**APPENDIX**

## Appendix A

## Model of the market game when workers' ranks are determined randomly

- There are four sets of workers $W_1 = \{w_1, \dots, w_5\}$, $W_2 = \{w_6, \dots, w_9\}$, $W_3 = \{w_{10}, \dots, w_{13}\}$ and $W_4 = \{w_{14}, \dots, w_{16}\}$. Let $W = W_1 \cup W_2 \cup W_3 \cup W_4$.
- There are three sets of firms $F_1 = \{f_1, \dots, f_5\}$, $F_2 = \{f_6, \dots, f_9\}$, and $F_3 = \{f_{10}, \dots, f_{13}\}$. Let $F = F_1 \cup F_2 \cup F_3$.
- Strategies of firms consist of sending or not sending an offer in the first stage. Let $S^f$ be firm's strategy. Therefore, for all $f \in F, S^f \in \{0,1\}$.
- Strategies of workers consist of determining the firms from which they would accept an offer in the first stage. Therefore, for all $w \in W, S^w \in \{0,1\}^{|F|}$.[1] We abuse notation and denote by $S^w(f)$ the value of the item with the index of $f$ in $S^w$. That is, if $S^w(f) = 1$ , the strategy $S^w$ states that an offer from $f$ would be accepted.
- The cardinal utilities derived by workers and firms when matched are given in tables 1 and 2.

Firms and workers simultaneously choose their strategies. The outcome of the game is produced from the following process:

1. Step 0: Let $W^0 = W$ and $F^0 = F$. Nature draws, from the uniform distribution, a permutation of the workers in $W$ to their indices.
2. Step 1: If $S^{f_1} = 0$, proceed to the next step. If $S^{f_1} = 1$, firm $f_1$ makes an offer to a uniformly random drawn worker $w \in W$. If $S^w(f_1) = 1$, worker $w$ and firm $f_1$ are matched in the first stage, $W^1 = W^0 \backslash \{w\}$ and $F^1 = F^0 \backslash \{f_1\}$. Otherwise, firm $f_1$ makes an offer to a uniformly random drawn worker $w' \in W \backslash \{w\}$. If $S^{w'}(f_1) = 1$, worker $w'$ and firm $f_1$ are matched in the first stage, $W^1 = W^0 \backslash \{w'\}$ and $F^1 = F^0 \backslash \{f_1\}$. Proceed this way until either some worker accepts the offer from $f_1$ and both are therefore matched and leave the market, in which case the values of $W^1$ and $F^1$ are updated accordingly, or until all workers reject the offer from $f_1$, in which case $f_1$ is left unmatched in the first stage, $F^1 = F^0$ and $W^1 = W^0$.
3. Step k ≤ 13 : If $S^{f_k} = 0$, proceed to the next step. If $S^{f_k} = 1$, firm $f_k$ makes an offer to a uniformly random-drawn worker $w \in W^{k-1}$. If $S^w(f_k) = 1$, worker $w$ and firm $f_k$ are matched in the first stage, $W^k = W^{k-1} \backslash \{w\}$ and $F^k = F^{k-1} \backslash \{f_k\}$. Otherwise, firm $f_k$ makes an offer to a uniformly random drawn worker $w' \in W^{k-1} \backslash \{w\}$. If $S^{w'}(f_k) = 1$, worker $w'$ and firm $f_k$ are matched in the first stage, $W^k = W^{k-1} \backslash \{w'\}$ and

[1] For simplicity, we consider the natural ordering of firms denoted by their indices, so that, for example, $S^w = (1,1,0,0, \dots ,0)$ represents the strategy of accepting offers only from firms $f_1$ and $f_2$.

$F^k = F^{k-1} \setminus \{f_k\}$. Proceed this way until either some worker accepts the offer from $f_k$ and both are therefore matched and leave the market, in which case the values of $W^k$ and $F^k$ are updated accordingly, or until all workers reject the offer from $f_k$, in which case $f_k$ is left unmatched in the first stage, $F^k = F^{k-1}$ and $W^k = W^k$.

4. Step 14: Workers in $W^{13}$ and firms in $F^{13}$ are matched assortatively.

Note that the process above describes the algorithm of finding the allocation, while the actions of the firms and the workers are taken simultaneously and cannot be conditioned at Step k.

The solution concept we use is that of the Bayesian Nash Equilibrium, where all workers and firms share the correct belief that the permutation of workers to their indices is drawn uniformly random. We focus on pure-strategy equilibria.

**Theorem 1.** *In every pure-strategy Bayesian Nash Equilibrium:*
*For every* $f \in F_1$, $S^f$ *=0, for every* $f' \in F_2$, $S^{f'}$*=1, for every* $f'' \in F_3$, $S^{f''} \in \{0,1\}$.
*For every* $w \in W$ *and* $f \in F_1$, $S^w(f) \in \{0,1\}$; *for all* $f' \in F_2$; $S^w(f') = 1$; *for all* $f'' \in F_3$; $S^w(f'') = 0$.

Before turning to the computations, let us explain how the proof proceeds. We first show that firms $f_1$, $f_2$ and $f_3$ which will be matched to the three most productive workers in the second stage, will not make offers at stage one in any equilibrium. This, in turn, results in a higher expected payoff of workers in the second period such that workers never accept offers from firms $F_3 = \{f_{10}, \dots, f_{13}\}$ in the first stage. Thus, firms in $F_3$ are indifferent between making offers or not in the first stage. This in turn makes the offers of firms $F_2 = \{f_6, \dots, f_9\}$ more attractive relative to the expected payoff in the second stage, and their offers are accepted. Although there are multiple equilibrium strategy profiles, they are all outcome-equivalent and differ only with respect to offers by firms which are not accepted and with respect to workers accepting or rejecting firms which do not make offers in equilibrium.

First, consider firm $f_1$. The expected utility from making an early offer is 27.5 (as workers always accept offers from $f_1$). The strategy profile that would lead to the lowest expected utility for firm $f_1$ under $S^{f_1}$ =0 results when all other firms make offers which are accepted, that is, for all $f \in F \setminus \{f_1\}$, $S^f$ =1 and for all $w \in W$, $S^w(f) = 1$. This yields an expected utility of 45.27.[2] Thus, the expected utility from making an early offer is lower than the expected utility of not making an early offer under the worst possible scenario, thus $S^{f_1}$ =0.

