

1 Project ICFES: Evidence from a referral field experiment* 1

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4 **Abstract** 4

5 Lorem Ipsum ([Beaman, Keleher, & Magruder, 2018](#)) 5

6 **JEL Classification:** C93, D03, D83, J24 6

7 **Keywords:** productivity beliefs, referrals, field experiment, skill identification, social 7
8 class 8

*We obtained Institutional Review Board approvals from NYU Abu Dhabi (HRPP 2024-50) and the University of Luxembourg (ERP 24-028). The study design was preregistered in the OSF Registries prior to data collection (see <https://doi.org/10.17605/OSF.IO/V9T3W>).

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Table 1: Selection into the experiment

	Admin Data	Sample	p
Reading score (z-score)	0.000	0.264	0.000
Math score (z-score)	0.000	0.295	0.000
GPA (z-score)	0.000	0.156	0.000
Low-SES	0.343	0.410	0.000
Female	0.567	0.530	0.060
Age	21.154	20.651	0.000
Observations	4,417	734	5,151

Note: This table compares characteristics between the full administrative sample and the experimental sample. p -values for binary outcomes (Low-SES, Female) are from two-sample tests of proportions; for continuous variables, from two-sample t -tests with unequal variances. All reported p -values are two-tailed. GPA and test scores are standardized to have mean zero and standard deviation one in the administrative sample.

Table 2: Balance between treatments

	Baseline	Bonus	<i>p</i>
Reading score (z-score)	0.212	0.320	0.116
Math score (z-score)	0.285	0.307	0.753
GPA (z-score)	0.126	0.187	0.393
# connections	346.80	353.75	0.574
Tie strength	3.665	3.565	0.798
Low-SES	0.419	0.401	0.615
Female	0.529	0.531	0.947
Age	20.576	20.733	0.380
Observations	382	352	734

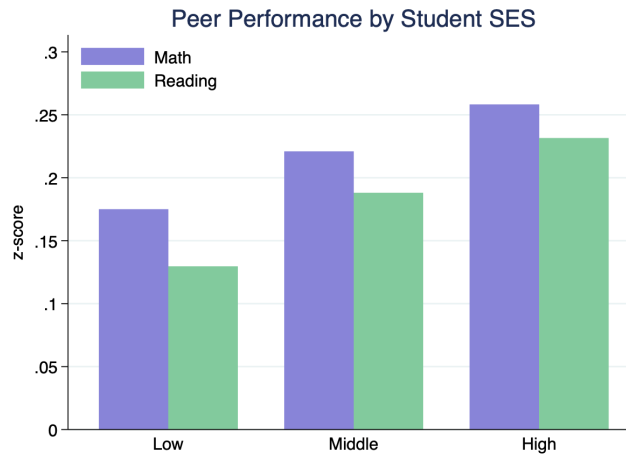
Note: This table presents balance tests between **Baseline** and **Bonus** conditions. p -values for binary outcomes are from two-sample tests of proportions; for continuous variables, from two-sample t -tests with unequal variances. All reported p -values are two-tailed. GPA and test scores are standardized to have mean zero and standard deviation one in the administrative sample. Tie strength refers to the number of classes taken together. # connections refers to the number of individuals in referrer choice sets, otherwise called the “network degree”. Low-SES is a binary variable indicating the share of participants in estrato 1 or 2.

Table 3: Summary statistics for referred and not referred

	Verbal		Math	
	Not Referred	Referred	Not Referred	Referred
Reading score (z-score)	0.165 (0.003)	0.547 (0.034)	0.164 (0.003)	0.501 (0.035)
Math score (z-score)	0.201 (0.002)	0.513 (0.035)	0.204 (0.002)	0.624 (0.036)
GPA (z-score)	-0.144 (0.003)	0.579 (0.038)	-0.151 (0.003)	0.580 (0.039)
Tie strength	3.163 (0.013)	14.467 (0.362)	3.161 (0.013)	13.822 (0.359)
Low-SES	0.334 (0.001)	0.374 (0.019)	0.338 (0.001)	0.384 (0.019)
Female	0.524 (0.001)	0.562 (0.019)	0.520 (0.001)	0.428 (0.019)
Age	20.945 (0.006)	20.501 (0.104)	20.961 (0.006)	20.490 (0.099)
Observations	128,174	673	127,481	669

