Fair Dictator

Project Presentation Research Practise 2

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Perception of Fair Inequality

Some decisions that humans make are influenced by their ideas of fairness and inequality. We focused in the inequality in an income and study if people's perception of fairness differ depending on achievements and luck. Our objective is to understand those perceptions of EAFIT University students.

Perception of Fair Inequality

We wanted to compare the perception of the inequality between students of different under graduate programs, for this reason we separated the students in two groups depending on the schools that they come from.

1. Sciences and Engineering Schools students.
2. Economics, Administration and Finance Schools students.

Dictator Game

To understand the perceptions of students we used two versions of the dictator game which were applied in "Fairness and the Development of Inequality Acceptance" [Almas et al., 2010], in that game, students have to divide one amount of money.

Dictator Game

Dictator Game:
DIVISION ELECTION

You have gotten XX points and you have to choose how much do you want for you.

Your point's value is 1 pesos.

Her point's value is 1 pesos.

Dictator Game: Production Phase

Dictator Game:

RESULT

You work for XX minutes.

You get YY points.

Your point's value is ZZ pesos.

You have YYxZZ pesos.

Dictator Game: Production Phase

Dictator Game:
ELECTION

You and your assigned partner get XX pesos between both.
How many points do you want for you?
How you get the money?

YOU	YOUR PARTNER
You got YY points.	She got YY points.
Your point's value is ZZ pesos.	Her point's value is ZZ pesos.
You have YYxZZ pesos.	She has YYxZZ pesos.

Dictator Game: Luck Phase

In the game, the points that they earned had a random value, what was different for each player, so the dictator had another variable to consider where she divided the points, the luck. In the second part of the game, the value of the points for the other participant had more value than the points of the dictator.

Dictator Game: Details

Questions:

1. Are you a woman or a man?
2. Imagine two secretaries who are both the same age and they do the same job. One of them earns a lot more than the another. The best paid secretary is better at her job in many ways. Do you think it is fair or unfair that one secretary earns more than the other?
3. Choose a point on the scale below:

Those who work hard normally have a better life.	1 2 3 4 5	Hard work does not help, it is luck and connections that are important.

Dictator Game: Groups

We divided the students in three groups depending on the points they considered fair to share with the other participant, this division was made in "The Pluralism of Fairness Ideals: An Experimental Approach"[Cappelen et al., 2005].

1. Strict Egalitarian Ideal: dictator divided the points in equal parts.
2. Meritocratic Ideal: dictator divided the points depending on how much she and the another player earned.
3. Libertarian Ideal: dictator divided the points depending on how much she and the another player earned and the value of the points.

Dictator Game: Groups

To measure the ideals, m is the amount that individual i considered fair to share. If i has an egalitarian ideal, shares $m^{E(i)}$, if has a meritocratic one, shares $m^{M(i)}$ and if has an libertarian one, shares $m^{L(i)}$.

$$m^{E(i)} = \frac{X}{2},$$
$$m^{M(i)} = \frac{a_i}{a_i + a_j} X,$$
$$m^{L(i)} = \frac{a_i p_i}{a_i p_i + a_j p_j} X,$$

where X is the total income of the two students, a_i is the points that individual i earned, and p_i is the value of the points for individual i.

Analysis of Variance

Analysis of Variance (ANOVA) is a set of methods use to compare the mean of some data groups. Using ANOVA we divide the sum of squares and the degrees of freedom, with this data we calculate a value of Fisher number, then we compare the real value of F-table and the F-calculated. If F-calculated $\geq$ F-table we accept null hypothesis [Massart et al., 1997].
In this case, the null hypothesis is "The two groups of data do not have the same ideal".

Analysis of Variance

Table 1: Variables we Use in the Analysis of Variance

	Sum of squares	Degrees of freedom	Variance	F calculated
Between groups	SS_B	$K-1$	V_B	F
Inside groups	SS_I	$N-K$	V_I	
Total	SS_T	$N-1$	V_T	
F from table $(\alpha = 0.1, K-1, N-K)$ =F_{table}				

Analysis of Variance

where,

$$SS_B = \sum_{k=1}^{K} n_k(\bar{x_k} - \bar{\bar{x}})^2,$$

$$SS_I = \sum_{k=1}^{K}\sum_{j=1}^{n_k} n_k(\bar{x_{kj}} - \bar{x_k})^2,$$

$$SS_T = SS_B + SS_I,$$

$$V_B = \frac{SS_B}{K-1},$$

$$V_I = \frac{SS_I}{N-K},$$

$$V_T = \frac{SS_T}{N-1},$$

$$F = \frac{V_B}{V_I},$$

where, K is the number of groups and N is the number of data.

