

Jeworrek, Sabrina

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Competition Entry and Relative Performance Feedback: The Importance of Information Disaggregated by Gender

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Competition Entry and Relative Performance Feedback: The Importance of Information Disaggregated by Gender

Abstract

By providing different forms of performance feedback before choosing between a piece-rate and a tournament compensation scheme, I test whether the gender tournament gap diminishes in size since individuals' entry decision might be driven by incorrect self-assessments. Only the provision of information on average performance by gender indeed shrinks the gender tournament gap, which is especially due to men with below average ability opting for the piece-rate more often. These results highlight that beliefs on one's own and others' abilities are still biased by gender stereotypes.

JEL Classifications: C91, D03, D04, D82, J16

Keywords: competitiveness, gender gap, information provision, self-confidence, self-assessment, self-selection, experiment

1. Introduction

A well-known fact as regards the labor market is that women, compared to men, are not only less likely to work full-time but that even full-time employed women are also less likely to be found in high-paid occupations or more senior job levels. Even though there is a positive trend in female employment participation, gender imbalances remain (OECD 2012). After focusing on potential discrimination on the part of employers (e.g. Altonji and Blank 1999), especially experimental research turned to investigating also the supply-side of the labor market.

In a large number of laboratory experiments, researchers found that women are significantly less willing than men to opt into a competitive environment even though there is no gender performance gap in a non-competitive setting.¹ Some studies even establish a link between individuals' competitiveness in the lab and their real world decision-making: Students are more likely to choose more prestigious academic tracks such as math and sciences, and Tanzanian entrepreneurs report higher investments, if they decided to compete in the lab (Buser et al. 2014, Berge et al. forthcoming). By conducting a large-scale natural field experiment, Flory et al. (2014) also showed that the applicant pool becomes more male dominated once the compensation regime becomes more reliant on an individual's relative performance.

Since especially well-paid (senior) jobs are often highly competitive, the diverging sorting behavior of men and women contributes to explain the absence of women in high-paid occupations and senior job levels and, hence, the gender differences in labor market outcomes. Even though genetic predispositions and physiological factors might contribute to the differences in competitive inclinations (e.g. Baron-Cohen 2003), nurture seems to matter, too (Gneezy et al. 2009, Booth and Nolan 2012, Andersen et al. 2013). Especially from a policy perspective, this is an important finding since it offers some scope of influence. Hence, affirmative action policies to promote women's participation in competitive settings, such as different forms of gender quotas, have also been tested in the lab. Results show that there is indeed a positive effect of such policies on women's participation rates (Balafoutas and Sutter 2012, Niederle et al. 2013, Brandts et al. 2015, Sutter et al. forthcoming). Affirmative action policies, however, might not be that easy to implement (probably necessity to pass a law and to enforce it afterwards). Additionally, it is questionable whether such policies are the right approach to ensure a gender balance in the labor market since most of the previous studies have also shown that the gender gap is especially driven by men who enter the tournament too often, compared to payoff-maximizing choices (e.g. Niederle and Vesterlund 2007, Vandegrift and

¹ For a recent study, see e.g. Sutter and Glätzle-Rützler (2015). For a review of studies, see Niederle and Vesterlund (2011).

Yavas 2009). To a certain extent, this finding can be explained by men's high level of self-confidence whereas women rather tend to underestimate their own abilities (e.g. Croson and Gneezy 2009). Hence, the availability of information and relative performance feedback might depict a crucial factor in individuals' decision making for or against the tournament.

Whereas Wozniak (2012) finds that even among a highly competitive population of professional tennis players within a market with good information about potential competitors abilities large gender differences persist, Ertac and Szentes (2011), Ewers (2012) and Wozniak et al. (2014a and 2014b) provide experimental evidence that the gender tournament gap becomes significantly smaller or even vanishes. These studies have in common that they provide rather detailed (up to perfect) information about their future competitors' performance before subjects have to decide on their tournament entry — and if you know that you are the best performing individual out of the four competing subjects it is only reasonable that the decision for or against the tournament is not driven by being a man or a woman. If you, however, have to choose which academic track, occupation or job to take, you do never know exactly who your future competitors will be.

