I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 15048

What's the Risk from Competing? Competition Aversion and the Gender Wage Gap

Chung Choe
SeEun Jung
Ronald L. Oaxaca

JANUARY 2022

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 15048

What's the Risk from Competing? Competition Aversion and the Gender Wage Gap

Chung Choe
Konkuk University

SeEun Jung
Inha University

Ronald L. Oaxaca
University of Arizona and IZA

JANUARY 2022

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

What's the Risk from Competing? Competition Aversion and the Gender Wage Gap

Laboratory experiments involving a real effort task are conducted to examine the importance of gender differences in competition aversion for generating gender wage gaps. Cross-subject design treatment and control experiments suggest that gender differences in risk aversion play no significant role in competitive (tournament) vs. piece-rate job choices and consequent gender wage gaps. Subjects in the treatment experiments are sorted into relatively more and relatively less risk averse groupings. Relatively less risk averse subjects are assigned to a risky job track involving a known constant probability of unemployment in each period. The gender wage gap contribution of gender differences in competition aversion compared with the contribution of gender differences in performance is especially large for relatively less risk averse subjects.

JEL Classification: J16, J31, C91, D91

Keywords: gender wage gaps, wage decompositions, competition preferences, risk aversion, lab experiments

Corresponding author:
SeEun Jung
Department of Economics
Inha University
100 Inharo
Michuholgu
Incheon, 22212
Korea
E-mail: jse@inha.ac.kr

Introduction

Theories of gender inequality are intrinsically interesting to the social science research community. However, broader social and policy interest in these theories are more likely motivated by the implications for gender income inequality. Depending on the particular circumstances, sources of gender wage gaps are varied as are the relevances attached to these sources of gender wage gaps. Gender wage gaps can arise from taste driven pure wage discrimination and discriminatory-based occupational segregation; monopsony; statistical discrimination; and gender differences in personal characteristics, risk aversion, and competition aversion.

The focus of this paper is an examination of the role played by gender differences in competition aversion in generating gender wage gaps. Conceptually, both competition aversion (tastes for competitive environments) and risk aversion can be factors driving choices between competitive jobs and non-competitive jobs. To identify any role that gender differences in pure competition aversion might play in generating gender wage gaps, laboratory experiments are conducted that allow us to take account of the presence of gender differences in risk preferences.

In the laboratory experiments, subjects faced real effort task choices that varied in terms of pure financial risk vs. no financial risk and in terms of tournament versus piece-rate based compensation. Two sets of experiments were conducted that correspond to cross-subject treatment and control experiments. Difference-in-difference methodology is used to determine whether gender differences in risk aversion is a factor in the observed experimental gender differences in competitive vs. noncompetitive job choices. Gender wage gaps for both risky and secure jobs are decomposed into competitive choice and productivity components. The wage decompositions contrast gender wage gaps generated by endogenous choice between risky and secure job tracks with the gender wage gaps generated from random assignment to risky and secure jobs.

Literature

It is an accepted fact that gender gaps exist in labor market outcomes (Altonji and Blank, 1999; Bertrand and Hallock, 2001; Blau and Kahn, 2017; Goldin et al., 2006). Since the seminal work by Polachek (1981), a handful of literature has recently attempted to explain the gender difference in terms of differences in preference towards risk and competition, apart from traditional market discrimination explanations. Bertrand (2011); Croson and Gneezy (2009); Eckel and Grossman (2008) suggest that women are more risk-averse, less confident, more altruistic, and not willing to compete compared to men.

Risk aversion is known to play an important role in decision-making under risk or uncertainty. For example, choosing between a job with high wages and high risks and a job with low wages and low risks in the presence of compensating differentials. Other things equal, a risk-averse worker would be more willing to choose the safer job with the lower wage (Pissarides (1974); Cox and Oaxaca (1989, 1992, 1996)). The gap in risk preference can, in turn, lead to a wage gap between risk-averse workers and risk-taking counterparts. In fact some studies examine the wage gap between men and women by considering that women are more risk-averse (Jung (2017)). A recent experimental study by Jung et al. (2018) has shown that a significant part of the gender wage gap (40%-77%) in a discrimination-free setting can be explained by the difference in job choices driven by relatively higher risk aversion among women.

Apart from risk aversion, the gender preference gap for competition can also be considered an important factor in explaining the gender gap in labor market outcomes. Since the pathbreaking work by Niederle and Vesterlund (2007), many studies have focused on the contribution of competitive job choices to explain gender differences in labor market outcomes (Buser et al. (2018); Croson and Gneezy (2009); Kamas and Preston (2012); Niederle and Vesterlund (2007, 2011)). Typically, highly competitive jobs pay more than non-competitive jobs. Consequently, women avoiding competition are likely to receive lower wages. Among others, Niederle and Vesterlund (2007) measures the extent to which a pure gender difference in preferences for compensation exists in terms of payment type (a competitive basis versus a piece-rate scheme). Their study concludes that gender differences in risk attitudes play only a minor role. However, the study does not examine the implications of competition aversion for gender differences in wages.

As women tend to be more risk-averse and more competition-averse, it is worth investigating how much both risk aversion and competition aversion can explain gender wage gaps. Although few in number, earlier studies have investigated specific instances of women being risk-averse along with being less competitive. For instance, Cardenas et al. (2012) found that girls are less competitive in Sweden while they are equally competitive in Colombia, but being more risk-averse in both countries. In contrast, Fletschner et al. (2010) studied couples in Vietnam and found that wives are more risk-averse and less competitive compared to their husbands.

None of these previous studies has provided an answer to how much each factor contributes to the gender wage gap. Our research objective is to identify the effect of gender differences in competition aversion on gender wage gaps, apart from risk aversion. To the best of our knowledge, this is the very first study to use the laboratory experimental methodology to identify the potential role of both risk aversion and competition aversion directly and simultaneously in explaining gender wage gaps. Our experimental design can effectively control for other confounders, e.g. productivity, prevalent in field labor markets. We extend the experimental design used in Jung et al. (2018) to introduce a competitive job environment and perform wage decompositions in a similar spirit of the conventional decomposition method (Oaxaca, 1973). The wage decompositions identify the separate contributions of competition aversion and productivity to the gender wage gap.

Experimental Design

Following Jung et al. (2018), subjects participate in a real effort typing task. The task consists of typing random five letter blocks during a given amount of time within each time period allotted to the task. Potential compensation is based on a known piece-rate for each correctly typed block. Our experimental design entails four combinations of risk free, risky, competitive, and noncompetitive compensation conditions:

1. Compensation with piece rate γ_s, no unemployment risk, no competition (ss);

2. Compensation with piece rate γ_{sc}, no unemployment risk, but competitive in that only individuals who scored in the top 25% of a tournament can receive compensation (sc);

3. Compensation with piece rate γ_r, unemployment rate ϕ, no competition (rr);

4. Compensation with piece rate γ_{rc}, unemployment rate ϕ, and competitive in that only individuals who score in top 25% of a tournament can receive compensation (rc);

where $\gamma_s < \gamma_r < \gamma_{sc} < \gamma_{rc}$, and ϕ is the probability that in any given period the typing task will be unavailable.

Two sets of cross-subject experiments were conducted: treatment experiments and control experiments. In the treatment experiments each subject experiences 5 stages:

T1 - ss or rr randomly assigned;

T2 - rr or ss assigned in reverse of the assignment in T1;

T3 - subject chooses ss or rr;

T4S - sc assigned if subject selected ss in T3 (the subject's performance is ranked against the top 25% performance of all subjects who participated in T4S and compensated accordingly);

T4R - rc assigned if subject selected rr in T3 (the subject's performance is ranked against the top 25% performance of all subjects who participated in T4R and compensated accordingly);

T5S - subject chooses ss or sc if they participated in T4S;

T5R - subject chooses rr or rc if they participated in T4R (if rc is chosen, the subject's performance is ranked against the top 25% performance of the other subjects who participated in T4R and compensated accordingly).

Subjects who chose ss in T3 are identified as relatively more risk averse and subsequently participate in T4S and T5S. This sequence constitutes the secure job track for the treatment experiments. Subjects who chose rr in T3 are identified as relatively less risk averse and subsequently participate in T4R and T5R. This sequence constitutes the risky job track for the treatment experiments. Relatively less (more) risk averse subjects who chose the competitive job in trial T5S (T5R) win the tournament if their performance lies within the top 25% of the other subjects who participated in trial T4S (T4R).

Following Niederle and Vesterlund (2007), we require that the expected income from the competitive/tournament job equal the expected income from the noncompetitive job for any given performance (productivity) P_i. For those identified as relatively more risk averse, i.e. participated in treatments T4S and T5S, the expected income equality condition is given by

$$\gamma_s P_i = 0.25\gamma_{sc} P_i$$
$$\Rightarrow \gamma_{sc} = 4\gamma_s.$$

Similarly, for those identified as relatively less risk averse, i.e. participated in treatments T4R and T5R,

$$(1-\phi)\gamma_r P_i = 0.25(1-\phi)\gamma_{rc} P_i$$
$$\Rightarrow \gamma_{rc} = 4\gamma_r.$$

For $j = m, f$, let $\theta^j_{T5S\_sc}$ and $\theta^j_{T5R\_sc}$ denote the proportions of subjects who selected the competitive job in the T5S and T5R competitive job choice trials, respectively. Gender differences in the selection of the competitive task in the treatment experiments are conditioned on revealed risky vs. secure job choices and accordingly are calculated separately for those identified as relatively more risk averse and those identified as relatively less risk averse: $\Delta\theta_{TS5\_sc} = \theta^m_{T5S\_sc} - \theta^f_{T5S\_sc}$ and $\Delta\theta_{TR5\_rc} = \theta^m_{T5R\_rc} - \theta^f_{TRS\_rc}$.

In order to detect the effects of risk preferences apart from competition aversion, companion experiments are conducted to generate a control group (CG_S) to compare against those identified as relatively more risk averse in the T3 trial experiments and a control group (CG_R) to compare against those identified as relatively less risk averse in the T3 trial experiments. Subjects exogenously assigned to control group CG_S participate in 5 stages:

C1S - all subjects assigned to ss;
C2S - all subjects assigned to sc (the subject's performance is ranked against the top 25% performance of the subjects who participated in C2S and compensated accordingly);
C3S - subjects randomly assigned to either ss or sc (if assigned to sc, the subject's performance is ranked against the top 25% performance of the other subjects who participated in C2S and compensated accordingly);
C4S - sc or ss assigned in reverse of assignment in C3S (if assigned to sc, the subject's performance is ranked against the top 25% performance of the other subjects who participated in C2S and compensated accordingly);
C5S - subject chooses either ss or sc (if sc is chosen, the subject's performance is ranked against the top 25% performance of the other subjects who participated in C2S and compensated accordingly).