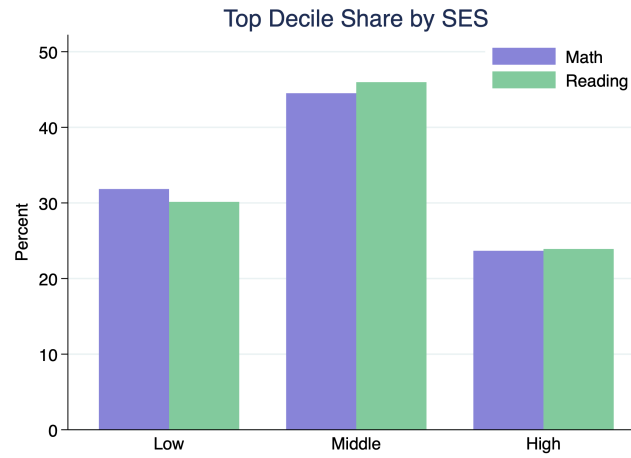
Note: Standard errors in parentheses. All scores are standardized (z-scores). Tie strength measures the number of courses taken together. Low-SES indicates the share of participants in estrato 1 or 2.

Figure 1: Distribution of performance by subject



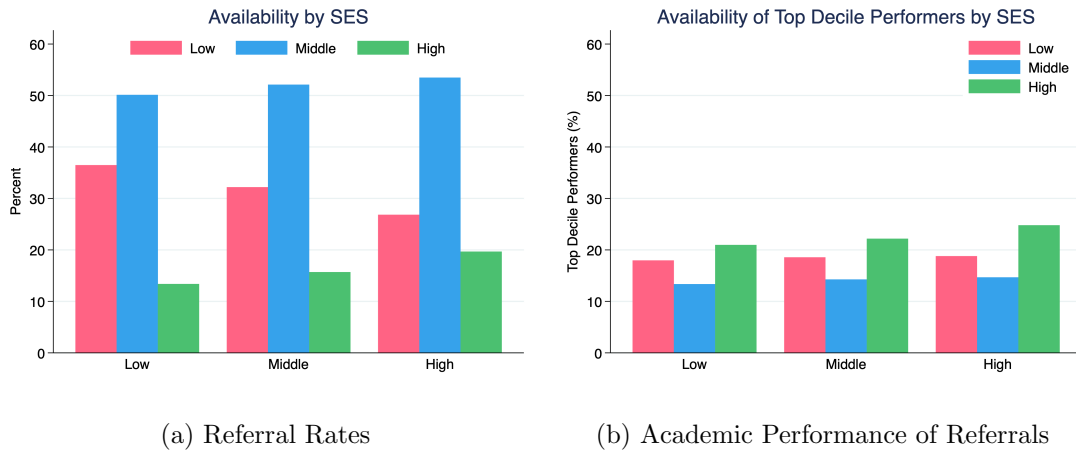
Note: This figure displays the average standardized math and reading z-scores across socioeconomic status groups. We test differences between math and reading scores within each SES group using paired t-tests. No statistically significant differences were found between subjects for Low SES ($p = 0.495$), Middle SES ($p = 0.734$), or High SES students ($p = 0.124$). While math scores are consistently higher than reading scores across all groups, these differences do not reach statistical significance. The data shows a clear socioeconomic gradient, with performance improving as SES increases for both subjects.

Figure 2: Distribution of top decile performers by subject



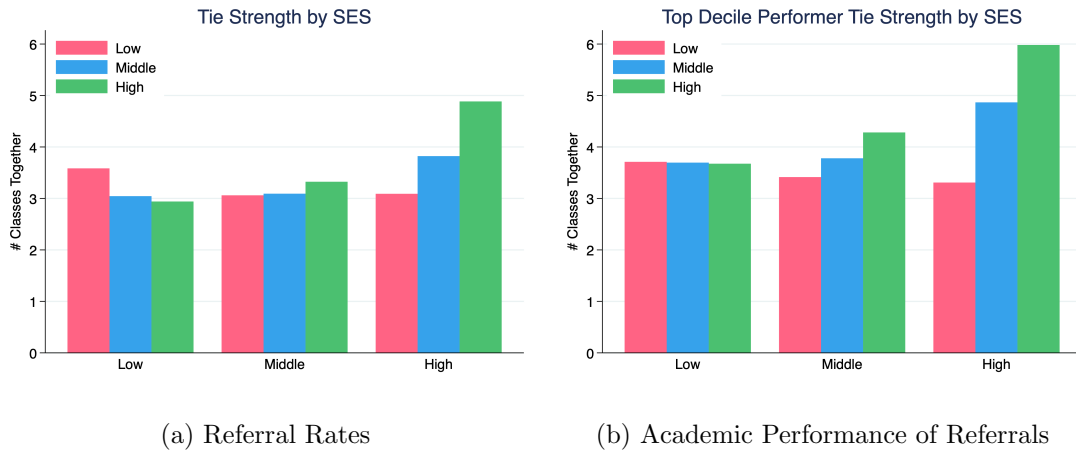
Note: This figure displays the percentage of participants across SES who score in the top decile for math and reading. We test differences between math and reading proportions within each SES group using two-sample tests of proportions and find no statistically significant differences ($p > 0.28$). Middle-SES students show the highest representation in the top decile for both subjects in the sample.