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[2] Firm $f_1$ can get three possible payoffs when not making an early offer. First, it receives a payoff of 50 if at least one of the five best workers did not receive an early offer. This happens with probability 1-(C(5,5)*C(11,7))/C(16,12)=1490/1820.

Consider now firms $f_2$ and $f_3$. The expected utility from making an early offer is 27.5. Since in every equilibrium firm $f_1$ does not make an early offer, the strategy profile that would lead to the lowest expected utility of $f_2$ when $S^{f_2}$ =0 results when all other firms (except for $f_1$) make offers which are accepted, that is, for all $f \in F\backslash\{f_1, f_2\}$, $S^f$ =1 and for all $w \in W, S^w(f) = 1$. This yields an expected utility of 37.14.[3] Thus, the expected utility from making an early offer is lower than the expected utility of not making an early offer under the worst possible scenario, and therefore $S^{f_2}$ =0. As for firm $f_3$, given that firms $f_1$ and $f_2$ do not make early offers, the strategy profile that would lead to the lowest expected utility given $S^{f_3}$ =0 results when all other firms (except for $f_1$ and $f_2$ ) make offers which are accepted, that is, for all $f \in F\backslash\{f_1, f_2, f_3\}$, $S^f$ =1 and for all $w \in W, S^w(f) = 1$. This yields an expected utility of 29.23.[4] Thus, the expected utility from making an early offer is lower than the expected utility of not making an early offer under the worst possible scenario, thus $S^{f_3}$ =0.

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Second, it can get a payoff of 25 if all the five best workers $W_1 = \{w_1, \dots, w_5\}$ received an early offer and at least one of the four workers in $W_2 = \{w_6, \dots, w_9\}$ did not. This happens with probability [C(5,5)*C(4,3)*C(7,4)+C(5,5)*C(4,2)*C(7,5)+C(5,5)*C(4,1)*C(7,6)+C(5,5)*C(7,7)]/C(16,12)=295/1820. Finally, it can get a payoff of 15 if all workers in $W_1 = \{w_1, \dots, w_5\}$ and $W_2 = \{w_6, \dots, w_9\}$ received an early offer. This happens with probability C(9,9)*C(7,3)/C(16,12)=35/1820. Overall, this yields an expected payoff from not making an early offer of 45.27.

[3] Firm $f_2$ can get three possible payoffs. It will get a payoff of 15 if at least eight of the workers in $W_1 = \{w_1, \dots, w_5\}$ and $W_2 = \{w_6, \dots, w_9\}$ receive and accept an early offer. This happens with probability [(C(9,8)*C(7,3))+(C(9,9*C(7,2))]/C(16,11)=336/4368. Then, if at least four of the workers $W_1 = \{w_1, \dots, w_5\}$, but a maximum of seven of the workers $W_1 = \{w_1, \dots, w_5\}$ and $W_2 = \{w_6, \dots, w_9\}$ receive and accept an early offer (with a probability of [C(5,4)*(C(4,0)*C(7,7)+C(4,1)*C(7,6)+C(4,2)*C(7,5)+C(4,3)*C(7,4))+C(5,5) *(C(4,0)*C(7,6)+C(4,1)*C(7,5)+C(4,2)*C(7,4))]/C(16,11)=1776/4368), firm $f_2$ will get a payoff of 25. Firm $f_2$will finally get a payoff of 50 if a maximum of three workers $W_1 = \{w_1, \dots, w_5\}$ receive and accept an early offer (probability=[C(5,0)*C(11,11)+C(5,1)*C(11,10)+C(5,2)*C(11,9)+C(5,3)*C(11,8)]/C(16,11)==2256/4368). The expected payoff of waiting for stage 2 is therefore at least equal to 37.14.

[4] Similarly, firm $f_3$ can get payoffs of 15 (case a), 25 (case b) and 50 (case c) which are computed with the help of the following probabilities: P(a)=[(C(9,7)*C(7,3)+C(9,8)*C(7,2)+C(9,9)*C(7,1)]/C(16,10), P(b)=[C(5,3)*(C(4,0)*C(7,7)+C(4,1)*C(7,6)+((4,2)*C(7,5)+C(4,3)*C(7,4))+C(5,4)*(C(4,0)*C(7,6)+C(4,1)*C(7,5)+C(4,2)*C(7,4))+C(5,5)*(C(4,0)*C(7,5)+C(4,1)*C(7,4))]/C(16,10) and P(c)=[C(5,0)*C(11,10)+C(5,1)*C(11,9)+C(5,2)*C(11,8)]/C(16,10).

The fact that in equilibrium the three best firms $f_1, f_2, f_3$ do not make early offers, ensures that the expected payoff under the worst possible scenario of the second round for workers is higher than being matched to any of the three bad firms, i.e., firms from $F_3$. As a result, any offers from firms in $F_3$ will not be accepted in equilibrium: for all $w \in W$and for all $f \in F_3$, $S^w(f) = 0$.

We can now turn to firms $f_4$ and$f_5$. Given that firms $f_1, f_2, f_3$ and firms $F_3 = \{f_{10}, \ldots, f_{13}\}$ will hire workers at the second stage, the worst-case scenario for firm $f_4$ is when firms $f_5, f_6, f_7$, $f_8$ and $f_9$ make early offers which are accepted. In this case, firm $f_4$'s expected utility of matching in the second stage is 37.09.[5] Firm $f_4$ will therefore choose not to make an early offer: $S^{f_4}$ =0. Likewise, given that firms $f_1, f_2, f_3, f_4$ do not make early offers in equilibrium and offers from firms $F_3 = \{f_{10}, \ldots, f_{13}\}$ are rejected in equilibrium, firm $f_5$ will get a higher expected utility by not making an early offer in the worst case scenario where firms $F_2 = \{f_6, \ldots, f_9\}$ have left the market. Indeed, its expected utility from not making an early offer in this situation is 29.53.[6] Thus, $S^{f_5}$ =0.