None of the trials for CG_S involve risk in terms of the risk of unemployment and the concomitant lost of potential earnings. Therefore, CG_S constitutes the secure job track for the control experiments. Of the set of gender group $j = m, f$ individuals who participated in the C5S trials, $\theta^j_{C5S\_sc}$ denotes the proportion of subjects who chose the secure competitive job. The gender difference in the selection of the secure competitive task from the C5S experiments is given by $\Delta\theta_{C5S\_sc} = \theta^m_{C5S\_sc} - \theta^f_{C5S\_sc}$. This difference will arise from gender differences in risk attitudes and tastes for competition. We use the difference-in-difference method to isolate the pure effect of the gender difference in competition aversion by comparison of the control group gender difference with the gender difference among those identified as more risk averse:

$$\Delta\theta_{mf\_sc} = \Delta\theta_{C5S\_sc} - \Delta\theta_{TS5\_sc}. \tag{1}$$

If greater risk aversion among women is a factor in the gender difference in the selection of the competitive job, we would expect $\Delta\theta_{mf\_sc} > 0$. One can also determine separately for males and females whether or not risk aversion is present in selecting the competitive job:

$$\Delta\theta^j_{sc} = \theta^j_{C5S\_sc} - \theta^j_{T5S\_sc}, \quad j = m, f.$$

If risk aversion among gender group 'j' were present in the decision to select the competitive job, we would expect that $\Delta\theta^j_{sc} < 0$.

For those identified as relatively less risk averse in the T3 treatment experiments, the companion control group CG_R experiments require that subjects participate in 5 stages:

C1R - all subjects assigned to rr;

C2R - all subjects assigned to rc, the subject's performance is ranked against the top 25% performance of all subjects who participated in C2R and compensated accordingly;

C3R - subjects randomly assigned to either rr or rc; if assigned to rc, the subject's performance is ranked against the top 25% performance of others in C2R and compensated accordingly;

C4R - rc or rr assigned in reverse of assignment in C3R; if assigned to rc, the subject's performance is ranked against the top 25% performance of others in C2R and compensated accordingly;

C5R - subject chooses either rr or rc; if rc is chosen, the subject's performance is ranked against the performance of others in C2R and compensated accordingly.

Because none of the trials for CG_R involve the secure job, all jobs are exposed to the risk of unemployment and the concomitant lost of potential earnings. Therefore, CG_R constitutes the risky job track for the control experiments. We denote the proportion of subjects who selected the risky competitive job in the C5R trials as $\theta^j_{C5R\_rc}$. The gender difference in the selection of the risky competitive task for the C5R experiments is given by $\Delta\theta_{C5R\_rc} = \theta^m_{C5R\_rc} - \theta^f_{C5R\_rc}$. This difference will arise from gender differences in risk attitudes and tastes for competition. We use the difference-in-difference method to isolate the pure effect of the gender difference in competition aversion by comparison of the control group gender difference with the gender difference among those identified as more risk averse:

$$\Delta\theta_{mf\_rc} = \Delta\theta_{C5R\_rc} - \Delta\theta_{T5R\_rc}. \tag{2}$$

If greater risk aversion among women is a factor in the gender difference in the selection of the competitive job, we would expect $\Delta\theta_{mf\_rc} > 0$. As before, one can also determine separately for males and females whether or not risk aversion is present in selecting the competitive job:

$$\Delta\theta^j_{rc} = \theta^j_{C5R\_rc} - \theta^j_{T5R\_rc}, \quad j = m, f.$$

If risk aversion among gender group 'j' were present in the decision to select the competitive job, we would expect that $\Delta\theta^j_{rc} < 0$.

The experimental design parameter values are specified below:

$\phi = 0.3$, i.e. there is a known 30% chance that the typing task will be unavailable

$T = 10$ rounds (periods)

$\gamma_s =$ €0.14

$\gamma_r =$ €0.20

$\gamma_{sc} = 4\gamma_s =$ €0.56

$\gamma_{rc} = 4\gamma_r =$ €0.80.

Logit Competitive Job Choice Model

Beyond computation of observed proportions of subjects, we also consider a companion logit framework for the choice between competitive and noncompetitive jobs. We define the following mutually exclusive treatment and control trial indicator variables:

$T_{5S_i} = 1(\text{subject 'i' participates in trial } T5S)$

$C_{5S_i} = 1(\text{subject 'i' participates in trial } C5S)$

$T_{5R_i} = 1(\text{subject 'i' participates in trial } T5R)$

$C_{5R_i} = 1(\text{subject 'i' participates in trial } C5R,$

where $T_{5S_i} + C_{5S_i} + T_{5R_i} + C_{5R_i} = 1$. The outcome indicator is defined as $J_{c_i} = 1(\text{subject 'i' chooses the competitive job})$. The logit binary job choice model is given by

$$Prob(J_{c_i} = 1|I_i) = \Lambda(I_i),$$

where $\Lambda(I_i)$ is the logistic CDF and I_i is the index function.

The index functions for gender $j = f, m$ are expressed without an explicit constant term:

$$\begin{aligned}
I_i^j &= \beta^j_{C5S_sc} C_{5S_i} + \beta^j_{T5S_sc} T_{5S_i} + \beta^j_{C5R_rc} C_{5R_i} + \beta^j_{T5R_rc} T_{5R_i} + \beta^j_p \overline{P}_i,\ i = 1, ..., N_j \\
&= \beta^j_{C5S_sc} C_{5S_i} - \beta^j_{T5S_sc} C_{5S_i} + \beta^j_{T5S_sc} C_{5S_i} + \beta^j_{T5S_sc} T_{5S_i} \\
&+ \beta^j_{C5R_rc} C_{5R_i} - \beta^j_{T5R_rc} C_{5R_i} + \beta^j_{T5R_rc} C_{5R_i} + \beta^j_{T5R_rc} T_{5R_i} + \beta^j_p \overline{P}_i \\
&= \left(\beta^j_{C5S_sc} - \beta^j_{T5S_sc}\right) C_{5S_i} + \beta^j_{T5S_sc} \left(C_{5S_i} + T_{S5_i}\right) + \left(\beta^j_{C5R_rc} - \beta^j_{T5R_rc}\right) C_{5R_i} \\
&+ \beta^j_{T5R_rc} \left(C_{5R_i} + T_{R5_i}\right) + \beta^j_p \overline{P}_i \\
&= \Delta\beta^j_{5S_sc} C_{5S_i} + \Delta\beta^j_{5R_rc} C_{5R_i} + \beta^j_{T5S_sc} \left(C_{5S_i} + T_{5S_i}\right) + \beta^j_{T5R_rc} \left(C_{5R_i} + T_{5R_i}\right) + \beta^j_p \overline{P}_i,
\end{aligned}$$

where $\Delta\beta^j_{5S\_sc} = \left(\beta^j_{C5S\_sc} - \beta^j_{T5S\_sc}\right)$, $\Delta\beta^j_{5R\_rc} = \left(\beta^j_{C5R\_rc} - \beta^j_{T5R\_rc}\right)$, and $\overline{P}_i$ = the ith subject's productivity (number of correctly typed blocks). In the case of assigned competitive experimental trials, productivity is averaged over each subject's participation prior to their choice between the competitive and noncompetitive jobs. [1]

We pool the samples of males and females into a single logit model using gender indicators M_i and $1 - M_i$ for males and females, respectively:

$$
\begin{aligned}
I_i = {} & \Delta\beta^f_{5S\_sc} C_{5S_i} + \Delta\beta^f_{5R\_rc} C_{5R_i} + \beta^f_{T5S\_sc}\left(C_{5S_i} + T_{5S_i}\right) + \beta^f_{T5R\_rc}\left(C_{5R_i} + T_{5R_i}\right) + \beta^f_p \overline{P}_i \\
& + \Delta\beta_{sc} M_i \cdot C_{5S_i} + \Delta\beta_{rc} M_i \cdot C_{5R_i} + \Delta\beta_{T5S\_sc} M_i \cdot \left(C_{5S_i} + T_{5S_i}\right) + \Delta\beta_{T5R\_rc} M_i \cdot \left(C_{5R_i} + T_{5R_i}\right) \\
& + \Delta\beta_p M_i \cdot \overline{P}_i,
\end{aligned}
$$

where

$$
\begin{aligned}
\Delta\beta_{sc} &= \Delta\beta^m_{5S\_sc} - \Delta\beta^f_{5S\_sc} \\
&= \left(\beta^m_{C5S\_sc} - \beta^m_{T5S\_sc}\right) - \left(\beta^f_{C5S\_sc} - \beta^f_{T5S\_sc}\right) \\
&= \left(\beta^m_{C5S\_sc} - \beta^f_{C5S\_sc}\right) - \left(\beta^m_{T5S\_sc} - \beta^f_{T5S\_sc}\right) \\
\Delta\beta_{rc} &= \Delta\beta^m_{5R\_rc} - \Delta\beta^f_{5R\_rc} \\
&= \left(\beta^m_{C5R\_rc} - \beta^m_{T5R\_rc}\right) - \left(\beta^f_{C5R\_rc} - \beta^f_{T5R\_rc}\right) \\
&= \left(\beta^m_{C5R\_rc} - \beta^f_{C5R\_rc}\right) - \left(\beta^m_{T5R\_rc} - \beta^f_{T5R\_rc}\right) \\
\Delta\beta_{T5S\_sc} &= \beta^m_{T5S\_sc} - \beta^f_{T5S\_sc} \\
\Delta\beta_{T5R\_rc} &= \beta^m_{T5R\_rc} - \beta^f_{T5R\_rc} \\
\Delta\beta_p &= \beta^m_p - \beta^f_p.
\end{aligned}
$$

The coefficients $\Delta\beta_{sc}$ and $\Delta\beta_{rc}$ on variables $M_i \cdot C_{5S_i}$ and $M_i \cdot C_{5R_i}$ are logit parameter analogs to the sample proportion difference-in-difference estimates $\Delta\theta_{sc}$ and $\Delta\theta_{rc}$, respectively.

[1] Prior assigned competitive trial productivities are determined as follows: for those who participated in $T5S$ or in $T5R$, average productivities are used from $T4S$ and $T4R$, respectively; for those who particpated in $C5S$ or in $C5R$, average productivities are used from $C2S$ and $C2R$, respectively. In the case of participation in risky job trials, average productivity will reflect periods in which the subject did not have the opportunity to perform the typing task.