Linear Regression Model

Linear regression model finds an estimate model that described a situation where there is a "y" variable that it dependent on some "x" variables, this model suppose the relationship between the variables is linear, and "ϵ" is the error. This is the model structure [Moore, 2005]:

$$y_i = \beta_1 X_{i1} + ... + \beta_k X_{ik} + \epsilon_i$$

where $i = 1, 2, ..., T$ and T is the number of variables values that we have and k is the number of variables "x" that we have.

Results

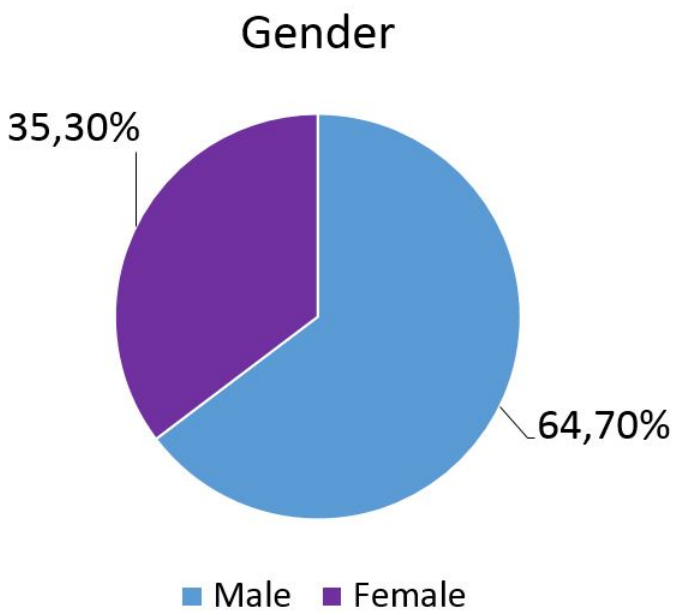

Figure 1: Gender of the Students

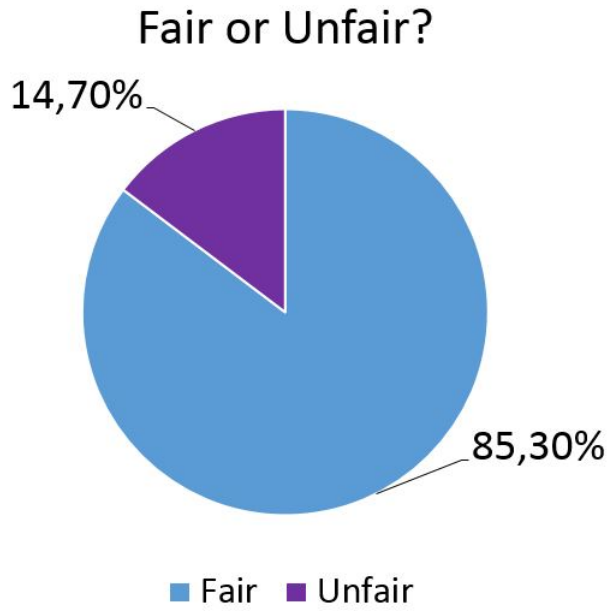

Figure 2: Concept of Fairness with Question Number 2

Results

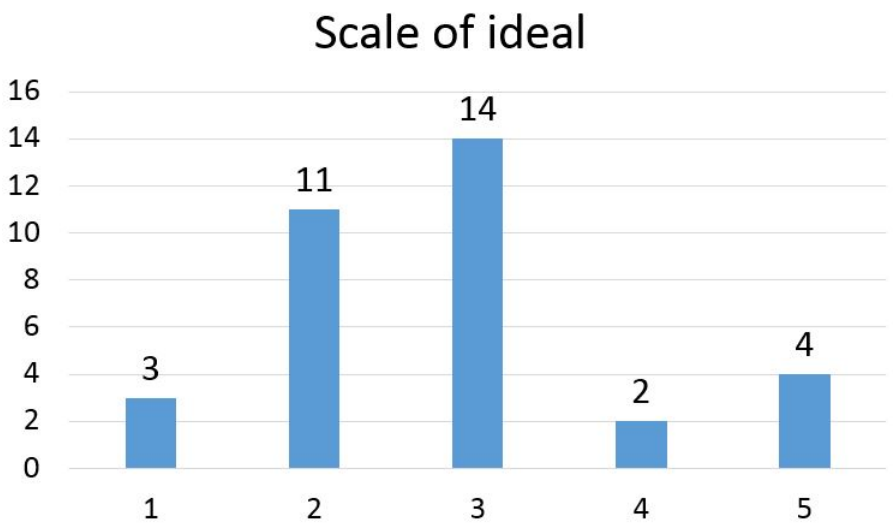

Figure 3: Concept of Fairness with Question Number 3

Results

Table 2: Parameters to Calculate Ideal

	Average
X	5088.17
a_i	947.058
a_j	1022.14
p_i	3.91667
p_j	3.88889

Table 3: Percent of Error Between Expected Values of Ideals and Real Proportion of Shared Money

	Expected Value	Error %
$m^{E(i)}$	0.5000	38.3468
$m^{M(i)}$	0.4809	35.9030
$m^{L(i)}$	0,4827	36.1389

Results

We applied the analysis of variance between the two groups of schools and we study it depending on the phase. We work with the proportion of shared money.
The notation that we use is:

- p=proportion of shared money.
- s=quantity of points that student share.
- d=points that the student earn.
- $vald$= value of points that the student earn.
- c=points that the student's partner earn.
- $valc$= value of points that the student's partner earn.