The uncertainty that workers have over their own type allows us to narrow down the possible equilibrium strategies further. Consider a worker who receives an offer from firm $f_9$. The utility of accepting the offer is 29 which is better than the expected utility of rejecting the offer, which is 27.125 in the best possible scenario where firms $f_6, f_7$, and $f_8$ are still in the market in the second stage. The same holds for the offers of $f_6, f_7$, and $f_8$. As a result, for every worker w, it holds that $S^w(f) = 1$ for $F_2 = \{f_6, \ldots, f_9\}$. For firms $F_2 = \{f_6, \ldots, f_9\}$, given that firms $F_1 = \{f_1, \ldots, f_5\}$ do not make early offers in equilibrium, the maximum utility in the second stage is 25, while the expected utility of making an early offer is 27.5. Thus, firms $F_2 = \{f_6, \ldots, f_9\}$ make early offers in equilibrium, and these offers are accepted by the workers.

To conclude, in each equilibrium we have that

- Firms in $F_1$ do not make an offer in the first stage, i.e., $S^f$ *=0,* for all $f \in F_1$.
- Firms in $F_2$ make offers in the first stage, i.e., $S^f$ *=1,* for all $f \in F_2$.
- Firms in $F_3$ are indifferent between making and not making an offer in the first stage, i.e., $S^f \in \{0,1\}$*1,* for all $f \in F_3$.
- Workers' strategies are such that any $S^w(f) \in \{0,1\}$ is an equilibrium for any $w \in W$ and $f \in F_1$ (since these offers will not be made), $S^w(f) = 1$ for every $f' \in F_2$ and for every $f'' \in F_3$ , $S^w(f'') = 0$.
- The outcome is unique: Firms in $F_1$ do not make early offers, firms in $F_2$ make early offers which are accepted and firms in $F_3$ only make offers which are not accepted. As a result, the workers who are not

[5] The payoff of firm $f_4$ is 50 if at most one of the five best workers received an early offer (probability=[C(5,0)*C(11,5)+C(5,1)*C(11,4)]/C(16,5)=2112/4368) and 25 otherwise.

[6] This is due to the fact that it will get a payoff of 50 with probability [C(5,0)*C(11,4)/C(16,4)] and a payoff of 25 otherwise.

matched with the firms in $F_2$ in the first stage are matched to some firm in $F_1 \cup F_3$ in the second stage, or remain unmatched.

## Appendix B

## Additional results

### B. 1 Second-order beliefs of firms

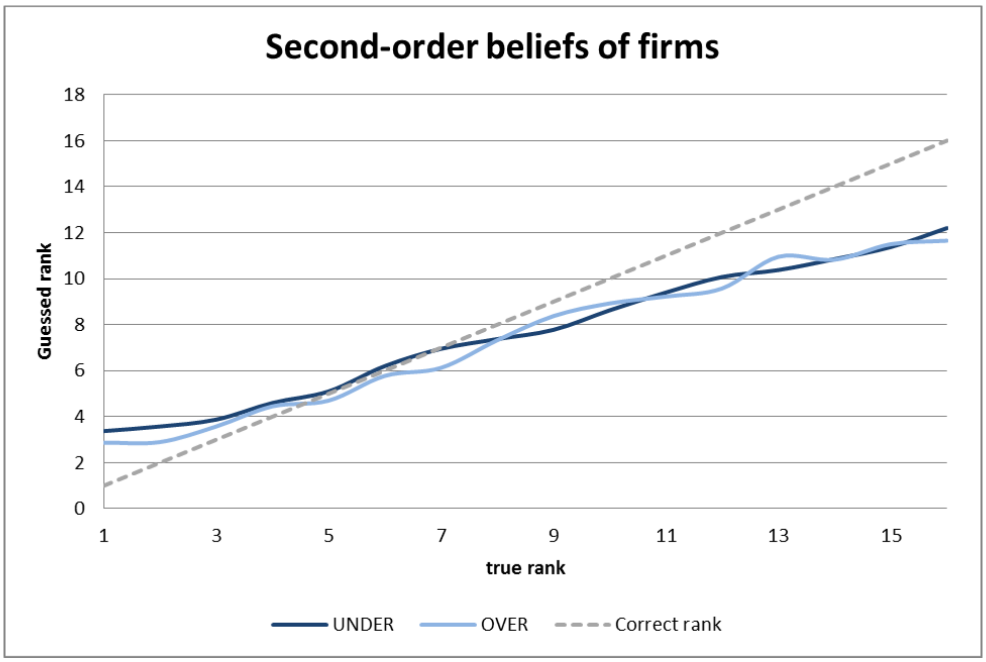


Figure B1: Second-order beliefs of firms regarding the workers' guessed ranks.

Notes: The horizontal axis shows the productivity of the workers for whom the firms state their second-order beliefs. The vertical axis shows the average guessed first-order beliefs of the respective workers of ranks 1 to 16. The 45-degree line corresponds to calibrated beliefs.

### B. 2 Payoffs of workers

Model (1) of Table 5 presents the results of regressing the payoffs of the workers in the simulated allocations on the treatment dummy OVER and on the rank of the workers. Note that due to the non-linearity of the payoffs of the workers, we control for the workers' productivity with the help of dummy variables for each group of workers, namely workers of ranks 1 to 5, workers of ranks 6 to 9, and workers of ranks 10 to 13. Thus, the effects of the dummies are relative to the payoffs of workers of ranks 14 to 16. Workers, on average, earn higher payoffs in OVER compared to UNDER, documented by the significance of the treatment dummy. Note that the only situations where the sum of the workers' payoffs are lower than in the case of the assortative matching are those where some of the five best workers are not hired by one of the five best firms. Thus, the payoff difference between the treatments is due to the five best workers making it to stage two more often in OVER than in UNDER, and thereby realizing the high payoff of 50. This is evident from Model (2) of Table 5: the five most productive workers significantly benefit from OVER relative to UNDER in contrast to all other workers.

| Dep var : Payoff | Model (1) | Model (2) |
|---|---|---|
| OVER | 0.46***<br>(0.11) | 0.06<br>(0.56) |
| Workers 1–5 | 44.98***<br>(0.48) | 44.14***<br>(0.40) |
| Workers 6–9 | 25.36***<br>(0.35) | 25.39***<br>(0.58) |
| Workers 10–13 | 11.86***<br>(0.60) | 12.09***<br>(0.43) |
| Workers 1–5 * OVER | | 1.67*<br>(0.77) |
| Workers 6–9 * OVER | | -0.05<br>(0.69) |
| Workers 10–13 * OVER | | -0.47<br>(1.19) |
| Constant | 2.89***<br>(0.29) | 3.09***<br>(0.16) |
| N | 160,000 | 160,000 |
| R-squared | 0.86 | 0.86 |

Table B1: Workers' payoffs from simulated data

Notes: OLS regression with errors clustered at the session level. The dummy variable OVER is 1 for treatment OVER. The variable Workers 1–5 is a dummy for the workers of rank 1 to 5. The variable Workers 6–9 is a dummy for the workers of rank 6 to 9. The variable Workers 10–13 is a dummy for the workers of rank 10 to 13. The baseline category is Workers 14–16. The variable Workers 1–5 * OVER is an interaction of the dummy for the top five most productive workers and the dummy for treatment OVER. Values in parentheses represent standard errors. *p<0.1,**p<0.05,***p<0.01.