Gender Wage Gaps

In our experimental design, gender wage gaps can only arise from gender differences in productivity (typing performance) and competitive job choices potentially involving some combination of risk aversion and tastes for competition (competition aversion). Gender wage gap decompositions reflect '0' wages for unemployment spells or lost tournaments. These '0' wage outcomes are manifested in the associated average productivity measures.[2]

Secure Job Tracks

For subjects who participated in the secure job track T5S (having selected the secure job in T3), let $P^j_{T5S\_ss\_it}$ and $P^j_{T5S\_sc\_it}$ represent the number of correctly typed blocks in period t for the ith individual in gender group $j = m.f$ in the secure noncompetitive and secure competitive jobs, respectively. The average wage among the set of subjects who participated in T5S is calculated as

$$\overline{W}^j_{T5S} = \gamma_s \overline{P}^j_{T5S\_ss}(1 - \theta^j_{T5S\_sc}) + 4\gamma_s \overline{P}^j_{T5S\_sc}\theta^j_{T5S\_sc}, \quad j = m, f$$

where $\overline{P}^j_{T5S\_ss}$ and $\overline{P}^j_{T5S\_sc}$ are the respective average productivities for the secure noncompetitive and secure competitive jobs. The latter includes 0 productivities for periods in which the subjects did not win the tournaments.

The gender wage gap among the set of subjects who selected the secure job track can be decomposed into the gap attributable to gender differences in the choice between the competitive and noncompetive job and gender differences in task productivity. Two alternative

[2] Details regarding the construction of productivity measures used in the wage decompositions are provided in an appendix.

decompositions are given by

$$\overline{W}^m_{T5S} - \overline{W}^f_{T5S} = \underbrace{\gamma_s(4\overline{P}^f_{T5S\_sc} - \overline{P}^f_{T5S\_ss})(\theta^m_{T5S\_sc} - \theta^f_{T5S\_sc})}_{\text{competition aversionb}}$$
$$+ \underbrace{\gamma_s\{(1-\theta^m_{T5S\_sc})(\overline{P}^m_{T5S\_ss} - \overline{P}^f_{T5S\_ss}) + 4\theta^m_{T5S\_sc}(\overline{P}^m_{T5S\_sc} - \overline{P}^f_{T5S\_sc})}_{\text{productivity}} \tag{3}$$

$$= \underbrace{\gamma_s(4\overline{P}^m_{T5S\_sc} - \overline{P}^m_{T5S\_ss})(\theta^m_{T5S\_sc} - \theta^f_{T5S\_sc})}_{\text{competition aversion}}$$
$$+ \underbrace{\gamma_s\{(1-\theta^f_{T5S\_sc})(\overline{P}^m_{T5S\_ss} - \overline{P}^f_{T5S\_ss}) + 4\theta^f_{T5S\_sc}(\overline{P}^m_{T5S\_sc} - \overline{P}^f_{T5S\_sc})}_{\text{productivity}}. \tag{4}$$

Decomposition (3) adopts the counterfactual that the propensity of women to chose the competitive job assumes the value exhibited by the men ($\theta^m_{T5S\_sc}$); or equivalently, the counterfactual in which the productivities of the men assume the values exhibited by the women ($\overline{P}^f_{T5S\_sc}, \overline{P}^f_{T5S\_ss}$). Decomposition (4) adopts the counterfactual that the propensity of men to chose the competitive job assumes the value exhibited by women ($\theta^f_{T5S\_sc}$); or equivalently, the counterfactual in which the productivities of women assume the values exhibited by the men ($\overline{P}^m_{T5S\_sc}, \overline{P}^m_{T5S\_ss}$).

Gender wage gaps and decompositions for the companion secure control experiments offer insight into the gender wage gap effects of endogenous choice vs. exogenous assignment. Apart from subscripts that identify the experimental trial, the formulas are identical to those used for the secure job treatment experiments. Consider the average wage among the set of subjects who were assigned to the secure job control experiment and subsequently chose between the competitive and noncompetitive job in in experimental trial C5S:

$$\overline{W}^j_{C5S} = \gamma_s \overline{P}^j_{C5S\_ss}(1-\theta^j_{C5S\_sc}) + 4\gamma_s \overline{P}^j_{C5S\_sc}\theta^j_{C5S\_sc}, \quad j = m, f.$$

The gender wage gap among the set of subjects who were assigned the control experiment secure job track can be decomposed into the gap attributable to gender differences in the choice between the competitive and noncompetive job and gender differences in task productivity. The two alternative decompositions are given by

$$\begin{aligned}
\overline{W}^m_{C5S} - \overline{W}^f_{C5S} &= \underbrace{\gamma_s(4\overline{P}^f_{C5S_sc} - \overline{P}^f_{C5S_ss})(\theta^m_{C5S_sc} - \theta^f_{C5S_sc})}_{\text{competition aversion}} \\
&+ \underbrace{\gamma_s\{(1-\theta^m_{C5S_sc})(\overline{P}^m_{C5S_ss} - \overline{P}^f_{C5S_ss}) + 4\theta^m_{C5S_sc}(\overline{P}^m_{C5S_sc} - \overline{P}^f_{C5S_sc})}_{\text{productivity}} \qquad (5) \\
&= \underbrace{\gamma_s(4\overline{P}^m_{C5S_sc} - \overline{P}^m_{C5S_ss})(\theta^m_{C5S_sc} - \theta^f_{C5S_sc})}_{\text{competitionaversion}} \\
&+ \underbrace{\gamma_s\{(1-\theta^f_{C5S_sc})(\overline{P}^m_{C5S_ss} - \overline{P}^f_{C5S_ss}) + 4\theta^f_{C5S_sc}(\overline{P}^m_{C5S_sc} - \overline{P}^f_{C5S_sc})}_{\text{productivity}}. \qquad (6)
\end{aligned}$$

Risky Job Tracks

For subjects who participated in the risky job track T5R (having selected the risky job in T3), let $P^j_{T5R\_rr\_it}$ and $P^j_{T5R\_rc\_it}$ represent the number of correctly typed blocks in period t for the ith individual in gender group $j = m.f$ in the risky noncompetitive and risky competitive jobs, respectively. The average wage among the set of subjects who participated in T5R is calculated as

$$\overline{W}^j_{T5R} = \gamma_r \overline{P}^j_{T5R\_rr}(1-\theta^j_{T5R\_rc}) + 4\gamma_r \overline{P}^j_{T5R\_rc}\theta^j_{T5R\_rc}, \quad j = m, f$$

where $\overline{P}^j_{T5R\_rr}$ and $\overline{P}^j_{T5R\_rc}$ are the average productivities corresponding to the risky competitive and risky noncompetitive treatment experiments, respectively.

Next, the gender wage gap among the set of subjects who selected the risky job is decomposed into the gap attributable to gender differences in the choice between the competitive and noncompetive job and gender differences in task productivity. Two alternative decompositions are given by

$$\overline{W}^m_{T5R} - \overline{W}^f_{T5R} = \underbrace{\gamma_r(4\overline{P}^f_{T5R\_rc} - \overline{P}^f_{T5R\_rr})(\theta^m_{T5R\_rc} - \theta^f_{T5R\_rc})}_{\text{competition aversion}}$$

$$+ \underbrace{\gamma_r\{(1-\theta^m_{T5R\_rc})(\overline{P}^m_{T5R\_rr} - \overline{P}^f_{T5R\_rr}) + 4\theta^m_{T5R\_rc}(\overline{P}^m_{T5R\_rc} - \overline{P}^f_{T5R\_rc})}_{\text{productivity}} \quad (7)$$

$$= \underbrace{\gamma_r(4\overline{P}^m_{T5R\_rc} - \overline{P}^m_{T5R\_rr})(\theta^m_{T5R\_rc} - \theta^f_{T5R\_rc})}_{\text{competition aversion}}$$

$$+ \underbrace{\gamma_r\{(1-\theta^f_{T5R\_rc})(\overline{P}^m_{T5R\_rr} - \overline{P}^f_{T5R\_rr}) + 4\theta^f_{T5R\_rc}(\overline{P}^m_{T5R\_rc} - \overline{P}^f_{T5R\_rc})}_{\text{productivity}}. \quad (8)$$

Decomposition (7) adopts the counterfactual that the propensity of women to chose the competitive job assumes the value exhibited by the men ($\theta^m_{T5S\_rc}$); or equivalently, the counterfactual in which the productivities of the men assume the values exhibited by the women ($\overline{P}^f_{T5R\_rc}, \overline{P}^f_{T5R\_rr}$). Decomposition (8) adopts the counterfactual that the propensity of men to chose the competitive job assumes the value exhibited by women ($\theta^f_{T5R\_rc}$); or equivalently, the the counterfactual in which productivities of women assume the values exhibited by the men ($\overline{P}^m_{T5R\_rc}, \overline{P}^m_{T5R\_rr}$).

Unfortunately, our analysis of the risky job gender wage gap is complicated by departures of the realized unemployment rates from the corresponding experimental design rate. Gender differences in the realized rates (luck of the draw) will affect our inferences about gender productivity gaps, gender wage gaps, and gender wage gap decompositions. To address this issue, we develop a methodology for calculating expected gender wage gaps that would arise from the experimental design unemployment(employment) rate.

The competitive job wage rate for the ith subject in gender group j in period t in T5R is determined according to

$$W^j_{T5R\_rc\_it} = 4\gamma_r P^j_{T5R\_rc\_it}\omega^j_{T5R\_rc\_it},$$

where $\omega^j_{T5R\_rc\_it}$ is an indicator for whether or not a subject in the competitive job task won the period t tournament. The expected tournament win rate for an individual subject in any given period t can be expressed as

$$\begin{aligned} E(\omega^j_{T5R\_rc\_it}) &= E\left(\omega^j_{T5R\_rc\_it} | E^j_{T5R\_rc\_it} = 1\right) E(E^j_{T5R\_rc\_it}) \\ &= E\left(\omega^j_{T5R\_rc\_it} | E^j_{T5R\_rc\_it} = 1\right) (1 - \phi). \end{aligned}$$

Let $E^j_{T5R\_rc\_it}$ be an indicator for employment in period t in the risky competitive job. The expected tournament win rate conditional upon employment is given by $E\left(\omega^j_{T5R\_rc\_it} | E^j_{T5R\_rc\_it} = 1\right)$. We estimate this expected tournament win rate as the proportion of employment periods in which the subject won tournaments. This estimate is denoted by $\pi^j_{WE\_T5R\_rc\_i}$. A subject's expected productivity conditional upon having the opportunity to type, i.e. being employed in any given period, is estimated as the sum of their productivities divided by the number of periods in which they were employed. This estimate is denoted by $\overline{P}^{ej}_{T5R\_rc\_i}$.