Hence, I test the impact of very basic relative performance feedback on the gender tournament gap in a controlled laboratory experiment with 190 subjects conducting a real effort task (FAIR-2) for two rounds. Compared to treatment *Control* in which subjects only receive information on their own absolute performance from round 1 (which is paid based on a piece-rate) before deciding for or against the tournament in round 2, subjects in the treatment *Info* additionally receive information on potential competitors' average performance. By conducting the treatment *InfoGender*, I also investigate the role of specific gender information since previous research suggests that the group composition and the gender of the competitor significantly influences results, possibly due to the stereotypical beliefs about the genders' abilities (Gneezy et al. 2003, Datta Gupta et al. 2013, Niederle et al. 2013). In line with previous findings, men decide roughly twice as often as women in favor of the tournament even though there is no performance difference under the piece-rate compensation scheme. Whereas I do observe exactly the same pattern in the treatments *Control* and *Info*, I find that only information on average performance separated by gender influences individuals' competition choices and decreases the gender tournament gap by about 25%. Especially low performing men opt less often for the tournament so that the overall share of men who opt for the profit-maximizing choice increases by roughly 15 percentage points compared to treatment *Control* — calculated by simulating 1000 tournaments for each individual and comparing the expected payoff from a tournament with the payoff received from the piece-rate compensation. The reason why the

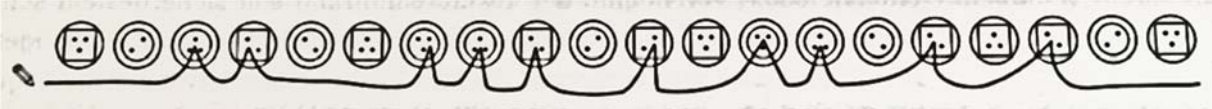
gender tournament gap shrinks by not more than 25% is that women behave somewhat contrary to what is expected: When they are told that their average tends to be slightly above the average score obtained by men, above average performing women rather shy away from the competition instead of embracing it. This behavior raises the question whether the well-intended information might additionally put pressure on women in that they believe they now also have to win the tournament to meet others' expectations.

2. Experimental Design

The experiment was conducted in summer 2015 with a total of 190 students of which 102 were female. A session lasted for roughly 40 minutes with average earnings of 8,83 EUR (with minimum of 5 EUR) and due to the task subjects had to fulfill, it was designed as a paper-pencil experiment. The task was the *Frankfurter Aufmerksamkeits-Inventar 2* (FAIR-2) which is especially used by psychologists to test inter-individual differences in attentional performance and ability to concentrate. Compared to the most commonly used task of adding up five two-digit numbers from the Niederle and Vesterlund (2007) design, this test has the advantage that the corresponding handbook (Moosbrugger and Oehlschläger 1996) provides the performance distribution of almost 3000 individuals across different age cohorts which allows a quite precise evaluation of participants' relative performance and the discrepancy between their self-assessed and true relative performance. More importantly, this data also delivers the average scores of previous test participants which is exactly the information needed for the different treatment conditions.

The test itself consists of two times 320 alternating symbols of which specific symbols have to be ticked, as shown in Figure 1. The processing time for 320 symbols is limited to three minutes so that the total time for one round is six minutes. Participants can do two different mistakes: First, they can miss a symbol which should have been ticked and, second, they can tick a symbol which is not allowed to be ticked. Hence, the achieved score after one whole round is calculated as follows: *Number of processed symbols – (Number of mistakes x 2)*.

Figure 1: FAIR-2



Source: Moosbrugger and Oehlschläger (1996). Only circles with three dots or squares with two dots have to be ticked.

The experiment starts with one round of the FAIR-2 which is paid on a piece rate basis. Afterwards, participants received a questionnaire to assess their own relative performance, also including a query on individual risk attitude. To elicit beliefs on own relative performance as accurate as possible, I employ an incentive structure similar to Gächter and Renner (2010) where earnings decrease rather fast with less accurate beliefs (see Appendix A.1). The elicitation of individual risk attitudes follows Holt and Laury (2002) where one out of the ten lotteries and, hence, choices was *ex-post* randomly determined to be paid (see Appendix A.2). Before the second round of the FAIR-2 started, all participants received the information on their own absolute performance and the corresponding earnings from round one (sole information for participants in treatment Control). Depending on the treatment participants have been allocated randomly into —Control, Info and InfoGender—, they receive additional information on the average performance of previous test participants (received from Moosbrugger and Oehlschlägel 1996). The treatment scripts read as follows:

[All participants]

Out of a maximum score of 640 points, you received x points, resulting in a payment of y Euro.

[Additionally for treatment Info]

To compare: The average score of several hundreds of previous test participants is about 367 points.