## B. 3 Payoffs of firms

Figure B2 shows that the profits of firms 6 to 13 are (almost) always higher in UNDER than in OVER.

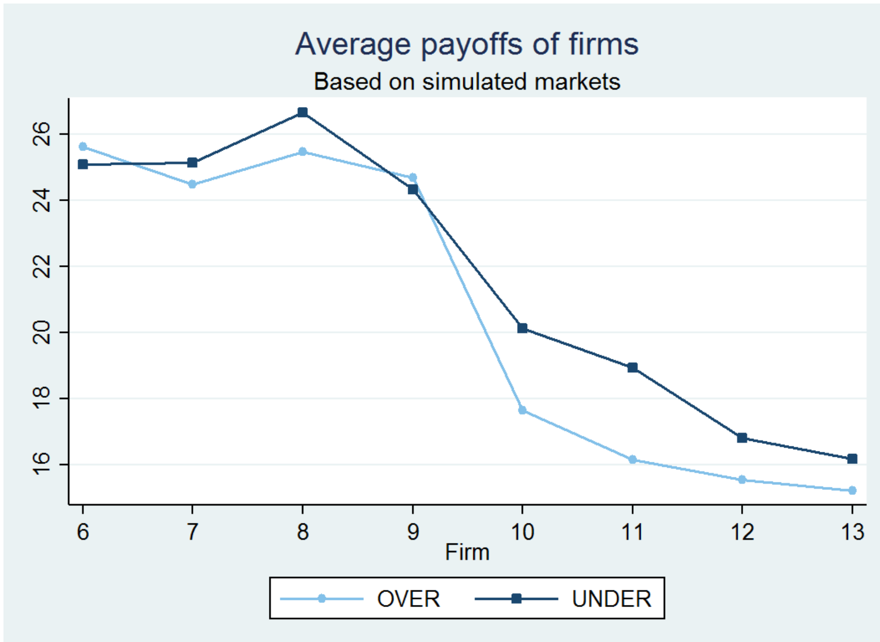


Figure B2: Payoffs of firms depending on the firms' ranks in treatments OVER and UNDER.

Notes: The graph plots the average payoffs of the middle and low-quality firms. The horizontal axis displays the ranks of the firms.

Table 7 displays the regression results for payoffs of the middle and low-quality firms only. To account for the non-linearity of the payoffs, we control for the quality of the firms by introducing a dummy variable for low-quality firms of ranks 10 to 13, taking firms 6 to 9 as the base category. Model (1) shows that all middle- and low-quality firms (6 to 13) earn lower profits in OVER than in UNDER. Model (2) demonstrates that the treatment effect is mainly driven by the worst firms. Making an early offer is, on average, beneficial for the firms as shown by Model (3). Model (4) demonstrates that making an early offer in UNDER leads to higher payoffs than in OVER. The treatment dummy is no longer significant, indicating that the treatment effect on payoffs is mainly driven by those firms that make early offers. In particular, the firms that make early offers in UNDER earn higher payoffs than the firms making early offers in OVER or firms not making early offers.[7]

[7] Inserting a dummy for the interaction of Rank of firm and Early offer in Model (4) yields a coefficient that is not significantly different from zero without changing the significance of the other variables.

| Dep var : Payoff | Model (1) | Model (2) | Model (3) | Model (4) |
|---|---|---|---|---|
| OVER | -1.05***<br>(0.19) | -0.23<br>(0.51) | -1.05***<br>(0.18) | 0.57<br>(0.35) |
| Firms 10–13 | -8.10***<br>(0.50) | -7.28***<br>(0.53) | -8.91***<br>(0.09) | -9.92***<br>(0.61) |
| Firms 10–13*OVER | | -1.64*<br>(0.84) | | |
| Early offer | | | 1.80**<br>(0.71) | 3.16***<br>(0.70) |
| Early offer*OVER | | | | -2.69***<br>(0.80) |
| Constant | 25.71***<br>(0.26) | 25.30***<br>(0.26) | 25.03***<br>(0.33) | 24.22***<br>(0.27) |
| N | 80,000 | 80,000 | 80,000 | 80,000 |
| R-squared | 0.23 | 0.23 | 0.24 | 0.24 |

Table B2: Payoffs of the firms of ranks 6 to 13

Notes: The table shows the marginal effects of the probit regression of early offers. The regressions are based on the simulated data with errors clustered at the session level. The dummy variable OVER takes the value of 1 for treatment OVER and the dummy variable Early offer is 1 if the firm makes an early offer. The variable Firms 10–13 is a dummy variable for firms of ranks 10 to 13. The variable Firms 10–13* OVER is the interaction of the dummy for firms of ranks 10 to 13 and OVER. Values in parentheses represent standard errors. *p<0.1,**p<0.05,***p<0.01.

## Appendix C

## Measuring risk aversion: Detailed procedures and results

After all decisions were made but before receiving feedback, all subjects answered several risk-elicitation questions. First, they worked on three incentivized multiple prices lists. The first one replicates Holt and Laury's (2002) list. We implemented a procedure that imposes consistent decisions. The subjects' only decision is to determine the row along which to switch from a safer (small variance in the outcomes of the lottery) to a riskier option (larger variance in the outcomes of the lottery). In this list, a risk-neutral subject should switch at row five out of 10. Switching earlier means that the subject is risk-seeking, while switching later means that the subject is risk averse. Based on this task, we cannot reject risk-neutrality for 13.3% of subjects (they switched exactly at row five), 18.3% of subjects are risk-seeking, while 68.3% of subjects are risk averse.