Figure 3: Availability of SES groups



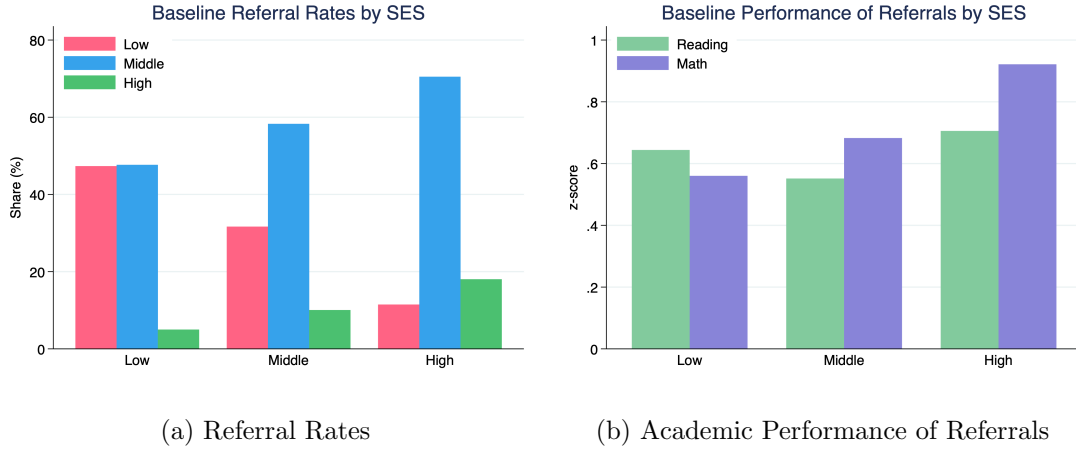
Note: The figure on the left displays the availability of each SES group by SES backgrounds. Two-sample tests of proportions show all differences across SES groups are statistically significant ($p < 0.001$). Low-SES students have 9.6 percentage points more connections with Low-SES peers than High-SES students do (36.5% vs 26.8%). In contrast, high-SES students have 6.3 percentage points more connections with High-SES peers than Low-SES students do (19.7% vs 13.4%).

Figure 4: Baseline Referral Patterns by SES



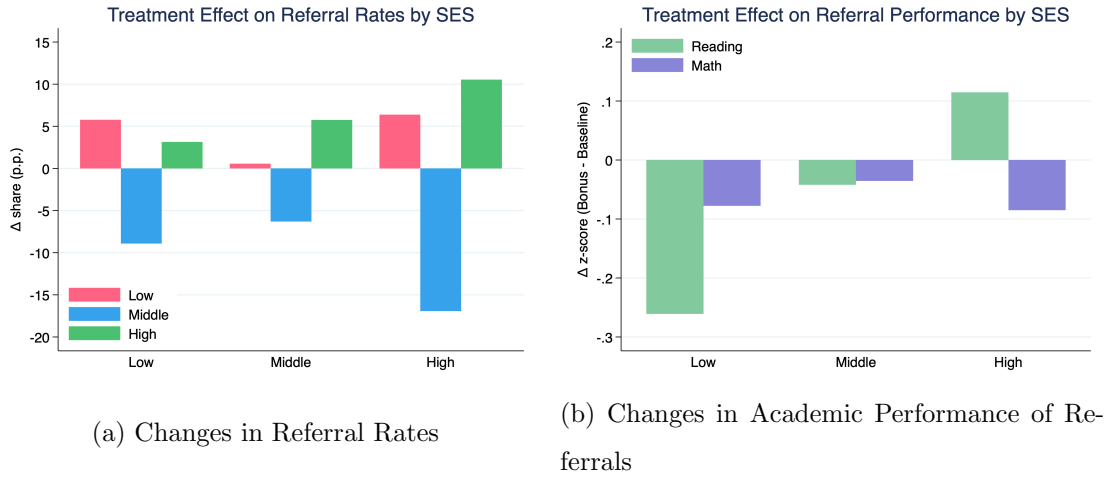
Note: The left panel shows the availability of SES groups across socioeconomic strata. The right panel shows the availability of top decile performers within each SES group.