Results

In the first phase, the proportion of shared money is: $p = \frac{s}{d}$

Table 4: Results Phase 1

	Science and Engineering Schools	Economics and Finances Schools
Sum	6.13016	4.23256
Average	0.34056	0.26453
n	18	16
Average of every data		0.30478
Data number		34

Table 5: Anova Phase 1

	Sum of squares	Degrees of freedom	Variance	F calculated
Between schools	0.04896	1	0.04896	1.27812
Inside schools	1.22589	32	0.03830	
Total	1.27485	33	0.03863	
F from table ($\alpha = 0.1, 1, 32$) = 2.88				

Results

In the second phase, the proportion of shared money is: $p = \frac{d}{d+c} s$

Table 6: Results Phase 2

	Science and Engineering Schools	Economics and Finances Schools
Sum	5.31472	6.18745
Average	0.29526	0.38671
n	18	16
Average of every data		0.33829
Data number		34

Table 7: Anova Phase 2

	Sum of squares	Degrees of freedom	Variance	F calculated
Between schools	0.07084	1	0.07084	1.21562
Inside schools	1.86493	32	0.05827	
Total	1.93577	33	0.05865	
F from table ($\alpha = 0.1, 1, 32$) = 2.88				

Results

In the third phase, the proportion of shared money which depend on points is: $p = \frac{d}{d+c} s$

Table 8: Results Phase 3 Points

	Science and Engineering Schools	Economics and Finances Schools
Sum	6.52367	4.58678
Average	0.36242	0.28667
n	18	16
Average of every data		0.32677
Data number		34

Table 9: Anova Phase 3 Points

	Sum of squares	Degrees of freedom	Variance	F calculated
Between schools	0.04860	1	0.04860	0.94148
Inside schools	1.65212	32	0.05162	
Total	1.70072	33	0.05153	
F from table ($\alpha = 0.1, 1, 32$) = 2.88				

Results

In the third phase, the proportion of shared money which depend on the value of points is: $p = \frac{d*vald}{d*vald+c*valc} s * c$

Table 10: Results Phase 3 Value of Points

	Science and Engineering Schools	Economics and Finances Schools
Sum	8.93149	4.57447
Average	0.49619	0.28590
n	18	16
Average of every data		0.39723
Data number		34

Table 11: Anova Phase 3 Value of Points

	Sum of squares	Degrees of freedom	Variance	F calculated
Between schools	0.37458	1	0.37458	2.01744
Inside schools	5.94151	32	0.18567	
Total	6.31610	33	0.19139	
F from table ($\alpha = 0.1, 1, 32$) = 2.88				

Results

The variables used in the linear regression model are:

- Quantity of points that student i share: Dependent variable "y_i".
- Quantity of points that player i got in phase 1: Independent variable "x_{i1}".
- Points that player i earned: Independent variable "x_{i2}".
- Points value for player i: Independent variable "x_{i3}".
- Points that player's partner i earned: Independent variable "x_{i4}".
- Points value for player's partner i: Independent variable "x_{i5}".

Results

- School where the student i come from: Independent variable "x_{i6}". If the student come from Science and Engineering School x_{i6}=0 and if the student come from Economics and Finances School x_{i6}=1.

where i =1, 2, ..., T, T is the number of students who did the experiment.
The result model was:

$$y_i = 0.3282x_{i1} + 0.2636x_{i2} + 11.8537x_{i3} + 0.3855x_{i4} - 0.5155x_{i5} - 108.0551x_{i6} - 7.4270$$

References


Almas, I., Cappelen, A., Sorensen, E., and Tungodden, B. (2010).
Fairness and the Development of Inequality Acceptance.
Science, 328:3.


Cappelen, A. W., Hole, A. D., Sorensen, E., and Tungodden, B. (2005).
The Pluralism of Fairness Ideals: An Experimental Approach.
CESifo, 1611:31.


Massart, D., Vandeginste, B., Buydens, L., de Jong, S., Lewi, P., and Smeyers-Verbeke, J. (1997).
Handbook of Chemometrics and Qualimetrics: Part A.
Elsevier, pages 85–102.


Moore, D. (2005).
Estadistica Aplicada Basica.
2:120–138.

Thanks for your attention!