Given the evidence of Vieider (forthcoming), in order to provide a less noisy measure of risk aversion we use two additional multiple price lists. Thus, each subject took three incentivized decisions. The maximum and minimum values of the lotteries are similar to the classic Holt and Laury list, but we vary the row of the optimal switch for a risk-neutral player (the exact lists are provided in Appendix D.3). In the second list, the risk-neutral player should switch to the riskier option only at the eighth row out of 10. Thus, if a subject tends to switch in the middle of the list, it should lead to more risk-seeking subjects than in the Holt and Laury list. We cannot reject risk-neutrality for 18.3% of the subjects (who switch at row eight), while 47.9% of the subjects are risk-seeking, and 33.7% of the subjects are risk averse. In the third list, we move the row at which risk-neutral subjects should switch to the beginning of the list (row 3). We cannot reject risk-neutrality for 10% of the subjects, 5.42% of the subjects are risk-seeking, and 84.5% of the subjects are risk averse. Despite the differences, the three measures are correlated. The Spearman correlations are 0.40, 0.52, and 0.38, respectively, between the switching points in the first and the second, the first and the third, and the second and third list. For the goal of controlling for the risk in the regression analysis, we construct the variable Risk aversion:

Risk aversion=Average switching point of the three MPLs

Thus, the higher the value of the variable Risk aversion, the less risk-taking the subject is.

Additionally, we run a non-incentivized risk questionnaire (Dohmen et al. 2011). According to Dohmen et al. (2011), the non-incentivized measures correlate with the incentivized risk task. For the general risk question (with answers between 0 and 10, with higher numbers implying more risk tolerance), the average self-assessment was 4.9 with a standard deviation of 2.3. The Spearman correlation with the Risk aversion measure from the multiple price lists is -0.36, and is significant with $p<0.01$. The Spearman correlation of the domain-specific risk measures with the variable Risk aversion from the multiple price lists is significant for risk-taking in financial matters, -0.24 ($p<0.01$), for leisure and sports, -0.17 ($p<0.01$), and for faith in other people, -0.11 ($p=0.08$). Regarding the non-incentivized investment choice question, the average amount invested is 30.3, with a standard deviation of 27. The Spearman correlation of the amount invested and the Risk aversion measure from the multiple price lists is -0.25, and significant with $p<0.01$.

We use these different risk measures to control for risk aversion in the main regression concerning the propensity of workers to accept early offers. In the paper, we use the risk-aversion measure based on the multiple price lists, but the results (significance of the coefficient and the direction of the effect) are the same for each lottery list separately, for the general risk question, and for the question regarding the risky investment. Regarding the domain-specific measures, the coefficients are not significant.

Finally, the measure of risk aversion is not significantly different between treatments. It is 6.44 in UNDER and 6.58 in OVER (Wilcoxon rank-sum $p=0.28$). Each multiple price list separately and the non-incentivized risk measures also do not differ significantly between treatments.

## Appendix D

## D.1 Instructions of the experiment

### Instructions

### General description

This experiment is about **workers** who are trying to find the best possible job and **firms** looking for the best possible workers. Each firm wants to employ exactly one worker. At the beginning of the experiment, it will be randomly determined whether you will be in the role of a worker or of a firm. You will keep this role for the entire experiment.

There are 13 firms in the market of which five are of high quality and the remaining eight are each of a different quality. The five firms of high quality are played by the computer while the other eight firms are played by participants in this room. There are also 16 workers who prefer to be matched to the firms of high quality relative to the firms of intermediate or lower quality.

The workers have different productivities for the firm. That is, the workers can be ranked in terms of their productivity, with one worker being the most productive and one worker being the least productive. All firms have identical preferences over workers, that is, they agree on which worker is the most productive, etc.

Each round of the experiments consists of two stages.

### First stage

At the beginning of the first stage, the quality of the firms is revealed to all participants. The productivity of the workers is known neither by the firms nor by the workers themselves.

During the first stage, all eight firms that are not of the highest quality are allowed to make early offers to the workers. The firms of high quality which are played by the computer do not make offers. The firms that make offers do not differentiate between the workers, thus they make an offer, if any, to a random worker. Each worker is free to accept or reject the offer. The workers have 30 seconds to submit the decision to accept or reject. If the offer is accepted, both the firm and the worker leave the market. The first stage consists of a maximum of nine rounds. Thus, if an offer of a firm was rejected by a worker it will automatically be sent to another worker. If it is rejected again it will be sent to the third one. Thus, any offer can be rejected a maximum of nine times. (Note that the procedure of distributing offers guarantees that an offer is always sent to a new worker.)

Every worker who receives an offer receives two more fictitious offers. A worker must decide whether or not to accept each of the three offers. This means that she can accept all three offers, only two of them, only one or none. She does not know which offer is real and which offers are fictitious. If she rejects an offer, she will not get any more offers from this firm, regardless of whether it was a real or a fictitious offer.

Now consider the following example: Firm 12 makes an offer to a randomly selected worker. The worker sees three offers on her screen: two randomly selected offers and the offer of firm 12. Let us suppose that the offers of firms 9 and 11 were made randomly. Let us also suppose that the worker accepts the offer of firm 9 but rejects the offers of firms 11 and 12. The worker is then told that only the offer of firm 12 was real, so she is still unmatched. The rejection of the offer of firm 11 is final. This means that the worker will not receive another offer from firm 11 again. This means that a worker should consider each of the three offers as if it is the only one that she has received.

## Second stage

All workers and firms who remain unmatched at the end of the first stage (that is, firms who decided to wait and did not make early offers, and firms whose offer was rejected) move on to the second stage.

At the beginning of the second stage, the quality of all workers is revealed. Moreover, it will be announced which firms and workers have already left the market in the first stage. The following matching will then be implemented: the five best unmatched workers are assigned to the five best firms, the sixth-best unmatched worker is assigned to the sixth-best firm, and so on. The three workers of the lowest productivity among all workers at the second stage remain unmatched and receive a payoff of 0.

Workers and firms only have to make decisions in the first stage. The second stage is executed by the computer, according to the above description.