Figure 5: Baseline Referral Patterns by SES



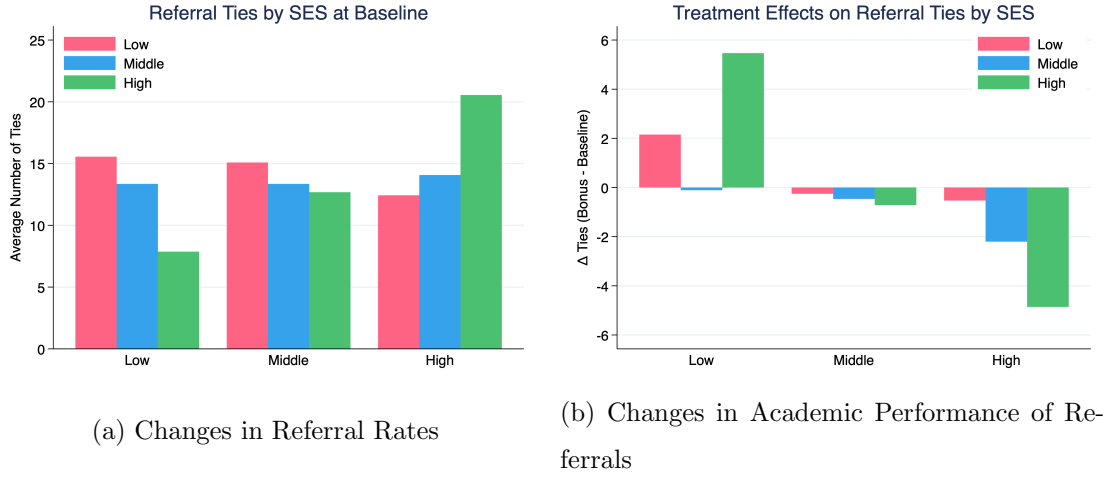
Note: The left panel shows the distribution of referrals across socioeconomic strata in the baseline condition. The right panel shows the average standardized math and reading scores of referred students by referrer's SES.

Figure 6: Treatment Effects on Referral Patterns



Note: The left panel shows the changes in referral rates across socioeconomic strata (bonus minus baseline). The right panel shows the differences in average standardized math and reading scores of referred students by referrer's SES.

Figure 7: Treatment Effects on Tie Strength



Note: The left panel shows the changes in referral rates across socioeconomic strata (bonus minus baseline). The right panel shows the differences in average standardized math and reading scores of referred students by referrer's SES.

Table 4: SES shares by SES and referral status

	Baseline		Bonus	
	Not Referred	Referred	Not Referred	Referred
Low-SES	0.361	0.473	0.368	0.531
Middle-SES	0.527	0.583	0.515	0.520
High-SES	0.201	0.180	0.193	0.286
Observations	131,777	699	123,878	643

Table 5: SES shares in Verbal

	Top Decile	Availability	Referred	
			Baseline	Bonus
Low-SES	0.301	0.398	0.483	0.508
Middle-SES	0.460	0.438	0.595	0.527
High-SES	0.239	0.282	0.161	0.259
Observations	385	25,196	147	128

Table 6: SES shares in Math

	Top Decile	Availability	Referred	
			Baseline	Bonus
Low-SES	0.318	0.398	0.464	0.554
Middle-SES	0.445	0.428	0.570	0.512
High-SES	0.237	0.278	0.200	0.310
Observations	355	23,883	153	130

Table 7: Verbal performance (z-score) of Referred Students

	Baseline	Bonus	Total
Low-SES	0.644	0.383	0.513
Middle-SES	0.551	0.509	0.530
High-SES	0.705	0.820	0.763
Observations	351	322	673

Table 8: Math performance (z-score) of Referred Students

	Baseline	Bonus	Total
Low-SES	0.560	0.483	0.521
Middle-SES	0.683	0.647	0.665
High-SES	0.921	0.836	0.879
Observations	348	321	669

15 **References**

15

- 16 Beaman, L., Keleher, N., & Magruder, J. (2018). Do Job Networks Disadvantage 16
17 Women? Evidence from a Recruitment Experiment in Malawi. *Journal of Labor* 17
18 *Economics*, 36(1), 121–157. doi: 10.1086/693869 18

