and Liu, Day-Yang (2003). Altruism versus Egoism in Human Behavior of Mixed Motives, *American Journal of Economics and Sociology*, 62, 677-705.
- Kangas, O. E. (1997). Self-interest and the common good: the impact of norms, selfishness and context in social policy opinions, *The Journal of Socio-Economics*, 26, 475-94.
- Lissowsky, G., Tadeusz, T., Wlodzimierz, O. (1991). Principles of distributive justice: experiments in Poland and America, *The Journal of Conflict Resolution*, 35, 98-119.
- Marwell, G., Ames, R. E. (1981). Economists free ride, does anyone else?, *Journal of Public Economics*, 15, 295-310.
- Rawls, J. (1971). *A theory of justice*, Cambridge, MA: Harvard University Press.
- Rawls, J. (1973). *A theory of justice*, Oxford: Oxford University Press.
- Rawls, J. (1974). Some reasons for the maximin criterion, *The American Economic Association*, 64, 141-6.
- Rescher, N. (1966). *Distributive justice – A constructive critique of the utilitarian theory of distribution*, USA: The Bobbs-Merril Company, Inc.
- Sen, A., Williams, B. (1982) (eds.). *Utilitarianism and beyond*, Cambridge: Cambridge University Press.
- Sen, A. (1992). *Inequality reexamined*, Oxford: Oxford University Press.
- Yaari, M. E., Bar-Hillel, M. (1984). On dividing justly, *Social Choice and Welfare*, 1, 1-24.

Yezer, A. M., Goldfarb, R. S., Poppen, P.J. (1996). Does studying economics discourage cooperation? Watch what we do, not what we say or how we play, *Journal of Economic Perspectives*, 10, 177-86.

Zsolnai, L. (2003). Honesty versus Cooperation, *American Journal of Economics and Sociology*, 62, 707-12.