[Additionally for treatment InfoGender]

Thereby, womens' average tends to be slightly above the average score obtained by men. However, women and men perform at virtually the same level.

Participants got to know that there would directly be a second round of the test they have done before but that this time they could choose between being paid on a piece rate basis or competing in a winner-takes-all tournament (Niederle and Vesterlund 2007) in which participants have to win against three competitors to receive the fourfold piece rate.² In case of not being the winner, participants did not receive any earnings from this round (for entire script, see Appendix A.3). Following on round two of the FAIR-2, participants received a final

² Competitors are previous tournament attendees and are drawn randomly out of a lottery wheel by the participant itself. A pre-test was conducted to receive competitors for the first session of the main experiment. Average performance of pre-test participants was comparable to the average of the core group.

questionnaire to gather some socio-demographics and a 15 items short assessment of the Big Five personality traits (Lang et al. 2011).

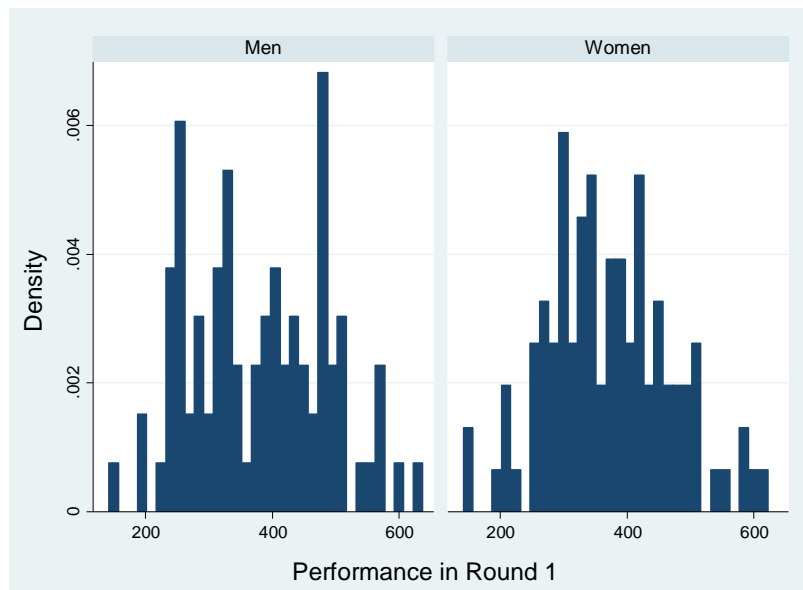
Table 1: Timeline of Events

1	Four minutes preparation time to read the test instructions and to practice with one exemplary row (Moosbrugger and Oehlschlägel 1996), afterwards one round (six minutes) of the FAIR-2 (Frankfurter Aufmerksamkeits-Inventar 2) paid on a piece rate basis
2	Questionnaire on beliefs about own relative performance and risk aversion (both incentivized)
3	Feedback on own absolute performance and treatment variation regarding information on performance of other test participants
4	Choice of compensation scheme: Piece-rate or winner-takes-all tournament (Niederle and Vesterlund 2007), competitors are drawn from previous tournament participants out of a lottery wheel
5	Second round of the FAIR-2
6	Final questionnaire to gather some socio-demographics and personality traits (Big Five)

3. Results

On average, participants attain 375.85 points during round one —which is only slightly higher than the average of 367 received from several hundreds of previous test participants within the 18-25 age group (Moosbrugger and Oehlschlägel 2011). Contrary to these test participants, however, the women in our sample perform with on average 372.72 points slightly worse than men with 379.55 points. Nevertheless, this difference is statistically insignificant with $p=0.755$ (Wilcoxon rank-sum test, two-sided). Figure 2 illustrates the performance distribution for both genders and it becomes obvious that there is a huge variation in individuals' ability —from 142 up to 628 points out of a maximum of 640 point.

Figure 2: Distribution of Performance by Gender



Even though the FAIR-2 has not been used for similar experiments yet, the tournament entry decisions within the control group are almost identical to previous findings (e.g. Balafoutas and Sutter 2012, Niederle and Vesterlund 2007): Men compete almost twice as much as women (44.8% vs. 24.2%) even though there is no significant gender gap with regard to risk aversion and overconfidence³. This is partly in contrast to the existing research (e.g. Kamas and Preston 2012, Niederle and Vesterlund 2007), the literature, however, also indicates that the assessment of own ability is dependent on the task participants have to perform and that women are especially less confident in ‘male oriented’ mathematical tasks (Dreber et al. 2014).