19 **A Additional Figures and Tables**

19

20 **A.1 Additional Figures**

20

21	B Experiment	21
22	<i>We include the English version of the instructions used in Qualtrics. Participansts saw</i>	22
23	<i>the Spanish version. Horizontal lines in the text indicate page breaks and clarifying</i>	23
24	<i>comments are inside brackets.</i>	24
25	Consent	25
26	You have been invited to participate in this decision-making study. This study is directed	26
27	by [omitted for anonymous review] and organized with the support of the Social Bee Lab	27
28	(Social Behavior and Experimental Economics Laboratory) at UNAB.	28
29	In this study, we will pay one (1) out of every ten (10) participants, who will be	29
30	randomly selected. Each selected person will receive a fixed payment of 70,000 (seventy	30
31	thousand pesos) for completing the study. Additionally, they can earn up to 270,000	31
32	(two hundred and seventy thousand pesos), depending on their decisions. So, in total,	32
33	if you are selected to receive payment, you can earn up to 340,000 (three hundred and	33
34	forty thousand pesos) for completing this study.	34
35	If you are selected, you can claim your payment at any Banco de Bogotá office by	35
36	presenting your ID. Your participation in this study is voluntary and you can leave the	36
37	study at any time. If you withdraw before completing the study, you will not receive	37
38	any payment.	38
39	The estimated duration of this study is 20 minutes.	39
40	The purpose of this study is to understand how people make decisions. For this, we will	40
41	use administrative information from the university such as the SABER 11 test scores of	41
42	various students (including you). Your responses will not be shared with anyone and your	42
43	participation will not affect your academic records. To maintain strict confidentiality, the	43
44	research results will not be associated at any time with information that could personally	44

45 identify you. 45

46 There are no risks associated with your participation in this study beyond everyday risks. 46

47 However, if you wish to report any problems, you can contact Professor [omitted for 47

48 anonymous review]. For questions related to your rights as a research study participant, 48

49 you can contact the IRB office of [omitted for anonymous review]. 49

50 By selecting the option “I want to participate in the study” below, you give your con- 50

51 sent to participate in this study and allow us to compare your responses with some 51

52 administrative records from the university. 52

53 • I want to participate in the study [advances to next page] 53

54 • I do not want to participate in the study 54

55

 55

56 Student Information 56

57 Please write your student code. In case you are enrolled in more than one program 57

58 simultaneously, write the code of the first program you entered: 58

59 [Student ID code] 59

60 What semester are you currently in? 60

61 [Slider ranging from 1 to 11] 61

62

 62

63 [Random assignment to treatment or control] 63

64	Instructions	64
65	The instructions for this study are presented in the following video. Please watch it	65
66	carefully. We will explain your participation and how earnings are determined if you are	66
67	selected to receive payment.	67
68	[Treatment-specific instructions in video format]	68
69	If you want to read the text of the instructions narrated in the video, press the “Read	69
70	instruction text” button. Also know that in each question, there will be a button with	70
71	information that will remind you if that question has earnings and how it is calculated,	71
72	in case you have any doubts.	72
73	<ul style="list-style-type: none"> • I want to read the instructions text [text version below] 	73
74	<hr/>	74
75	In this study, you will respond to three types of questions. First, are the belief questions.	75
76	For belief questions, we will use as reference the results of the SABER 11 test that you	76
77	and other students took to enter the university, focused on three areas of the exam:	77
78	mathematics, reading, and English.	78
79	For each area, we will take the scores of all university students and order them from	79
80	lowest to highest. We will then group them into 100 percentiles. The percentile is a	80
81	position measure that indicates the percentage of students with an exam score that is	81
82	above or below a value.	82
83	For example, if your score in mathematics is in the 20th percentile, it means that 20	83
84	percent of university students have a score lower than yours and the remaining 80 percent	84
85	have a higher score. A sample belief question is: “compared to university students, in	85
86	what percentile is your score for mathematics?”	86
87	If your answer is correct, you can earn 20 thousand pesos. We say your answer is correct	87

88 if the difference between the percentile you suggest and the actual percentile of your 88
89 score is not greater than 7 units. For example, if you have a score that is in the 33rd 89
90 percentile and you say it is in the 38th, the answer is correct because the difference is 90
91 less than 7. But if you answer that it is in the 41st, the difference is greater than 7 and 91
92 the answer is incorrect. 92