A subject's expected competitive wage in treatment trial T5R is estimated as

$$\begin{aligned} \widetilde{W}^{ej}_{T5R\_rc\_i} &= 4\gamma_r(1 - \phi)\overline{P}^{ej}_{T5R\_rc\_i}\pi^j_{WE\_T5R\_rc\_i} \\ &= 4\gamma_r(1 - \phi)P^{\omega j}_{T5R\_rc\_i}, \end{aligned}$$

where $P^{\omega j}_{T5R\_rc\_i} = \overline{P}^{ej}_{T5R\_rc\_i}\pi^j_{WE\_T5R\_rc\_i}$ is the estimated expected productivity conditional upon being employed weighted by the estimated expected probability of winning conditional upon employment, and $(1-\phi)P^{\omega j}_{T5R\_rc\_i}$ is an estimate of the subject's unconditional expected productivity. It follows that the average expected competitive wage for gender group j is simply

$$\widetilde{W}^{ej}_{T5R\_rc} = \frac{\sum_{i=1}^{N^j_{T5R\_rc}} \widetilde{W}^{ej}_{T5R\_rc\_i}}{N^j_{T5R\_rc}} = 4\gamma_r(1 - \phi)\overline{P}^{\omega j}_{T5R\_rc},$$

where $\overline{P}^{\omega j}_{T5R\_rc}$ is the average of the individual $P^{\omega j}_{T5R\_rc\_i}$ productivities. Accordingly, the expected gender competitive wage gap is estimated as

$$\widetilde{W}^{em}_{T5R\_rc} - \widetilde{W}^{ef}_{T5R\_rc} = 4\gamma_r(1-\phi)\left(\overline{P}^{\omega m}_{T5R\_rc} - \overline{P}^{\omega f}_{T5R\_rc}\right).$$

The noncompetitve job wage rate for the ith subject of gender j in period t in T5R is determined according to

$$W^{j}_{T5R\_rr\_it} = \gamma_r P^{j}_{T5R\_rr\_it} E^{j}_{T5R\_rr\_it} = \gamma_r P^{j}_{T5R\_rr\_it},$$

where $E^{j}_{T5R\_rr\_it}$ is an indicator for employment in period t in the risky noncompetitive job. A subject's expected productivity conditional upon having the opportunity to type, i.e. being employed in any given period, is estimated as the sum of their productivities divided by the number of periods in which they were employed. This estimate is denoted by $\overline{P}^{ej}_{T5R\_rr\_i}$. Given that $E(E^{j}_{T5R\_rr\_it}) = \phi$, we can estimate subject i's expected wage as

$$\widetilde{W}^{ej}_{T5R\_rr\_i} = \gamma_r(1-\phi)\overline{P}^{ej}_{T5R\_rr\_i}.$$

Thus, the average expected noncompetitive wage for gender group j is simply

$$\begin{aligned}\widetilde{W}^{ej}_{T5R\_rr} &= \frac{\sum_{i=1}^{N^{j}_{T5R\_rr}} \widetilde{W}^{ej}_{T5R\_rr\_i}}{N^{j}_{T5R\_rr}} \\ &= \gamma_r(1-\phi)\overline{P}^{ej}_{T5R\_rr},\end{aligned}$$

where $\overline{P}^{ej}_{T5R\_rr}$ is the average of the individual $\overline{P}^{ej}_{T5R\_rr\_i}$ productivities. The gender noncompetitive wage gap is therefore given by

$$\widetilde{W}^{em}_{T5R\_rr} - \widetilde{W}^{ef}_{T5R\_rr} = \gamma_r(1-\phi)\left(\overline{P}^{em}_{T5R\_rc} - \overline{P}^{ef}_{T5R\_rr}\right).$$

The average expected wage of subjects who participated in T5R is given by

$$\widetilde{W}^{ej}_{T5R} = \theta^j_{T5R\_rc}\widetilde{W}^{ej}_{T5R\_rc} + (1-\theta^j_{T5R\_rc})\widetilde{W}^{ej}_{T5R\_rr} \quad j = m, f.$$

After substitution of the expressions for the average expected wages for males and females and collecting terms, we obtain the alternative counterfactual decompositions:

$$\widetilde{W}^{em}_{T5R} - \widetilde{W}^{ef}_{T5R} = \underbrace{\gamma_r(1-\phi)\left(4\overline{P}^{\omega f}_{T5R\_rc} - \overline{P}^{ef}_{T5R\_rr}\right)\left(\theta^m_{T5R\_rc} - \theta^f_{T5R\_rc}\right)}_{\text{competition aversion}}$$
$$+ \underbrace{\gamma_r(1-\phi)\left[(1-\theta^m_{T5R\_rc})(\overline{P}^{em}_{T5R\_rr} - \overline{P}^{ef}_{T5R\_rr}) + 4\theta^m_{T5R\_rc}(\overline{P}^{\omega m}_{T5R\_rc} - \overline{P}^{\omega f}_{T5R\_rc})\right]}_{\text{productivity}} \tag{9}$$

$$= \underbrace{\gamma_r(1-\phi)(4\overline{P}^{\omega m}_{T5R\_rc} - \overline{P}^{em}_{T5R\_rr})(\theta^m_{T5R\_rc} - \theta^f_{T5R\_rc})}_{\text{competition aversion}}$$
$$+ \underbrace{\gamma_r(1-\phi)\left[(1-\theta^f_{T5R\_rc})(\overline{P}^{em}_{T5R\_rr} - \overline{P}^{ef}_{T5R\_rr}) + 4\theta^f_{T5R\_rc}(\overline{P}^{\omega m}_{T5R\_rc} - \overline{P}^{\omega f}_{T5R\_rc})\right]}_{\text{productivity}}. \tag{10}$$

Apart from subscripts that identify the experimental trial, the formulas for the risky job control experiments are identical to those used for the risky job treatment experiments. Consider the average wage among the set of subjects who were randomly assigned to the risky job control experiment and subsequently chose between the competitive and noncompetitive job in experimental trial C5R:

$$\overline{W}^j_{C5R} = \gamma_r\overline{P}^j_{C5R\_rr}(1-\theta^j_{C5R\_rc}) + 4\gamma_r\overline{P}^j_{C5R\_rc}\theta^j_{C5R\_rc}, \quad j = m, f.$$

The gender wage gap among the set of subjects who were randomly assigned the risky job track is decomposed into the gap attributable to gender differences in the choice between the competitive and noncompetitive job and gender differences in task productivity. The two alternative decompositions are given by

$$\begin{aligned}\overline{W}^m_{C5R} - \overline{W}^f_{C5R} &= \underbrace{\gamma_r(4\overline{P}^f_{C5R\_rc} - \overline{P}^f_{C5R\_rr})(\theta^m_{C5R\_rc} - \theta^f_{C5R\_rc})}_{\text{competition aversion}} \\ &+ \underbrace{\gamma_r\{(1-\theta^m_{C5R\_rc})(\overline{P}^m_{C5R\_rr} - \overline{P}^f_{C5R\_rr}) + 4\theta^m_{C5R\_rc}(\overline{P}^m_{C5R\_rc} - \overline{P}^f_{C5R\_rc})}_{\text{productivity}} \qquad (11) \\ &= \underbrace{\gamma_r(4\overline{P}^m_{C5R\_rc} - \overline{P}^m_{C5R\_rr})(\theta^m_{C5R\_rc} - \theta^f_{C5R\_rc})}_{\text{competition aversion}} \\ &+ \underbrace{\gamma_r\{(1-\theta^f_{C5R\_rc})(\overline{P}^m_{C5R\_rr} - \overline{P}^f_{C5R\_rr}) + 4\theta^f_{C5R\_rc}(\overline{P}^m_{C5R\_rc} - \overline{P}^f_{C5R\_rc})}_{\text{productivity}}. \qquad (12)\end{aligned}$$

We now apply our methodology for obtaining the expected wage gaps for C5R. The competitive wage rate for the ith subject in gender group j in period t is calculated as

$$W^j_{C5R\_rc\_it} = 4\gamma_r P^j_{C5R\_rc\_it}\omega^j_{C5R\_rc\_it}.$$

A subject's expected wage in treatment trial C5R is estimated by

$$\widetilde{W}^{ej}_{C5R\_rc\_i} = 4\gamma_r(1-\phi)\overline{P}^{ej}_{C5R\_rc\_i}\pi^j_{WE\_C5R\_rc\_i} = 4\gamma_r(1-\phi)P^{\omega j}_{C5R\_rc\_i},$$

where $(1-\phi)P^{\omega j}_{C5R\_rc\_i}$ is an estimate of the subject's unconditional expected productivity, and $P^{\omega j}_{C5R\_rc\_i} = \overline{P}^{ej}_{C5R\_rc\_i}\pi^j_{WE\_C5R\_rc\_i}$ is the estimated expected productivity conditional upon being employed weighted by the estimated expected probability of winning conditional upon employment. The average estimated expected competitive wage for gender group j is therefore

$$\widetilde{W}^{ej}_{C5R\_rc} = 4\gamma_r(1-\phi)\overline{P}^{\omega j}_{C5R\_rc},$$

where $\overline{P}^{\omega j}_{C5R\_rc}$ is the average tournament win rate weighted productivity. It follows that the expected gender competitive wage gap is given by

$$\widetilde{W}^{em}_{C5R\_rc} - \widetilde{W}^{ef}_{C5R\_rc} = 4\gamma_r(1-\phi)\left(\overline{P}^{\omega m}_{C5R\_rc} - \overline{P}^{\omega f}_{C5R\_rc}\right).$$

Turning to the risky, noncompetitive job in the control experiments, the wage for the ith subject of gender $j = m, f$ in period t is given by

$$W^{j}_{C5R\_rr\_it} = \gamma_r P^{j}_{C5R\_rr\_it} E^{j}_{C5R\_rr\_it} = \gamma_r P^{j}_{C5R\_rr\_it}.$$

We estimate subject i's expected noncompetitive wage as

$$\widetilde{W}^{ej}_{C5R\_rr\_i} = \gamma_r(1-\phi)\overline{P}^{ej}_{C5R\_rr\_i}.$$

where $\overline{P}^{ej}_{C5R\_rr\_i}$ is subject i's expected productivity, i.e. productivity conditional on the opportunity to type. Thus, the average expected noncompetitive wage for gender group j is simply

$$\widetilde{W}^{ej}_{C5R\_rr} = \gamma_r(1-\phi)\overline{P}^{ej}_{C5R\_rr}.$$

The expected gender noncompetitive wage gap is therefore estimated by

$$\widetilde{W}^{em}_{C5R\_rr} - \widetilde{W}^{ef}_{C5R\_rr} = \gamma_r(1-\phi)\left(\overline{P}^{em}_{C5R\_rc} - \overline{P}^{ef}_{C5R\_rr}\right).$$

The average expected wage of subjects who participated in C5R is estimated as

$$\widetilde{W}^{ej}_{C5R} = \theta^{j}_{C5R\_rc}\widetilde{W}^{ej}_{C5R\_rc} + (1-\theta^{j}_{C5R\_rc})\widetilde{W}^{ej}_{C5R\_rr} \quad j = m, f.$$