By simulating 1000 tournaments for each individual (randomly drawing three competitors each out of all participants who have chosen to compete) and comparing the expected payoff from a tournament with the payoff received from the piece-rate compensation, I find that —without any intervention in the control group— 84.9% of women opt for the payoff maximizing compensation scheme whereas this is the case for only 62.1% of male participants. Women obviously know quite well whether they should choose the tournament or not, as already suggested by Müller and Schwieren (2012).

³ An individual is declared to be overconfident if the self-declared percentile rank deviates more than one decile from the true percentile rank. This is the case for 45.5% of men and 43.1% of women. There is also no statistically significant difference between the two genders if self-confidence is measured as the total deviation between the self-declared and the true percentile rank.

Figure 3: Percentage of Not Payoff Maximizing Choices

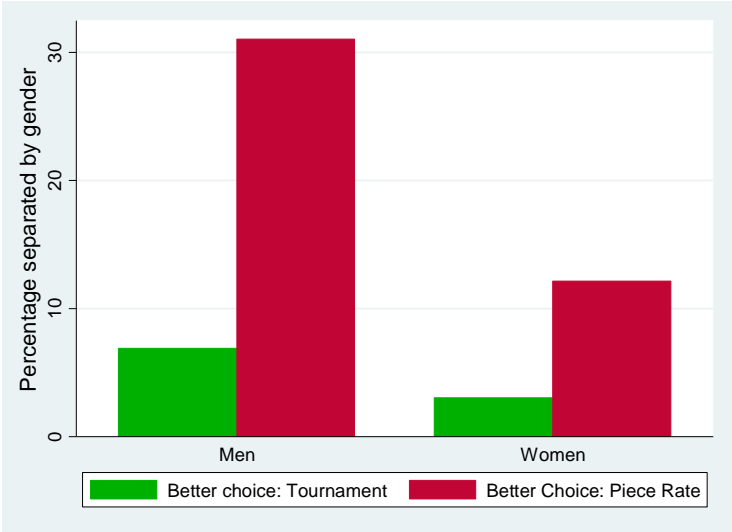
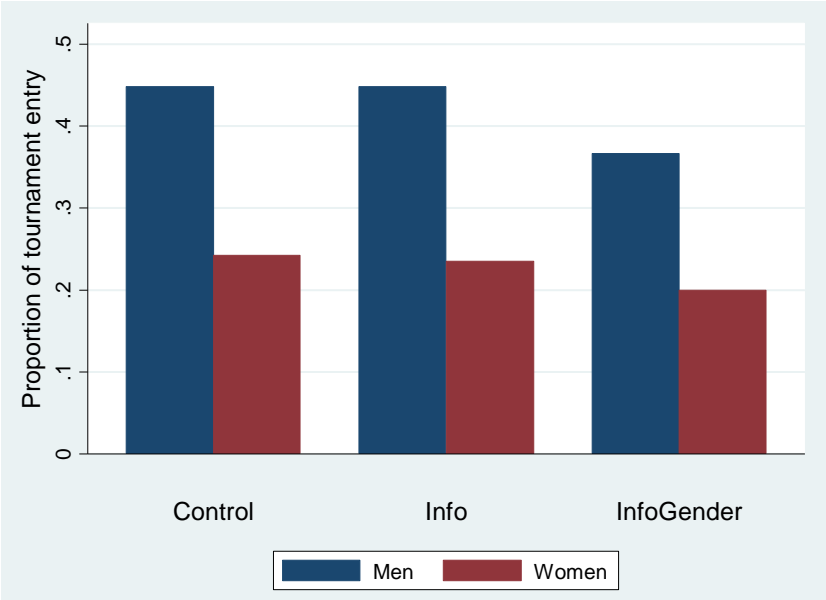


Figure 3 illustrates the percentage of men and women who should have chosen the opposite compensation scheme to maximize their expected payoff. The figure highlights that the gender tournament gap is driven by men who indeed compete too much (e.g. Niederle and Vesterlund 2007) whereas there are only very few women who should additionally opt for the tournament. By providing information on other test participants’ average performance, the tournament gap should especially decrease due to better informed men choosing the piece rate compensation to increase their payoff. Figure 4 displays the percentages of tournament entries by treatment.