93 The second type of questions are recommendation questions and are also based on the 93
94 mathematics, reading, and English areas of the SABER 11 test. We will ask you to think 94
95 about the students with whom you have taken or are taking classes, to recommend from 95
96 among them the person you consider best at solving problems similar to those on the 96
97 SABER 11 test. 97

98 When you start typing the name of your recommended person, the computer will show 98
99 suggestions with the full name, program, and university entry year of different students. 99
100 Choose the person you want to recommend. If the name doesn't appear, check that you 100
101 are writing it correctly. Do not use accents and use 'n' instead of 'ñ'. If it still doesn't 101
102 appear, it may be because that person is not enrolled this semester or because they did 102
103 not take the SABER 11 test. In that case, recommend someone else. 103

104 You can earn up to 250,000 pesos for your recommendation. We will multiply your 104
105 recommended person's score by 100 pesos if they are in the first 50 percentiles. We will 105
106 multiply it by 500 pesos if your recommended person's score is between the 51st and 106
107 65th percentile. If it is between the 66th and 80th percentile, we will multiply your 107
108 recommended person's score by 1000 pesos. If the score is between the 81st and 90th 108
109 percentile, you earn 1500 pesos multiplied by your recommended person's score. And if 109
110 the score is between the 91st and 100th percentile, we will multiply your recommended 110
111 person's score by 2500 pesos to determine the earnings. 111

112 The third type of questions are information questions and focus on aspects of your 112
113 personal life or your relationship with the people you have recommended. 113

114 Earnings 114

115 Now we will explain who gets paid for participating and how the earnings for this study 115
116 are assigned. The computer will randomly select one out of every 10 participants to pay 116
117 for their responses. For selected individuals, the computer will randomly choose one of 117
118 the three areas, and from that chosen area, it will pay for one of the belief questions. 118

119 Similarly, the computer will randomly select one of the three areas to pay for one of the 119
120 recommendation questions. 120

121 **Additionally, if you are selected to receive payment, your recommended per-** 121
122 **son in the chosen area will receive a fixed payment of 100 thousand pesos.** 122
123 [Only seen if assigned to the treatment] 123

124 Each person selected to receive payment for this study can earn: up to 20 thousand pesos 124
125 for one of the belief questions, up to 250 thousand pesos for one of the recommendation 125
126 questions, and a fixed payment of 70 thousand pesos for completing the study. 126

127 Selected individuals can earn up to 340 thousand pesos. 127

128

 128

129 [Participants go through all three Subject Areas in randomized order] 129

130 Subject Areas 130

131 Critical Reading 131

132 For this section, we will use as reference the Critical Reading test from SABER 11, which 132
133 evaluates the necessary competencies to understand, interpret, and evaluate texts that 133
134 can be found in everyday life and in non-specialized academic fields. 134

135 [Clicking shows the example question from SABER 11 below] 135

Although the democratic political tradition dates back to ancient Greece, political thinkers did not address the democratic cause until the 19th century. Until then, democracy had been rejected as the government of the ignorant and unenlightened masses. Today it seems that we have all become democrats without having solid arguments in favor. Liberals, conservatives, socialists, communists, anarchists, and even fascists have rushed to proclaim the virtues of democracy and to show their democratic credentials (Andrew Heywood). According to the text, which political positions identify themselves as democratic?

- Only political positions that are not extremist
- The most recent political positions historically
- The majority of existing political positions
- The totality of possible political currents

Mathematics

This section references the Mathematics test from SABER 11, which evaluates people's competencies to face situations that can be resolved using certain mathematical tools.

[Clicking shows the example question from SABER 11 below]

A person living in Colombia has investments in dollars in the United States and knows that the exchange rate of the dollar against the Colombian peso will remain constant this month, with 1 dollar equivalent to 2,000 Colombian pesos. Their investment, in dollars, will yield profits of 3% in the same period. A friend assures them that their profits in pesos will also be 3%. Their friend's statement is:

- Correct. The proportion in which the investment increases in dollars is the same as in pesos.