After substitution of the expressions for the average expected wages for males and females and collecting terms, we obtain the alternative counterfactual decompositions:

$$\widetilde{W}^{em}_{C5R} - \widetilde{W}^{ef}_{C5R} = \underbrace{\gamma_r(1-\phi)\left(4\overline{P}^{\omega f}_{C5R\_rc} - \overline{P}^{ef}_{C5R\_rr}\right)\left(\theta^m_{C5R\_rc} - \theta^f_{C5R\_rc}\right)}_{\text{competition aversion}}$$
$$+ \underbrace{\gamma_r(1-\phi)\left[(1-\theta^m_{C5R\_rc})(\overline{P}^{em}_{C5R\_rr} - \overline{P}^{ef}_{C5R\_rr}) + 4\theta^m_{C5R\_rc}(\overline{P}^{\omega m}_{C5R\_rc} - \overline{P}^{\omega f}_{C5R\_rc})\right]}_{\text{productivity}} \tag{13}$$

$$= \underbrace{\gamma_r(1-\phi)(4\overline{P}^{\omega m}_{C5R\_rc} - \overline{P}^{em}_{C5R\_rr})(\theta^m_{C5R\_rc} - \theta^f_{C5R\_rc})}_{\text{competition aversion}}$$
$$+ \underbrace{\gamma_r(1-\phi)\left[(1-\theta^f_{C5R\_rc})(\overline{P}^{em}_{C5R\_rr} - \overline{P}^{ef}_{C5R\_rr}) + 4\theta^f_{C5R\_rc}(\overline{P}^{\omega m}_{C5R\_rc} - \overline{P}^{\omega f}_{C5R\_rc})\right]}_{\text{productivity}}. \tag{14}$$

Empirical Results

Subjects were recruited from the University of Paris I (The Parisian Experimental Economics Laboratory (LEEP)) from December 2016 to December 2017. At the end of the experiment, a questionnaire was administered that asked the subjects for information regarding their age, gender, and education level.[3] There was a total of 213 subjects who participated in the experiments: 98 subjects (of which 50 subjects were female) in the treatment session, 55 subjects (of which 30 subjects were female) in the secure control session, and 60 subjects (of which 29 subjects were female) in the risky control session.

Table 1 reports average productivity (number of correctly typed blocks) by experimental trial categories, separately for males and females. The productivity figures are averages conditional upon subjects having the opportunity to type. Figures in brackets are average productivities that include spells of unemployment in risky job trials for which subjects do not have the opportunity to perform the typing task. Generally, participants perform better under competition and in risky jobs. To some extent this might reflect a desire to compensate

[3] A detailed instruction of the experiment can be found in the appendix

for the potential loss from tournament losses and unemployment. In the choice experimental trials there will also be higher-productivity subject selection effects at work.

For the treatment experimental trials involving choice between the competitive and noncompetitive jobs, both men and women exhibited higher productivity in the risky job trials than in the secure job trials. This was true for both the competitive jobs and noncompetitive job. Of course when unemployment spells are included, average productivity is less in the risky job than in the secure job.

In the case of subjects identified as relatively more risk averse in the treatment trials (T3(s)), those who subsequently chose the competitive job (T5S) performed on average at a much higher level than all participants in the assigned competitive job trial T4S. Women outperformed men in both the assigned competitive secure job treatment trials (T4S) and in the trials in which subjects were allowed to choose between the competitive and noncompetitive jobs (T5S). Women also outperformed men among those subjects who chose the secure, noncompetitive job. Nevertheless, the gender differences were relatively modest, i.e. averaging less than 1.0 correctly typed block.

Among subjects identified as relatively less risk averse in the treatment trials (T3(r)), those who subsequently chose the competitive job (T5R) performed on average at a much higher level than all participants in the assigned competitive job trial (T4R). Based on T3(s) vs. T3(r), more productive women tend to select the secure job whereas more productive men tend to select the risky job. Men outperformed women in both the assigned competitive secure job treatment trials (T4R) and in the trials in which subjects were allowed to choose between the competitive and noncompetitive jobs (T5R). Men also outperformed women among those subjects who chose the risky, noncompetitive job. These gender differences were relatively large, i.e. ranging from 1.11 to 2.74 correctly typed blocks. Thus, we see that relatively less risk averse men perform better than relatively less risk averse women which is the opposite of the case for relatively more risk averse subjects.

Among the subjects assigned to the secure job trials in the control experiments, those who subsequently chose the competitive job (C5S) performed significantly better than those who were assigned to the competitive job (C2S). This is indicative of a selection of more productive subjects into the competitive job. Men outperformed women in the assigned secure competitive control trials (C2S) and also in the secure competitive control trials when the subjects chose between competitive and noncompetitive jobs (C5S). In the case of random assignment to the competitive job, women outperformed men in C3S and men outperformed women in C4S. When considering noncompetitive jobs, men exhibited higher productivity than women in the assigned secure job trials (C1S), in the random assignment trials (C3S) and marginally in the job choice trials (C5S). Women's performance in the competitive job exceed that of the men in the random assignment trials (C3S).

For both men and women who participated in the risky control experimental trials, those who selected the competitive job in C5R on average performed at a significantly higher level than all participants who were assigned the competitive job in C2R. The gender productivity gap uniformly favored women in the risky competitive jobs, whether assigned or chosen. In terms of the noncompetitive jobs, the productivity of women exceeded that of the men in the assigned risky, noncompetitive jobs for C2R. This advantage carried over very slightly to the random assignment trials in C3R and C4R. With respect to the random assignment trials in C3R, the gender difference in productivity is virtually nonexistent when conditioning on the periods in which individuals were able to type. However, when spells of unemployment are included, the average typing performance of men exceeds that of women. This is indicative of women randomly experiencing more unemployment spells. The productivity of men in the risky, noncompetitive job exceeded that of the women in the job choice trials C5R.

An interesting pattern arises in the treatment job choice trials with respect to gender productivity differences for those who are identified as relatively more risk averse compared with those identified as relatively less risk averse. The higher productivity subjects are drawn to the competitive job among both male and female subjects. However, women dominate the men in terms of productivity among those who are identified as relatively more risk averse.

The opposite is true for those who are identified as relatively less risk averse. In the control job choice trials in which the secure and risky job tracks are randomly assigned, the higher productivity individuals also tend to be drawn to the competitive job.

Competitive job win rates are reported in Table 2. Each period of a competitive job trial constitutes a tournament. To win a tournament, a subject must score in the top 25% of the reference tournament. The reference tournaments are T4S, T4R, C2S, and C2R for T5S, T5R, C5S, and C5R, respectively. We report the applicable overall 75th percentiles. For the secure job treatment trials, the 75th percentile was 18 correctly typed blocks. For all other trials the 75th percentile was 17 correctly typed blocks.

For each gender group in experimental trial X, the win rate is calculated as the total number of tournament wins by gender group 'j' divided by the total number of tournament entries by gender group 'j':

$$\omega_X^j = \frac{\sum_{i=1}^{N_X^j} \sum_{t=1}^{T} \omega_{X\_it}^j}{T \cdot N_X^j}, \quad j = m, f.$$

The win rates are higher in job choice experimental trials than in the trials in which the tournament jobs are exogenously assigned. This is true for both men and women, for treatment and control trials, and for both secure and risky job tracks. This pattern is a manifestation of the selection at work in which higher productivity individuals select into the competitive jobs.

In the treatment experiments the tournament win rates were the highest among those identified as relatively less risk averse. The win rates were virtually identical for men and women, 0.44 and 0.43, respectively. The male subjects exhibited higher win rates than women for the secure job treatment in which the subjects were able to select the competitive job (T5S) and also for the risky job treatment in which the competitive job was exogenously assigned (T4R). Women experienced higher win rates than men in the secure job when subjects were exogenously assigned to the competitive job (T4S). For the control experiments in which subjects were exogenously assigned either to a risky job track or to a secure job track, the tournament win rate for men was higher than that of women in the secure job track when subjects could chose the competitive tournament (C5S). On the other hand, women dominated in the risky job track when subjects could choose the competitive job (C5R).

Table 3 reports gender differences in the propensity to select competitive jobs. For the secure jobs, those identified as relatively more risk averse were also more likely to choose the competitive job than those in the control experiments who were exogenously assigned to the secure job track. Also, men were more likely than women to select the competitive job for both the treatment trials and the control trials. However, these gender differences were not statistically significant.

In the case of the risky jobs, those who were identified as relatively less risk averse were less likely to choose the competitive job than those in the control experiments who were exogenously assigned to the risky job track. Men were also more likely than women to select the competitive jobs for both the treatment and control trials. In fact in the risky job treatment trials men were more than twice as likely as women to select the competitive job and almost twice as likely in the risky control trials to select the competitive job. Unlike in the case of the secure job, these gender gaps were both statistically significant.

Most importantly, the differences between the control and treatment gender gaps were not statistically significant for either the secure job trials or the risky job trials. This finding suggests that gender differences in risk preferences play no significant role in gender differences in competitive job choices. Furthermore, it is also the case that risk aversion is not a significant factor in choosing the competitive job for either male or female subjects, separately.

If we compare the competitive job choices from the secure job tracks with the competitive job choices from the risky job tracks, we see that subjects in the secure job tracks were usually more likely to select the competitive job than subjects in the risky job tracks. One might conjecture that conditional on the choice of the secure job track and its associated greater stability of earnings, subjects might be willing to gamble on the competitive job when confronted with the competitive job choice. By the same token, one might conjecture that conditional on the choice of the risky job track and its associated lower stability of earnings, subjects might be less willing to further gamble on the competitive job when confronted with the competitive job choice in the risky job environment. However, this conjecture is tempered by the fact that with only a single exception further testing revealed that there were no statistically significant differences in the competitive job choices between the secure job track and risky job track subjects. The single exception was that in the treatment (T5) experiments, women in the secure job track were statistically more likely to select the competitive job than women in the risky job track. Also, there were no statistically significant gender differences in the competitive job choices between the secure and risky job tracks.

The logit model estimates are reported in Table 4. The estimated coefficients on $M_i{\cdot}C_{S5\_i}$ and $M_i{\cdot}C_{R5\_i}$ reflect the logit diff-in-diff effects which are not statistically significant. This is consistent with the findings from Table 3 that indicate the absence of any effect of gender differences in risk aversion on gender differences in the propensity to select the competitive jobs.

The estimated coefficients on $M_i \cdot (C_{5S\_i} + T_{5S\_i})$ and $M_i \cdot (C_{5R\_i} + T_{5R\_i})$ reflect the gender differences in the effects of being relatively more risk averse or being relatively less risk averse on the probability of selecting the competitive job. These gender differences are not statistically significant, which means that the effects of being relatively more or relatively less risk averse on the probability of selecting the competitive job are the same for men and women. These effects are identified off of the estimated coefficients on $C_{5S\_i} + T_{5S\_i}$ and $C_{5R\_i} + T_{5R\_i}$ because statistically the male coefficients are the same as the corresponding female coefficients. These estimated coefficients for females (and implicitly for males) are negative and statistically significant, which means that both relatively more risk averse and relatively less risk averse subjects are less likely to select the competitive job.