## Information and Payoffs

The payoffs of firms and workers in all rounds of the experiment have the same structure and are presented in the tables below.

### Payoffs of the firms

| | Most productive workers 1–5 | Workers 6–9 | Workers 10–13 | Least productive workers 14–16 |
|---|---|---|---|---|
| Payoff of firm (points) | 50 | 25 | 15 | 10 |

Thus, all firms receive 50 points if they are matched with any of the five best workers, 25 if they employ a worker who is ranked sixth to ninth, 15 for a worker ranked 10th to 13th, and 10 if they employ any of the least productive three workers. The firms that are played by the computer receive no payoffs.

### Payoffs of the workers

The payoff of a worker depends on which firm it concludes a contract with. For a contract with one of the top five firms, the five most productive workers receive a payoff of 50, while all other workers receive a payoff of 32 for these firms. For all other firms, all workers receive an equal payoff. For example, every worker who signs a contract with the 10th-best firm receives a payoff of 17, with the 11th-best firm receiving only 16, etc.

| All workers | Five most productive workers | All other workers |
|---|---|---|
| Top Firm | 50 | 32 |
| 2nd-best firm | 50 | 32 |
| 3rd-best firm | 50 | 32 |
| 4th-best firm | 50 | 32 |
| 5th-best firm | 50 | 32 |
| 6th-best firm | 32 | 32 |
| 7th-best firm | 31 | 31 |
| 8th-best firm | 30 | 30 |
| 9th-best firm | 29 | 29 |
| 10th-best firm | 17 | 17 |
| 11th-best firm | 16 | 16 |
| 12th-best firm | 15 | 15 |
| 13th-best firm | 14 | 14 |
| Unassigned | 0 | 0 |
| Unassigned | 0 | 0 |
| Unassigned | 0 | 0 |

## Rounds

There are a total of four rounds. The first three are practice rounds and do not affect your payoff. Only in the fourth round will your payoffs be determined. In each practice round, the rank of the participants in the role of the workers is drawn anew.

### Productivity of workers

In each practice round the productivity of the workers is determined by a random draw. That is, the computer randomly assigns a productivity rank to each worker. A new ranking is randomly drawn in every round. The ranks thus determined are communicated to all workers and to all firms at the beginning of the second stage.

In the third round of the experiment, which is relevant for the payoffs, the ranks of all workers are determined as follows:

- All workers are asked to work on a task for which they earn points.
- Whoever has reached the most points within a certain time is the most productive worker. The one who has reached the second most points is the second most productive worker, and so on.
- If two or more workers are equal, the relative ranking of these workers is determined by chance.

### Exchange rate

The points that you earn in the experiments will be paid out to you according to the following exchange rate: 1 point = 40 cents.

### Hints

Note that in the first stage, only intermediate and low-quality firms can make offers to workers. Thus, the only way for workers to be employed by one of the five best firms is to stay in the market until the second stage.

Moreover, every time a worker receives an offer in the first stage, she knows which firm made the offer, and thus the corresponding payoff.

Note that every participant in the role of the firm knows its own quality.

Also, keep in mind that a firm that makes an offer in the first part does not know what productivity the workers have.

If you have any questions about the experiment, please raise your hand.

## D.2 Instructions for belief elicitation stage

[distributed in the final payoff-relevant round after subjects have worked on the real-effort task and have taken their decisions regarding offers, rejections, and acceptances]

## Indicating your expectations

## Workers

a) How to indicate your expectations

All 16 workers, including you, have completed a task. According to the performance of all workers, each of them is attributed a rank. Rank 1 corresponds to the worker whose performance was best, rank 2 to the worker whose performance was the second best, and so on. We would like to ask you to state your expectation of your rank. More precisely, we want you to tell us your expected rank as an integer between 1 and 16.

b) How is the payoff calculated for your stated beliefs?

After you have estimated your expected rank, your payoff is calculated. The more precise your estimation, the higher the probability is that you will win 5 points. The likelihood of your receiving the payoff of 5 is higher, the closer your stated rank is to your true rank (which corresponds to the rank of your performance among all other workers' performances). Your payoff is calculated as follows:

• First the computer randomly selects a number between 0 and 225. Every number between 0 und 225 is equally likely.

• The difference between the estimate of your rank and your true rank is the so-called prediction error. If your prediction error, multiplied by itself, is not larger than the random number then you will receive 5 points. Otherwise you will receive 0 points.

**Important:** You may wonder why we have chosen this payment rule. The reason is that this payment rule makes it optimal for you to indicate your expected rank.

Example: Your estimated rank is 13. Your true rank is 10. Thus, your prediction error is (13-10) = 3. Your prediction error, multiplied by itself, is 9. If the random number that is drawn by the computer is greater than or equal to 9, for example 26, then you will receive 5 points. If the random number that is drawn by the computer is smaller than 9, for example 8, then you will receive 0 points.

## Indicating your expectations

## Firms

a) How to indicate your expectations

We have just asked the workers to tell us what they think their rank is. The question was: "All 16 workers, including you, have completed a task. According to the performance of all workers, each of them is attributed a rank. Rank 1 corresponds to the worker whose performance was best, rank 2 to the worker whose performance was the second best, and so on. We would like to ask you to state your expectation about your rank. More precisely, we want you to tell us your expected rank as an integer between 1 and 16."

Please tell us what you think each worker thought about his true rank. In particular, please tell us which rank the worker thought would be his expected rank. Of course, the best-performing workers are likely to have guessed differently than the worst-performing ones. For this reason, you will be asked to give us your expectation for the estimated rank of each of the 16 workers.

b) How is the payoff calculated for your stated beliefs?

Your payoff is calculated after you have given us your estimate of the expected rank stated by all 16 workers. For each worker, it will be determined which payoff you will receive for your estimate. The more accurate your estimate, the more likely you are to earn 5 points. This is guaranteed by the following procedure:
The probability of the payoff depends on the difference between your expectation regarding the worker's self-assessment and the true self-assessment of the worker. The probability of your payoff is higher if you have indicated a rank that is close to the self-assessed rank of the worker. The probability of your payoff is lower if you have indicated a rank that is further away from the self-assessed rank of the worker. Your payoff is calculated as follows:

- First the computer randomly selects a number between 0 and 225. Every number between 0 und 225 is equally likely.
- The difference between your expectation of the estimate of the worker and the true self-assessment of the worker is the so-called prediction error. If your prediction error, multiplied by itself, is not larger than the random number then you will receive 5 points. Otherwise you will receive 0 points.