160	• Incorrect. The exact value of the investment should be known.	160
161	• Correct. 3% is a fixed proportion in either currency.	161
162	• Incorrect. 3% is a larger increase in Colombian pesos.	162
163	<hr/>	163
164	English	164
165	This section uses the English test from SABER 11 as a reference, which evaluates that	165
166	the person demonstrates their communicative abilities in reading and language use in	166
167	this language.	167
168	[Clicking shows the example question from SABER 11 below]	168
169	Complete the conversations by marking the correct option.	169
170	• Conversation 1: I can't eat a cold sandwich. It is horrible!	170
171	– I hope so.	171
172	– I agree.	172
173	– I am not.	173
174	• Conversation 2: It rained a lot last night!	174
175	– Did you accept?	175
176	– Did you understand?	176
177	– Did you sleep?	177
178	<hr/>	178
179	[Following parts are identical for all Subject Areas and are not repeated here for brevity]	179

180	Your Score	180
181	Compared to university students, in which percentile do you think your [Subject Area]	181
182	test score falls (1 is the lowest percentile and 100 the highest)?	182
183	[Clicking shows the explanations below]	183
184	How is a percentile calculated?	184
185	A percentile is a position measurement. To calculate it, we take the test scores for all	185
186	students currently enrolled in the university and order them from lowest to highest. The	186
187	percentile value you choose refers to the percentage of students whose score is below	187
188	yours. For example, if you choose the 20th percentile, you're indicating that 20% of	188
189	students have a score lower than yours and the remaining 80% have a score higher than	189
190	yours.	190
191	What can I earn for this question?	191
192	For your answer, you can earn 20,000 (twenty thousand) PESOS , but only if the	192
193	difference between your response and the correct percentile is less than 7. For example, if	193
194	the percentile where your score falls is 33 and you respond with 38 (or 28), the difference	194
195	is 5 and the answer is considered correct. But if you respond with 41 or more (or 25 or	195
196	less), for example, the difference would be greater than 7 and the answer is incorrect.	196
197	Please move the sphere to indicate which percentile you think your score falls in:	197
198	[Slider with values from 0 to 100]	198
199	<hr/>	199

200 **Recommendation** 200

201 Among the people with whom you have taken any class at the university, who is your 201
 202 recommendation for the [Subject Area] test? Please write that person's name in the 202
 203 box below: 203

204 **Important:** You will not be considered for payment unless the recommended 204
 205 person is someone with whom you have taken at least one class during your 205
 206 studies. 206

207 Your response is only a recommendation for the purposes of this study and we will **not** 207
 208 contact your recommended person at any time. 208

209 [Clicking shows the explanations below] 209

210 Who can I recommend? 210

211 Your recommendation **must** be someone with whom you have taken (or are taking) a 211
 212 class. If not, your answer will not be considered for payment. The person you recommend 212
 213 will not be contacted or receive any benefit from your recommendation. 213

214 As you write, you will see up to 7 suggested student names containing the letters you 214
 215 have entered. The more you write, the more accurate the suggestions will be. Please 215
 216 write **without** accents and use the letter 'n' instead of 'ñ'. If the name of the person 216
 217 you're writing doesn't appear, it could be because you made an error while writing the 217
 218 name. 218

219 If the name is correct and still doesn't appear, it could be because the student is not en- 219
 220 rolled this semester or didn't take the SABER 11 test. In that case, you must recommend 220
 221 someone else. 221

222 My earnings for this question? 222

For your recommendation, you could receive earnings of up to 250,000 (two hundred and fifty thousand) PESOS. The earnings are calculated based on your recommendation's score and the percentile of that score compared to other UNAB students, as follows:

- We will multiply your recommendation's score by \$100 (one hundred) pesos if it's between the 1st and 50th percentiles
- We will multiply your recommendation's score by \$500 (five hundred) pesos if it's between the 51st and 65th percentiles
- We will multiply your recommendation's score by \$1000 (one thousand) pesos if it's between the 66th and 80th percentiles
- We will multiply your recommendation's score by \$1500 (one thousand five hundred) pesos if it's between the 81st and 90th percentiles
- We will multiply your recommendation's score by \$2500 (two thousand five hundred) pesos if it's between the 91st and 100th percentiles

This is illustrated in the image below:

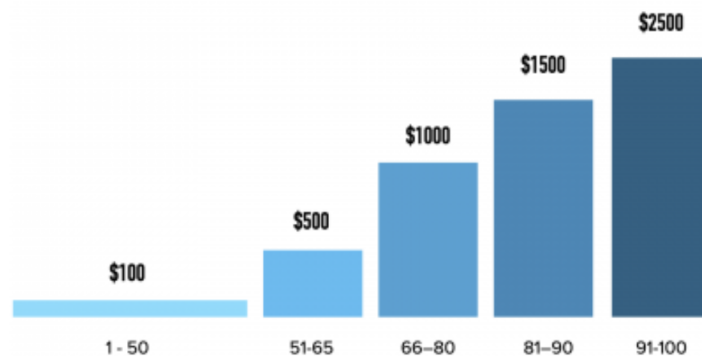


Figure B.1: Earnings for recommendation questions

For example, if your recommendation got 54 points and the score is in the 48th percentile,