Figure 4: Tournament Entry by Treatment



Independent of the treatment, we still observe a large gender tournament gap. Compared to the control treatment, providing basic information about other test participants’ average performance does not seem to exert any influence on participants’ compensation decisions. In

treatment InfoGender, both genders compete less often but men seem to reduce their tournament entry more substantially than women, resulting in a slightly smaller gender tournament gap which can be confirmed by regression analysis displayed in Table 2. Whereas women are roughly 28 percentage points less likely to enter the tournament in the treatments Control and Info, this number decreases to less than 21 percentage points in treatment InfoGender.

Table 1: Determinants of Tournament Entry

	Control	Info	InfoGender
<i>Female</i>	-0.286*** (0.096)	-0.272*** (0.088)	-0.206* (0.108)
Percentile rank	0.011*** (0.002)	0.014*** (0.003)	0.007*** (0.002)
Overconfidence	0.349*** (0.124)	0.663*** (0.214)	0.205 (0.154)
Risk aversion	-0.024 (0.020)	-0.088** (0.034)	-0.041 (0.031)
Neuroticism	-0.021 (0.043)	-0.010 (0.036)	0.044 (0.036)
Extraversion	0.034 (0.058)	0.017 (0.042)	0.021 (0.039)
Openness	-0.080* (0.047)	0.032 (0.041)	-0.018 (0.031)
Conscientiousness	0.001 (0.040)	0.026 (0.048)	0.031 (0.058)
Agreeableness	0.019 (0.050)	-0.061 (0.053)	0.116*** (0.041)
Impulsive	0.046** (0.020)	0.005 (0.023)	0.044* (0.024)
Similar test	-0.316*** (0.121)	-0.111 (0.125)	0.089 (0.149)
Pseudo R ²	0.391	0.348	0.227
Prob > χ^2	0.000	0.067	0.056
<i>N</i>	62	63	65

Notes: The dependent variable is a dummy for tournament entry. The table displays average partial effects obtained from Probit specifications (robust standard errors in parentheses).

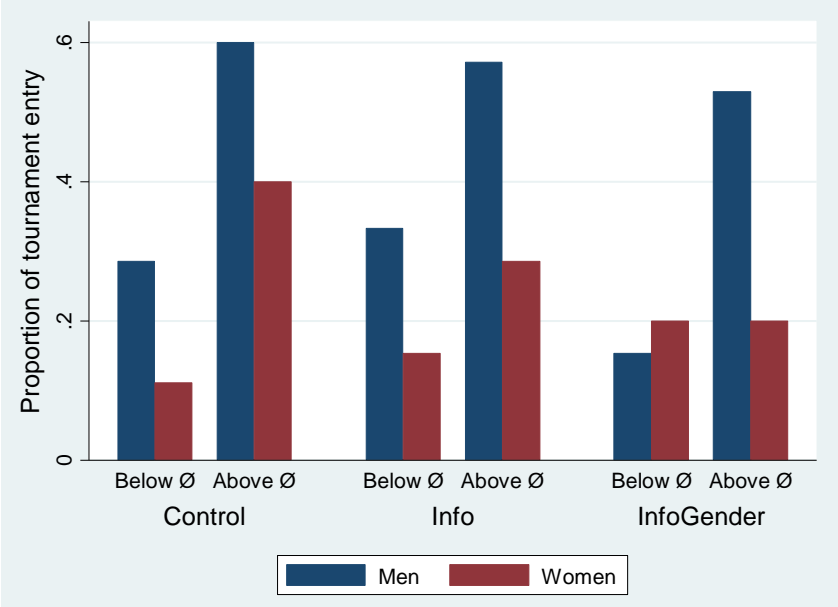
Significance levels are denoted as follows: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Besides being female, only individual ability (percentile rank) is another determinant of tournament entry which is statistically significant across all three treatment groups. To the contrary, an overconfident individual is much more likely to choose the tournament compensation scheme in the treatments Control and Info, the estimated average partial effect for overconfident individuals becomes obviously smaller and insignificant in treatment InfoGender. Due to the provided information, participants seem to make more reasonable decisions within this treatment group but impulsive individuals are still more likely to opt for the tournament. The Big Five do only slightly increase the power of the model and the attitude towards risk shows the right sign but is statistically significant only within the treatment Info. Experiences with the FAIR-2 or a similar test affect individual behavior only in treatment Control in which participants do not have any information about other participants' performance —presumably

because people who know the test already might also have a sense for other participants' performance which is no benefit anymore within the information treatments.

To investigate the decrease of the gender tournament gap a little further, I differentiate the sample into below and above average performance individuals, as shown in Figure 4.