The estimated coefficient on $M_i \cdot \overline{P}_i$ reflects the estimated gender difference in the effect of a subject's prior productivity on the probability of selecting the competitive job. This gender difference effect is not statistically significant which implies that the productivity effect on the probability of selecting the risky job is the same for males and females. This effect identified by the coefficient on $\overline{P}_i$ is positive and statistically significant. Thus, the higher a subject's prior productivity, the more likely the subject will choose the competitive job. That higher productivity subjects select into the competitive jobs is also evident from the productivity values reported in Table 1.

Although a spell of unemployment in each period for each subject participating in a risky job trial is randomly drawn from a simple binomial distribution with mean $\phi = 0.3$, gender differences inevitably arise in the realized unemployment rates. Table 5 reports the average realized unemployment rates separately for males and females. With a single exception, the average realized unemployment rates for female subjects exceeded that of the male subjects. The largest difference was 7.0 percentage points for the noncompetitive risky job in the control experimental trials C5R. The single exception was in for the competitive risky job in the control experimental trials C5R. In this case the realized female unemployment rate was 3.0 percentage points less than that of the males. These differences suggest that the observed gender wage gaps based on realized unemployment rates can differ considerably from the statistically expected gender wage gaps.

Table 6 reports the average wages and gender wage gaps for all experimental trials in which subjects chose between the competitive and noncompetitive jobs. We know from the results reported in Tables 3 and 4 that risk aversion plays no significant role in the choice between competitive and noncompetitive jobs. Therefore, it follows that risk aversion also plays no significant role in the wage gaps arising from these choices. Average wages reported in Table 6 include '0' wages earned during spells of unemployment in the risky jobs and tournament losses from the competitive jobs. The average wages earned in the competitive jobs always exceed the average wages earned in the noncompetitive jobs. The higher return to typing performance in the competitive jobs coupled with the higher average productivity in these jobs account for the greater remuneration in the competitive jobs.

Males averaged higher wage rates in all of the competitive job choice experimental trials. The male wage advantage was especially large in the risky job track of the treatment experiments. The wage gap was €1.40 or about 54% of the female average wage in T5R. Further disaggregation reveals that on average males earned more than females in competitive jobs in the treatment experiments and in the secure competitive job track in the control experiments. The male wage advantage was smaller both absolutely and relatively in the risky noncompetitive jobs. For the secure noncompetitive job in the control experiments (C5S), the gender wage gap was essentially nonexistent at €0.05. Women enjoyed a modest wage advantage in the risky competitive job in the control experiments (C5R) and a small wage advantage in the noncompetitive job in the secure job treatment experiments (T5S).

It is clear from Table 6 that the realized unemployment rates exaggerate the risky job gender wage gaps for both the treatment and control experiments. The biggest change from observed to expected gender wage gap was in the case of the risky competitive job in the treatment experiments T5R where the gender wage gap went from €1.08 in favor of males to €0.83 in favor of females. For the noncompetitive risky job in control experiment C5R, the gender wage gap went from €0.28 favoring males to a negligible €0.02.

The gender wage gap consequences of competition aversion are reported in Table 7. These effects are estimated from the decomposition of the wage gaps into competition aversion and productivity components.[4] When we examine the wage gap effects attributable to gender differences in competition aversion for the secure job treatment experiments, we find that from 40% to 53% of the gender wage gap can be attributable to gender differences in competition aversion. In these treatment experiments, subjects were identified as relatively

[4]Because gender differences in risk preferences have no statistically significant effect on gender wage gaps, gender differences in competitive vs. noncompetitive job choices are entirely attributed to competition aversion.

more risk averse. For the secure job control experiments, gender differences in competition aversion account for a proportionately smaller share of the wage gap, 17% to 39%. In these experiments, subjects were exogenously assigned to the secure job track.

Compared with the secure job tracks, the consequences of gender differences in competition aversion were much larger absolutely and relatively in the risky job track experiments. Among subjects identified as relatively less risk averse, gender differences in competition aversion accounted for between 67% and 77% of the gender wage gap. For the control experiments in which subjects were exogenously assigned to the risky job track, gender differences in competition aversion accounted for between 69% and 86% of the gender wage gap. The other side of the coin is that gender differences in productivity played a relatively modest role in generating wage gaps among subjects exogenously assigned to the risky job track.

Within the relatively homogeneous treatment job choice trials it is clear that competition aversion accounts for a greater share of the gender wage gap in the risky jobs compared with the secure jobs. This pattern is also found in the control job choice trials. When making comparisons between the relatively more homogeneous treatment group job tracks and the corresponding less homogeneous control group job tracks, there is no clear pattern for the association between the wage gap share of competition aversion and the risky vs. the secure job track.

Not surprisingly, the gender wage gaps based on the expected unemployment rate are markedly lower than those based on the realized unemployment rates. The adjusted gender wage gaps exhibit dramatic reductions in the contribution of gender productivity gaps and concomitant increases in the contribution of gender differences in competition aversion. This is the case because gender differences in the realized unemployment rate are manifested in gender productivity differences. Thus, the seeming male productivity advantage transforms either into a female productivity advantage or a significantly reduced male productivity advantage.

Summary and Conclusions

Specially designed laboratory experiments were conducted to shed light on the role that gender differences in competition aversion might play in generating gender wage gaps. These experiments were designed to detect and account for any possible effects of gender differences in risk aversion that might affect gender differences in competitive vs. noncompetitive job choices and the subsequent impact of gender differences in job choices on gender wage gaps.

A set of experimental treatments were run that aimed to generate more homogeneous subject groupings by separating subjects into relatively more risk averse and relatively less risk averse groupings based on their choices between risky and secure typing tasks. Depending on their risk choices, subjects ultimately chose between the secure competitive and the secure noncompetitive tasks or between the risky competitive and the risky noncompetitive tasks. In a cross-subject design, a set of control experiments were conducted that yielded a less homogeneous subject grouping with respect to risk preferences. In the control experiments subjects were exogenously assigned to either a secure or a risky job track. Depending on the assigned job track, subjects either chose between a secure competitive and a secure noncompetitive job or between a risky competitive and a risky noncompetitive job. The control typing tasks were the same as the corresponding treatment typing tasks.

Comparisons between the control and treatment job choices were used to identify the presence of pure risk preferences apart from competition aversion. The idea here is that subject job choice motivations in the control experiments could include risk aversion whereas in the corresponding treatment experiments attitudes toward risk aversion are at least partially controlled for by separating subjects based on their risky vs non-risky job choices.

The largest gender gap in the proportion of subjects choosing the competitive job occurred in the treatment job choice trials among those identified as relatively less risk averse. In agreement with Niederle and Vesterlund (2007), we find no evidence that risk aversion is an important factor underlying gender differences in competitive vs. noncompetitive job choices. Consequently, the wage gaps arising from gender differences in competitive vs.

noncompetitive job choices arise from gender differences in competition aversion.

The largest gender wage gap arose from those selecting the risky job track in the treatment experiments. The gender wage gap consequences of gender differences in competition aversion are far from modest and ranged between 39.7% and 77.0% of the total gender wage gaps when based on the realized unemployment rates. In the case of the risky job expected gender wage gaps, competition aversion ranged from 93.5% to 130.9% of the gender wage gap. After adjusting for the deviation of realized unemployment rates from the expected experimental design unemployment rate, gender wage gaps are significantly reduced with large decreases in the wage gap contribution of the gender productivity gap and concomitant increases in the wage gap contribution of gender differences in the competition aversion gap.

Naturally, in field settings the magnitude and nature of gender differences in productivity can be highly variable. Consequently, the relative and absolute importance of gender differences in competition aversion will vary with the nature of the employment context. Nevertheless, our experiments reveal the potential for gender wage gaps to arise from gender differences in competition aversion. Our experiments also reveal highly plausible selection effects associated with worker assessments of their own productivity. A broader perspective would include the determinants of how particular jobs are structured with respect to competition determined wages and the implications of these structures for gender wage gaps.

References

Altonji, J. G. and Blank, R. M. (1999). Race and gender in the labor market. In Ashenfelter, O. and Card, D., editors, *Handbook of Labor Economics*, volume 3 of *Handbook of Labor Economics*, chapter 48, pages 3143–3259. Elsevier.

Bertrand, M. (2011). *New Perspectives on Gender*, volume 4 of *Handbook of Labor Economics*, chapter 17, pages 1543–1590. Elsevier.

Bertrand, M. and Hallock, K. F. (2001). The gender gap in top corporate jobs. *ILR Review*, 55(1):3–21.

Blau, F. D. and Kahn, L. M. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of economic literature*, 55(3):789–865.

Buser, T., Geijtenbeek, L., and Plug, E. (2018). Sexual orientation, competitiveness and income. *Journal of Economic Behavior & Organization*, pages –.

Cardenas, J.-C., Dreber, A., von Essen, E., and Ranehill, E. (2012). Gender differences in competitiveness and risk taking: Comparing children in colombia and sweden. *Journal of Economic Behavior & Organization*, 83(1):11 – 23. Gender Differences in Risk Aversion and Competition.

Cox, J. and Oaxaca, R. (1996). Testing job search models: The laboratory approach,. *Research in Labor Economics*, 15:171–207.

Cox, J. C. and Oaxaca, R. L. (1989). Laboratory experiments with a finite-horizon job-search model. *Journal of Risk and Uncertainty*, 2(3):301–29.

Cox, J. C. and Oaxaca, R. L. (1992). Direct tests of the reservation wage property. *The Economic Journal*, 102(415):pp. 1423–1432.

Croson, R. and Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature*, 47(2):448–74.

Eckel, C. C. and Grossman, P. J. (2008). Men, Women and Risk Aversion: Experimental Evidence. In Plott, C. R. and Smith, V. L., editors, *Handbook of Experimental Economics Results*, volume 1 of *Handbook of Experimental Economics Results*, chapter 113, pages 1061–1073. Elsevier.

Fletschner, D., Anderson, C. L., and Cullen, A. (2010). Are women as likely to take risks and compete? behavioural findings from central vietnam. *The Journal of Development Studies*, 46(8):1459–1479. PMID: 21125722.

Goldin, C., Katz, L. F., and Kuziemko, I. (2006). The Homecoming of American College Women: The Reversal of the College Gender Gap. *Journal of Economic Perspectives*, 20(4):133–156.

Jung, S. (2017). Gender wage gap and sample selection via risk atttitudes. *International Journal of Manpower*, 38(2):318–335.

Jung, S., Choe, C., and Oaxaca, R. L. (2018). Gender wage gaps and risky vs. secure employment: An experimental analysis. *Labour Economics*, 52:112–121.

Kamas, L. and Preston, A. (2012). The importance of being confident; gender, career choice, and willingness to compete. *Journal of Economic Behavior & Organization*, 83(1):82–97.