238 you could earn $54 \times 100 = 5400$ PESOS. But, if the same score of 54 points were in the 238
239 98th percentile, you could earn $54 \times 2500 = 135,000$ PESOS. 239

240 [Text field with student name suggestions popping up as participant types] 240

241

 241

242 Relationship with your recommendation 242

243 How close is your relationship with your recommendedation: “[Name of the student 243
244 selected from earlier]”? (0 indicates you are barely acquaintances and 10 means you are 244
245 very close) 245

246 [Slider with values from 0 to 10] 246

247

 247

248 Your recommendation’s score 248

249 Compared to university students, in which percentile do you think [Name of the student 249
250 selected from earlier]’s score falls in the [Subject Area] test (1 is the lowest percentile 250
251 and 100 the highest)? 251

252 [Clicking shows the explanations below] 252

253 How is a percentile calculated? 253

254 A percentile is a position measurement. To calculate it, we take the test scores for all 254
255 students currently enrolled in the university and order them from lowest to highest. The 255
256 percentile value you choose refers to the percentage of students whose score is below 256
257 yours. For example, if you choose the 20th percentile, you’re indicating that 20% of 257
258 students have a score lower than yours and the remaining 80% have a score higher than 258
259 yours. 259

260 What can I earn for this question? 260

261 For your answer, you can earn **20,000 (twenty thousand) PESOS**, but only if the 261
262 difference between your response and the correct percentile is less than 7. For example, 262
263 if the percentile where your recommended person's score falls is 33 and you respond with 263
264 38 (or 28), the difference is 5 and the answer is considered correct. But if you respond 264
265 with 41 or more (or 25 or less), for example, the difference would be greater than 7 and 265
266 the answer is incorrect. 266

267 Please move the sphere to indicate which percentile you think your recommended per- 267
268 son's score falls in: 268

269 [Slider with values from 0 to 100] 269

270 _____ 270

271 Demographic Information 271

272 What is the highest level of education achieved by your father? 272

273 [Primary, High School, University, Graduate Studies, Not Applicable] 273

274 What is the highest level of education achieved by your mother? 274

275 [Primary, High School, University, Graduate Studies, Not Applicable] 275

276 Please indicate the socio-economic group to which your family belongs: 276

277 [Group A (Strata 1 or 2), Group B (Strata 3 or 4), Group C (Strata 5 or 6)] 277

278 _____ 278

279	UNAB Students Distribution	279
280	Thinking about UNAB students, in your opinion, what percentage belongs to each socio-	280
281	economic group? The total must sum to 100%:	281
282	[Group A (Strata 1 or 2) percentage input area]	282
283	[Group B (Strata 3 or 4) percentage input area]	283
284	[Group C (Strata 5 or 6) percentage input area]	284
285	[Shows sum of above percentages]	285
286	<hr/>	286
287	End of the Experiment	287
288	Thank you for participating in this study.	288
289	If you are chosen to receive payment for your participation, you will receive a confirma-	289
290	tion to your UNAB email and a link to fill out a form with your information. The process	290
291	of processing payments is done through Nequi and takes approximately 15 business days,	291
292	counted from the day of your participation.	292
293	[Clicking shows the explanations below]	293
294	Who gets paid and how is it decided?	294
295	The computer will randomly select one out of every ten participants in this study to be	295
296	paid for their decisions.	296
297	For selected individuals, the computer will randomly select one area: mathematics,	297
298	reading, or English, and from that area will select one of the belief questions. If the	298
299	answer to that question is correct, the participant will receive 20,000 pesos.	299

300 The computer will randomly select an area (mathematics, critical reading, or English) to 300
301 pay for one of the recommendation questions. The area chosen for the recommendation 301
302 question is independent of the area chosen for the belief question. The computer will 302
303 take one of the two recommendations you have made for the chosen area. Depending on 303
304 your recommendation's score, you could win up to 250,000 pesos. 304

305 Additionally, people selected to receive payment for their participation will have a fixed 305
306 earnings of 70,000 pesos for completing the study. 306

307 _____ 307

308 **Participation** 308

309 In the future, we will conduct studies similar to this one where people can earn money 309
310 for their participation. The participation in these studies is by invitation only. Please 310
311 indicate if you are interested in being invited to other studies similar to this one: 311

312 [Yes, No] 312