**Important:** You may wonder why we have chosen this payment rule. The reason is that under this payment rule it is best for you to indicate your expectation regarding the self-assessment of the workers.

At the end, one of the 16 workers will be drawn randomly. You will only be paid for your estimate regarding this worker.

Example:

Let us assume that the worker of rank 5 was chosen for your payoff. This worker has indicated an expected rank of 4. Your expectation of the estimate of this worker is 9. Therefore, your prediction error is (9-4)=5. Your prediction error, multiplied by itself, is 25. If the random number that is drawn by the computer is greater than or equal to 25, for example 26, then you will receive 5 points. If the random number that is drawn by the computer is smaller than 25, for example 8, then you will receive 0 points.

## D.3 Instructions for the risk-measurement questions

**Instructions**

In this task you will be shown on your screen three tables with 10 rows in sequential order. In each of the rows, you are given the choice between option A and B. You need to decide in every row which of the two options you prefer. At the end, only one of the rows from the three tables will determine your earnings, but you do not know in advance which row it will be. Every row is drawn with the same probability. Thus, after you have taken your decision in each of the three tables, the computer will randomly determine which row determines your payoffs. Afterwards, the computer will draw your earnings given your decision for one of the rows, which is either A or B. These earnings will be added to the return from the experiment. Thus, this exact sum will be paid out to you at the end of the experiment.

Please consider row 1 at the top of the screen. Option A yields a 10% chance of winning 2 euro and a 90% chance of winning 1.60 euro. Option B yields a 10% chance of winning 3.85 euro and a 90% chance of winning 0.10 euro. The other rows are analogous. By scrolling down the screen, in each option the chance of winning the higher amount increases. In row 10, no random draw is needed since both options yield the higher amount with certainty. Thus, you effectively decide in row 10 between 2 euro and 3.85 euro.

| | Option A | Option B |
|---|---|---|
| | Wähle Option B für ALLE Zeilen | |
| 1 | 10% Chance auf 2.00 EUR & 90% Chance auf 1.60 EUR | 10% Chance auf 3.85 EUR & 90% Chance auf 0.10 EUR |
| | Wähle Option A für Zeile 1 und Option B für Zeilen 2 bis 10 | |
| 2 | 20% Chance auf 2.00 EUR & 80% Chance auf 1.60 EUR | 20% Chance auf 3.85 EUR & 80% Chance auf 0.10 EUR |
| | Wähle Option A für Zeilen 1 bis 2 und Option B für Zeilen 3 bis 10 | |
| 3 | 30% Chance auf 2.00 EUR & 70% Chance auf 1.60 EUR | 30% Chance auf 3.85 EUR & 70% Chance auf 0.10 EUR |
| | Wähle Option A für Zeilen 1 bis 3 und Option B für Zeilen 4 bis 10 | |
| 4 | 40% Chance auf 2.00 EUR & 60% Chance auf 1.60 EUR | 40% Chance auf 3.85 EUR & 60% Chance auf 0.10 EUR |
| | Wähle Option A für Zeilen 1 bis 4 und Option B für Zeilen 5 bis 10 | |
| 5 | 50% Chance auf 2.00 EUR & 50% Chance auf 1.60 EUR | 50% Chance auf 3.85 EUR & 50% Chance auf 0.10 EUR |
| | Wähle Option A für Zeilen 1 bis 5 und Option B für Zeilen 6 bis 10 | |
| 6 | 60% Chance auf 2.00 EUR & 40% Chance auf 1.60 EUR | 60% Chance auf 3.85 EUR & 40% Chance auf 0.10 EUR |
| | Wähle Option A für Zeilen 1 bis 6 und Option B für Zeilen 7 bis 10 | |
| 7 | 70% Chance auf 2.00 EUR & 30% Chance auf 1.60 EUR | 70% Chance auf 3.85 EUR & 30% Chance auf 0.10 EUR |
| | Wähle Option A für Zeilen 1 bis 7 und Option B für Zeilen 8 bis 10 | |
| 8 | 80% Chance auf 2.00 EUR & 20% Chance auf 1.60 EUR | 80% Chance auf 3.85 EUR & 20% Chance auf 0.10 EUR |
| | Wähle Option A für Zeilen 1 bis 8 und Option B für Zeilen 9 bis 10 | |
| 9 | 90% Chance auf 2.00 EUR & 10% Chance auf 1.60 EUR | 90% Chance auf 3.85 EUR & 10% Chance auf 0.10 EUR |
| | Wähle Option A für Zeilen 1 bis 9 und Option B für Zeile 10 | |
| 10 | 100% Chance auf 2.00 EUR | 100% Chance auf 3.85 EUR |
| | Wähle Option A für ALLE Zeilen | |
| | | Bestätigen |

For each row you are asked to decide which of the two options you prefer.

**You have to make one of the following choices:**

- Choose Option B for ALL rows.
- Choose Option A for row 1 and Option B for rows 2 to 10.
- Choose Option A for rows 1 and 2 and Option B for rows 3 to 10.
- Choose Option A for rows 1 to 3 and Option B for rows 4 to 10.
- Choose Option A for rows 1 to 4 and Option B for rows 5 to 10.
- Choose Option A for rows 1 to 5 and Option B for rows 6 to 10.
- Choose Option A for rows 1 to 6 and Option B for rows 7 to 10.
- Choose Option A for rows 1 to 7 and Option B for rows 8 to 10.
- Choose Option A for rows 1 to 8 and Option B for rows 9 and 10.
- Choose Option A for rows 1 to 9 and Option B for row 10.
- Choose Option A for ALL rows.

You can choose which of these possible decisions to take. You can make your choice by **pressing the appropriate button.**

Please raise your hand if you have a question. The experimenter will come to you in order to help.