Niederle, M. and Vesterlund, L. (2007). Do Women Shy Away from Competition? Do Men Compete Too Much? *The Quarterly Journal of Economics*, 122(3):1067–1101.

Niederle, M. and Vesterlund, L. (2011). Gender and competition. *Annual Review of Economics*, 3(1):601–630.

Oaxaca, R. (1973). Male-Female Wage Differentials in Urban Labor Markets. *International Economic Review*, 14(3):693–709.

Pissarides, C. A. (1974). Risk, job search, and income distribution. *Journal of Political Economy*, 82(6):1255–67.

Polachek, S. W. (1981). Occupational Self-Selection: A Human Capital Approach to Sex Differences in Occupational Structure. *The Review of Economics and Statistics*, 63(1):60–69.

Tables

Table 1: Productivity (Average Number of Correctly Typed Blocks)

	Males (N=104)		Females (N=109)		Gender Difference	
	Competitive	Noncompetitive	Competitive	Noncompetitive	Competitive	Noncompetitive
Treatment						
T1(s)	–	13.9	–	13.6	–	0.3
T1(r)	–	15.68	–	14.6	–	1.08
	–	[10.92]	–	[10.81]	–	[0.11]
T2(s)	–	16.04	–	15.23	–	0.81
T2(r)	–	15.12	–	14.01	–	1.11
	–	[10.59]	–	[9.88]	–	[0.71]
T3(s)	–	14.31	–	15.11	–	-0.80
T3(r)	–	16.51	–	14.34	–	2.17
	–	[11.22]	–	[9.99]	–	[1.23]
T4S	15.15	–	16.00	–	-0.84	–
T5S	17.11	13.63	17.76	14.49	-0.64	-0.85
T4R	16.98	–	14.63	–	2.34	–
	[12.18]	–	[9.72]	–	[2.45]	–
T5R	21.52	15.68	18.78	14.57	2.74	1.11
	[16.14]	[11.12]	[11.27]	[9.96]	[4.87]	[1.16]
Control						
C1S	–	14.21	–	13.63	–	0.58
C2S	15.38	–	14.48	–	0.89	–
C3S	13.44	16.06	14.88	13.82	-1.44	2.24
C4S	16.45	14.23	14.10	15.69	2.35	-1.46
C5S	17.11	14.78	16.17	14.43	0.94	0.34
C1R	–	14.60	–	15.16	–	-0.56
	–	[9.85]	–	[10.40]	–	[-0.55]
C2R	15.05	–	15.77	–	-0.72	–
	[11.17]	–	[11.75]	–	[-0.58]	–
C3R	16.09	14.86	16.22	14.87	-0.13	-0.01
	[11.37]	[11.14]	[11.24]	[10.3]	[0.13]	[0.84]
C4R	14.88	16.62	15.82	16.90	-0.94	-0.28
	[9.21]	[13.29]	[11.07]	[11.83]	[-1.87]	[1.47]
C5R	16.16	16.81	17.17	16.37	-1.01	0.44
	[11.15]	[11.77]	[12.36]	[10.37]	[-1.21]	[1.40]

Notes: Figures in brackets are productivities that include spells of unemployment in the risky job trials.

Table 2: Gender Differences in Competitive Job Wins

	75th percentile	Proportion of Tournaments Won: Males	Females	Gender Difference
Treatment				
T4S	18	0.24	0.29	-0.05
T5S	18	0.41	0.36	0.06
T4R	17	0.29	0.17	0.12
T5R	17	0.44	0.43	0.01
Control				
C2S	17	0.34	0.19	0.15
C3S	17	0.18	0.23	-0.05
C4S	17	0.43	0.16	0.27
C5S	17	0.48	0.34	0.14
C2R	17	0.25	0.26	-0.01
C3R	17	0.31	0.30	0.01
C4R	17	0.18	0.24	-0.06
C5R	17	0.33	0.36	-0.03

Table 3: Gender Differences in Competitive Job Choices

	Secure Job			Risky Job		
	θ^m_{sc}	θ^f_{sc}	θ^m_{sc}-θ^f_{sc}	θ^m_{rc}	θ^f_{rc}	θ^m_{rc}-θ^f_{rc}
Treatment (T5)	0.368***	0.318***	0.050	0.276***	0.107*	0.169**
	(0.111)	(0.099)	(0.149)	(0.083)	(0.058)	(0.102)
Control (C5)	0.320***	0.233***	0.087	0.323***	0.172**	0.151*
	(0.093)	(0.077)	(0.121)	(0.084)	(0.070)	(0.109)
Δ_{xc}	-0.048	-0.085	0.037	0.047	0.065	-0.018
	(0.145)	(0.126)	(0.192)	(0.118)	(0.091)	(0.149)

Notes: Δ_{xc}=control - treatment, x = s,r. ***, **, and * indicate statistical significance at the 1% , 5%, and 10% levels. Standard errors in parentheses.

Table 4: Competitive Job Choice Logit Model

Variables	Coefficients	
C_{5S}	$\Delta\beta^f_{5S\_sc}$	-0.116
		(0.670)
C_{5R}	$\Delta\beta^f_{5R\_rc}$	0.228
		(0.827)
$C_{5S} + T_{5S}$	$\beta^f_{T5S\_sc}$	-4.152**
		(1.336)
$C_{5R} + T_{5R}$	$\beta^f_{T5R\_rc}$	-4.373***
		(1.107)
$\overline{P}$	β^f_p	0.208**
		(0.076)
$M \times C_{5S}$	$\Delta\beta_{sc}$	-0.165
		(0.948)
$M \times C_{5R}$	$\Delta\beta_{rc}$	0.147
		(1.012)
$M \times (C_{5S} + T_{5S})$	$\Delta\beta_{T5S\_sc}$	1.807
		(1.607)
$M \times (C_{5R} + T_{5R})$	$\Delta\beta_{T5R\_rc}$	1.920
		(1.344)
$M \times \overline{P}$	$\Delta\beta_p$	-0.090
		(0.090)
chi2		50.96
N		213

Notes: ***, **, and * indicate statistical significance at the 1% , 5%, and 10% levels. Standard errors in parentheses.

Table 5: Realized Unemployment Rates

	Male		Female	
	Noncompetitive	Competitive	Noncompetitive	Competitive
T5R	0.29	0.25	0.32	0.40
obs	210	80	250	30
C5R	0.30	0.31	0.37	0.28
obs	210	100	240	50

Table 6: Wages

	Males			Females			Gender I	
	Overall	Competitive	Noncompetitive	Overall	Competitive	Noncompetitive	Overall	Competitive
Treatment								
T5S	3.06	5.03	1.91	2.77	4.35	2.03	0.29	0.68
T5R	3.98	8.60	2.22	2.58	7.52	1.99	1.40	1.08
T5R†	3.59	7.30	2.18	2.67	8.13	2.01	0.92	-0.83
Control								
C5S	3.22	5.65	2.07	2.38	3.58	2.02	0.84	2.07
C5R	3.19	4.96	2.35	2.63	5.31	2.07	0.56	-0.35
C5R†	2.98	4.48	2.26	2.68	4.82	2.24	0.30	-0.34

† Expected wage rates based on the expected unemployment rate from the experimental design.

Table 7: Gender Wage Gap Decompositions

Decomp	Eq. No.	Experiment_ Counterfactual	Competition Aversion	Productivity	Total
$\overline{W}^m_{T5S} - \overline{W}^f_{T5S}$	(3)	T5S_m	0.116	0.176	0.292
			(39.7%)	(60.3%)	
	(4)	T5S_f	0.156	0.136	0.292
			(53.4%)	(46.6%)	
$\overline{W}^m_{C5S} - \overline{W}^f_{C5S}$	(5)	C5S_m	0.140	0.696	0.836
			(16.7%)	(83.3%)	
	(6)	C5S_f	0.322	0.514	0.836
			(38.5%)	(61.5%)	
$\overline{W}^m_{T5R} - \overline{W}^f_{T5R}$	(7)	T5R_m	0.940	0.468	1.408
			(66.8%)	(33.2%)	
	(8)	T5R_f	1.084	0.324	1.408
			(77.0%)	(23.0%)	
$\widetilde{W}^{em}_{T5R} - \widetilde{W}^{ef}_{T5R}$	(9)	T5R_m†	1.033	-0.108	0.925
			(111.7%)	(-11.7%)	
	(10)	T5R_f†	0.865	0.060	0.925
			(93.5%)	(6.5%)	
$\overline{W}^m_{C5R} - \overline{W}^f_{C5R}$	(11)	C5R_m	0.486	0.078	0.564
			(86.2%)	(13.8%)	
	(12)	C5R_f	0.391	0.173	0.564
			(69.3%)	(30.7%)	
$\widetilde{W}^{em}_{C5R} - \widetilde{W}^{ef}_{C5R}$	(13)	C5R_m†	0.390	-0.092	0.298
			(130.9%)	(-30.9%)	
	(14)	C5R_f†	0.335	-0.037	0.298
			(112.4%)	(-12.4%)	

† Expected wage rates based on the expected unemployment rate from the experimental design.

Appendix

Detailed Formulas

The formulas used to construct the proportions of subjects choosing competitive tasks and the average productivity measures appearing in the gender wage gap decompositions are documented below.

Of the set of gender group $j = m, f$ individuals who selected the secure job (ss) in T3, $N^j_{T5S\_sc}$ denotes the number who chose the competitive job in T5S, and $N^j_{T5S\_ss}$ denotes the number who chose the secure noncompetitive job in T5S. Similarly, of the set of individuals who selected the risky job (rr) in T3, $N^j_{T5R\_rc}$ denotes the number who chose the risky competitive job in T5R, and $N^j_{T5R\_rr}$ denotes the number who chose the risky noncompetitive job in T5R.

The proportions of subjects who selected the competitive job in the T5S and T5R competitive job choice trials are given by $\theta^j_{T5S\_sc}$ and $\theta^j_{T5R\_sc}$, $j = m, f$, respectively. These proportions are calculated as follows:

$$\theta^j_{T5S\_sc} = \frac{N^j_{T5S\_sc}}{N^j_{T5S\_sc} + N^j_{T5S\_ss}}$$

$$\theta^j_{T5R\_rc} = \frac{N^j_{T5R\_rc}}{N^j_{T5R\_rc} + N^j_{T5R\_rr}}.$$

For subjects who participated in the secure job track T5S (having selected the secure job in T3), let $P^j_{T5S\_ss\_it}$ and $P^j_{T5S\_sc\_it}$ represent the number of correctly typed blocks in period t for the ith individual in gender group $j = m.f$ in the secure noncompetitive and secure competitive jobs, respectively. The average productivities for the noncompetitive secure job and the competitive secure job are respectively given by

$$\overline{P}^{j}_{T5S\_ss} = \frac{\sum_{i=1}^{N^{j}_{T5S\_ss}} \sum_{t=1}^{T} P^{j}_{T5S\_ss\_it}}{T \cdot N^{j}_{T5S\_ss}},$$

$$\overline{P}^{j}_{T5S\_sc} = \frac{\sum_{i=1}^{N^{j}_{T5S\_sc}} \sum_{t=1}^{T} \omega^{j}_{T5S\_sc\_it} P^{j}_{T5S\_sc\_it}}{T \cdot N^{j}_{T5S\_sc}},$$

where $N^{j}_{T5S\_ss}$ and $N^{j}_{T5S\_sc}$ are the numbers of subjects in the secure job track for gender group j who selected the noncompetitive and competitive jobs, respectively; T is the number of periods in each experimental trial; and $\omega^{j}_{T5S\_sc\_it}$ is an indicator for whether a subject in the competitive job task won the period t tournament.