Figure 4: Individual Ability and Tournament Entry



As hypothesized earlier on, especially (bad performing) male participants should be affected by the provided information since it might increase the likelihood to decide in favor of the profit maximizing (piece rate) compensation scheme. In line with the findings from above, this is only true for the treatment group InfoGender. For below average performing individuals, the gender tournament gap completely disappears—in fact, women decide more often than men in favor of the tournament compensation scheme for the first time—and even for above average performing men the tournament entry rate is slightly smaller. Even though it is depending on the task at hand, these result support previous findings that women are stereotypically expected to perform worse than men (Günther et al. 2010, Shurchkov 2012) so that only the information that women perform at least as good as men gets the latter ones to make more reasonable decisions.

Figure 4, however, also suggests that the gender gap for above performing individuals becomes, if anything, larger—which can also be confirmed by regression results presented in Table 2— since well performing female participants opt less often for the tournament. Instead of becoming more confident due to the technically good news of women performing at least equally well as men, women do not seem to perceive this information as good as it was intended to be. As a result, the treatment was not efficient in terms of increasing the overall ratio of payoff maximizing choices: Whereas men benefit from the information provision, women's initially high rate of payoff maximizing decisions shrinks as far as it compensates the previous benefits entirely, as summarized in Table 3.

Table 2: Treatment Effects by High and Low Performers

	Control	Info	InfoGender
<i>Female</i>	-0.257* (0.135)	-0.248* (0.133)	-0.020 (0.144)
<i>Female X above average</i>	-0.061 (0.175)	-0.034 (0.171)	-0.346** (0.164)
Pseudo R ²	0.393	0.348	0.270
Prob > χ^2	0.001	0.066	0.066
<i>N</i>	62	63	65

Notes: The dependent variable is a dummy for tournament entry. The table displays average partial effects obtained from Probit specifications (robust standard errors in parentheses). Control variables are the same as in Table 3. Significance levels are denoted as follows: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 3: Percentage of Appropriate Compensation Scheme Choice

	All	Men	Women	Difference
Control	0.742	0.621	0.848	**
Info	0.762	0.655	0.853	**
InfoGender	0.738	0.767	0.714	

4. Conclusion

[To be written]

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Appendix

A.1 Own Relative Performance Assessment (following Gächter and Renner 2010)

Please try to assess how many other participants have correctly ticked more symbols than yourself. We reward the correctness of your self-assessment: If your guess is correct (+/- 2), you receive 5€. If your guess is outside this interval, you receive 4€ divided by the difference (minus 2) between the true value of your performance rank and your guess.

Please judge now:

How many of 100 participants have correctly ticked more symbols than yourself?

_____ participants

A.2 Measurement of Risk Aversion (Holt and Laury 2002)

Now you have to choose ten times between Option A and Option B. By throwing a ten-sided die for the first time, you will randomly identify the choice (1-10) which is going to set your payments. A second die roll determines your concrete payout (either 2€ or 1.60€ if you have chosen Option A and 3.85€ or 0.10€ if you have chosen Option B).

	Option A	Option B	Your Choice (A or B)
1	2 € if you roll 1 1.60 € if you roll 2-10	3.85 € if you roll 1 0.10 € if you roll 2-10	
2	2 € if you roll 1-2 1.60 € if you roll 3-10	3.85 € if you roll 1-2 0.10 € if you roll 3-10	
3	2 € if you roll 1-3 1.60 € if you roll 4-10	3.85 € if you roll 1-3 0.10 € if you roll 4-10	
4	2 € if you roll 1-4 1.60 € if you roll 5-10	3.85 € if you roll 1-4 0.10 € if you roll 5-10	
5	2 € if you roll 1-5 1.60 € if you roll 6-10	3.85 € if you roll 1-5 0.10 € if you roll 6-10	
6	2 € if you roll 1-6 1.60 € if you roll 7-10	3.85 € if you roll 1-6 0.10 € if you roll 7-10	
7	2 € if you roll 1-7 1.60 € if you roll 8-10	3.85 € if you roll 1-7 0.10 € if you roll 8-10	
8	2 € if you roll 1-8 1.60 € if you roll 9-10	3.85 € if you roll 1-8 0.10 € if you roll 9-10	
9	2 € if you roll 1-9 1.60 € if you roll 10	3.85 € if you roll 1-9 0.10 € if you roll 10	
10	2 € if you roll 1-10	3.85 € if you roll 1-10	

A.3 Piece Rate vs. Tournament: Explanatory Script

[To be translated]