As the first multiple price list, the original Holt and Laury (2002) was used, just like on the print screen above. The second and the third price lists looked as follows:

List 2:

| | |
|---|---|
| 10% Chance auf 2.60 EUR & 90% Chance auf 2.05 EUR | 10% Chance auf 3.00 EUR & 90% Chance auf 0.50 EUR |
| 20% Chance auf 2.60 EUR & 80% Chance auf 2.05 EUR | 20% Chance auf 3.00 EUR & 80% Chance auf 0.50 EUR |
| 30% Chance auf 2.60 EUR & 70% Chance auf 2.05 EUR | 30% Chance auf 3.00 EUR & 70% Chance auf 0.50 EUR |
| 40% Chance auf 2.60 EUR & 60% Chance auf 2.05 EUR | 40% Chance auf 3.00 EUR & 60% Chance auf 0.50 EUR |
| 50% Chance auf 2.60 EUR & 50% Chance auf 2.05 EUR | 50% Chance auf 3.00 EUR & 50% Chance auf 0.50 EUR |
| 60% Chance auf 2.60 EUR & 40% Chance auf 2.05 EUR | 60% Chance auf 3.00 EUR & 40% Chance auf 0.50 EUR |
| 70% Chance auf 2.60 EUR & 30% Chance auf 2.05 EUR | 70% Chance auf 3.00 EUR & 30% Chance auf 0.50 EUR |
| 80% Chance auf 2.60 EUR & 20% Chance auf 2.05 EUR | 80% Chance auf 3.00 EUR & 20% Chance auf 0.50 EUR |
| 90% Chance auf 2.60 EUR & 10% Chance auf 2.05 EUR | 90% Chance auf 3.00 EUR & 10% Chance auf 0.50 EUR |
| 100% 2.60 EUR | 100% 3.00 EUR |

List 3:

| | |
|---|---|
| 10% Chance auf 2.20 EUR & 90% Chance auf 1.00 EUR | 10% Chance auf 4.10 EUR & 90% Chance auf 0.30 EUR |
| 20% Chance auf 2.20 EUR & 80% Chance auf 1.00 EUR | 20% Chance auf 4.10 EUR & 80% Chance auf 0.30 EUR |
| 30% Chance auf 2.20 EUR & 70% Chance auf 1.00 EUR | 30% Chance auf 4.10 EUR & 70% Chance auf 0.30 EUR |
| 40% Chance auf 2.20 EUR & 60% Chance auf 1.00 EUR | 40% Chance auf 4.10 EUR & 60% Chance auf 0.30 EUR |
| 50% Chance auf 2.20 EUR & 50% Chance auf 1.00 EUR | 50% Chance auf 4.10 EUR & 50% Chance auf 0.30 EUR |
| 60% Chance auf 2.20 EUR & 40% Chance auf 1.00 EUR | 60% Chance auf 4.10 EUR & 40% Chance auf 0.30 EUR |
| 70% Chance auf 2.20 EUR & 30% Chance auf 1.00 EUR | 70% Chance auf 4.10 EUR & 30% Chance auf 0.30 EUR |
| 80% Chance auf 2.20 EUR & 20% Chance auf 1.00 EUR | 80% Chance auf 4.10 EUR & 20% Chance auf 0.30 EUR |
| 90% Chance auf 2.20 EUR & 10% Chance auf 1.00 EUR | 90% Chance auf 4.10 EUR & 10% Chance auf 0.30 EUR |
| 100% 2.20 EUR | 100% 4.10 EUR |

Only one random list was payoff-relevant for subjects.
In addition to making decisions in the incentivized multiple price lists, subjects were asked to answer the following questions:

How do you see yourself? Are you generally a person who is fully willing to take risks or do you try to avoid taking risks? Please tick a box on the scale below, where 0 means “risk averse” and 10 means “fully prepared to take risks”:

People can behave differently in different situations. How would you rate your willingness to take risks in the following areas?

- while driving?
- in financial matters?
- during leisure and sport?
- in your job?
- regarding your health?
- your faith in other people?

Please consider what you would do in the following situation:
Imagine that you have won 100,000 euro in a lottery. Almost immediately after you collect the winnings, you receive the following financial offer from a reputable bank, the conditions of which are as follows:
There is the chance to double the money within two years. It is equally possible that you could lose half of the amount invested. You have the opportunity to invest the full amount, part of the amount or reject the offer. What share of your lottery winnings would you be prepared to invest in this financially risky, yet lucrative investment?
100,000 euro / 80,000 euro / 60,000 euro / 40,000 euro / 20,000 euro / Nothing, I would decline the offer.

## D.4 Questionnaire on cultural orientations

**(completed by subjects in the role of firms while workers perform the real-effort task)**

The following section seeks to evaluate your cultural orientation. Please indicate your agreement with each of the following statements: Strongly disagree, Disagree, Neither agree nor disagree, Agree, Strongly agree

1. Individuals should sacrifice self-interest for the group that they belong to.
2. Individuals should stick with the group even through difficulties.
3. Group welfare is more important than individual rewards.
4. Group success is more important than individual success.
5. Individuals should pursue their goals after considering the welfare of the group.
6. Group loyalty should be encouraged even if individual goals suffer.
7. People in higher positions should make most decisions without consulting people in lower positions.
8. People in higher positions should not delegate important tasks to people in lower positions.
9. People in higher positions should not ask the opinions of people in lower positions too frequently.
10. People in higher positions should avoid social interaction with people in lower positions.
11. People in lower positions should not disagree with decisions made by people in higher positions.
12. It is important to have instructions spelled out in detail so that I always know what I am expected to do.
13. It is important to closely follow instructions and procedures.
14. Rules/regulations are important because they inform me of what is expected of me.
15. Standardized work procedures are helpful.
16. Instructions for operations are important.

17. It is more important for men to have a professional career than it is for women.
18. Men usually solve problems with logical analysis; women usually solve problems with intuition.
19. Solving difficult problems usually requires an active forceful approach, which is typical for men.
20. There are some jobs that a man can always do better than a woman.
21. Even though certain food products are available in a number of different flavors, I tend to buy the same flavor.
22. I would rather stick with a brand I usually buy than try something I am not very sure of.
23. I think of myself as a brand-loyal consumer.
24. When I go to a restaurant, I feel it is safer to order dishes I am familiar with.
25. If I like a brand, I rarely switch away from it just to try something different.
26. I am very cautious with respect to trying new or different products.
27. I rarely buy brands about which I am uncertain how they will perform.
28. I usually eat the same kinds of food on a regular basis.