Apart from subscripts that identify the experimental trial, the competitive job proportions and productivity formulas for subjects who participated in the companion secure job control group experiments ($C5S$) are identical to those used for the secure job treatment experiments:

$$\theta^{j}_{C5S\_sc} = \frac{N^{j}_{C5S\_sc}}{N^{j}_{C5S\_sc} + N^{j}_{C5S\_ss}},$$

$$\overline{P}^{j}_{C5S\_ss} = \frac{\sum_{i=1}^{N^{j}_{C5S\_ss}} \sum_{t=1}^{T} P^{j}_{C5S\_ss\_it}}{T \cdot N^{j}_{C5S\_ss}},$$

$$\overline{P}^{j}_{C5S\_sc} = \frac{\sum_{i=1}^{N^{j}_{C5S\_sc}} \sum_{t=1}^{T} \omega^{j}_{C5S\_sc\_it} P^{j}_{C5S\_sc\_it}}{T \cdot N^{j}_{C5S\_sc}}.$$

For subjects who participated in the risky job track T5R (having selected the risky job in T3), let $P^j_{T5R\_rr\_it}$ and $P^j_{T5R\_rc\_it}$ represent the number of correctly typed blocks in period t for the ith individual in gender group $j = m.f$ in the risky noncompetitive and risky competitive jobs, respectively. The average productivities for the noncompetitive risky job and the competitive risky job are respectively given by

$$\overline{P}^j_{T5R\_rr} = \frac{\sum_{i=1}^{N^j_{T5R\_rr}} \sum_{t=1}^{T} P^j_{T5R\_rr\_it} E^j_{T5R\_rr\_it}}{T \cdot N^j_{T5R\_rr}} = \frac{\sum_{i=1}^{N^j_{T5R\_rr}} \sum_{t=1}^{T} P^j_{T5R\_rr\_it}}{T \cdot N^j_{T5R\_rr}},$$

$$\overline{P}^j_{T5R\_rc} = \frac{\sum_{i=1}^{N^j_{T5R\_rc}} \sum_{t=1}^{T} \omega^j_{T5R\_rc\_it} P^j_{T5R\_rc\_it}}{T \cdot N^j_{T5R\_rc}},$$

where, $N^j_{T5R\_rr}$ and $N^j_{T5R\_rc}$ are the numbers of subjects in the risky job track for gender group j who selected the noncompetitive and competitive jobs, respectively; $\omega^j_{T5R\_rc\_it}$ is an indicator for whether a subject in the competitive job task won the tournament in period t; $E^j_{T5R\_rr\_it}$ and $E^j_{T5R\_rc\_it}$ are indicators for employment in period t in the risky noncompetitive job and the risky competitive jobs, respectively; and $E^j_{T5R\_rr\_it} = 0 \Rightarrow P^j_{T5R\_rr\_it} = 0$.

Apart from subscripts that identify the experimental trial, the competitive job proportions and productivity formulas for subjects who participated in the companion risky job control group experiments (C5R) are identical to those used for the risky job treatment experiments:

$$\theta^j_{C5R\_rc} = \frac{N^j_{C5R\_rc}}{N^j_{C5R\_rc} + N^j_{C5R\_rr}},$$

$$\overline{P}^j_{C5R\_rr} = \frac{\sum_{i=1}^{N^j_{T5R\_rr}} \sum_{t=1}^{T} P^j_{C5R\_rr\_it} E^j_{C5R\_rr\_it}}{T \cdot N^j_{C5R\_rr}} = \frac{\sum_{i=1}^{N^j_{C5R\_rr}} \sum_{t=1}^{T} P^j_{C5R\_rr\_it}}{T \cdot N^j_{C5R\_rr}},$$

$$\overline{P}^{j}_{C5R\_rc} = \frac{\sum_{i=1}^{N^{j}_{C5R\_rc}} \sum_{t=1}^{T} \omega^{j}_{C5R\_rc\_it} P^{j}_{C5R\_rc\_it}}{T \cdot N^{j}_{C5R\_rc}}.$$

Average expected productivities for risky job gender wage gaps are estimated on the basis of the observed tournament win rates and the experimental design unemployment rate given by $\phi = 0.3$.

In the case of the risky competitive job for the treatment experiments, a subject's expected tournament win rate conditional upon employment is estimated as the proportion of employment periods in which the subject won the tournament:

$$\pi^{j}_{WE\_T5R\_rc\_i} = \frac{\sum_{t=1}^{T} \omega^{j}_{T5R\_rc\_it}}{T^{j}_{E\_T5R\_rc\_i}},$$

where $T^{j}_{E\_T5R\_rc\_i}$ is the number of employed periods for subject i. A subject's expected productivity conditional upon having the opportunity to type, i.e. being employed in any given period, is estimated as

$$\overline{P}^{ej}_{T5R\_rc\_i} = \frac{\sum_{t=1}^{T} P^{j}_{T5R\_rc\_it}}{T^{j}_{E\_T5R\_rc\_i}}.$$

A subject's expected probability of winning a tournament conditional upon employment is estimated by $P^{\omega j}_{T5R\_rc\_i} = \overline{P}^{ej}_{T5R\_rc\_i} \pi^{j}_{WE\_T5R\_rc\_i}$. Accordingly, the gender group j average tournament win rate productivity is given by

$$\overline{P}^{\omega j}_{T5R\_rc} = \frac{\sum_{i=1}^{N^{j}_{T5R\_rc}} P^{\omega j}_{T5R\_rc\_i}}{N^{j}_{T5R\_rc}}.$$

In the case of the risky noncompetitive job for the treatment experiments, a subject's expected productivity conditional upon having the opportunity to type, i.e. being employed in any given period, is estimated as

$$\overline{P}^{ej}_{T5R\_rr\_i} = \frac{\sum_{t=1}^{T} P^{j}_{T5R\_rr\_it}}{T^{j}_{E\_T5R\_rr\_i}},$$

where $T^{j}_{E\_T5R\_rr\_i}$ is the number of employed periods for subject i. Gender group j average expected productivity is given by

$$\overline{P}^{ej}_{T5R\_rr} = \frac{\sum_{i=1}^{N^{j}_{T5R\_rr}} P^{ej}_{T5R\_rr\_i}}{N^{j}_{T5R\_rr}}.$$

Apart from subscripts that identify the experimental trial, the formulas for the risky job control experiments (C5R) are identical to those used for the risky job treatment experiments.

For the companion risky competitive job control experiments, the estimation formulas are given by

$$\pi^{j}_{WE\_C5R\_rc\_i} = \frac{\sum_{t=1}^{T} \omega^{j}_{C5R\_rc\_it}}{T^{j}_{E\_C5R\_rc\_i}},$$

$$\overline{P}^{ej}_{C5R\_rc\_i} = \frac{\sum_{t=1}^{T} P^{j}_{C5R\_rc\_it}}{T^{j}_{E\_C5R\_rc\_i}},$$

$$\overline{P}^{\omega j}_{C5R\_rc} = \frac{\sum_{i=1}^{N^{j}_{C5R\_rc}} P^{\omega j}_{C5R\_rc\_i}}{N^{j}_{C5R\_rc}}.$$

For the companion risky noncompetitive job control experiments, the estimation formulas are given by

$$\overline{P}^{ej}_{C5R\_rr\_i} = \frac{\sum_{t=1}^{T} P^{j}_{C5R\_rr\_it}}{T^{j}_{E\_C5R\_rr\_i}},$$

$$\overline{P}^{ej}_{C5R\_rr} = \frac{\sum_{i=1}^{N^{j}_{C5R\_rr}} P^{ej}_{C5R\_rr\_i}}{N^{j}_{C5R\_rr}}.$$

Experimental Instruction

[Slide1]

Hello, We thank you for your participation in this experiment. In this experiment, you can earn between 5 and 30 euros. It is important to read the instructions carefully, as your winnings will depend on your decisions.

You will have 60 seconds to copy to using your keyboard the words that appear on your screen. You will be paid according to your performance.

The recopied words can be separated by a comma or a space (using the space bar on your keyboard).

The word order does not matter (you can copy the words in the disorder).

There will be 5 stages each comprising 10 periods. Only one period of each stage will be randomly selected and retained to determine your final win.

[Slide2]

- *For treatment group*

During the first two stages, you will perform two different types of tasks (one type per stage). Then you will choose one of these two types of tasks, and you will do the task of your choice in the third stage.

After the third stage, you will perform another type of tasks. Then you will choose one of these two types of tasks (the third stage and the fourth stage), and you will do the task of your choice in the fifth stage. You will finally complete a questionnaire and collect your compensations.

- *For control groups*

During the first two stages, you will perform two different types of tasks (one type per stage). Next, you will repeat the two different types of tasks in the random order in the following two stages.

Then you will choose one of these two types of tasks, and you will do the task of your choice in the fifth stage.

You will finally complete a questionnaire and collect your compensations.

[**Treatment group**]

Each participant in the treatment group takes 5 stages as follows:

T1: Randomly assigned between ss and rr

T2: rr or ss in reverse of the assignment in T1

T3: Choice of ss vs. rr

T4: sc if ss chosen in T3 (T4S), rc if rr chosen in T3 (T4R)

T5: Choice of ss vs. sc if ss chosen in T3 (T5S), choice of rr vs. rc if rr chosen in T3 (T5R).

[At the beginning of each type of tasks]

Type ss: 10 periods , piece-rate payment (T1 or T2 : randomly assigned)

The remuneration for each correctly copied word is 14 cents. At each period, you will have to perform the task.

Type sc: 10 periods, the tournament (assigned : T4 if chosen secure job in T3: T4S)

At each period, you will have to perform the task.

For this task, your payment will depend on your performance against the performance of your colleagues in this room. If you scored in the top 25% of others in this room, the pay for each correctly copied word is 56 cents.

You will not be informed of the outcome of the tournament until the end of the session.

Type sc: 10 periods, the tournament (choice : T5 if chosen secure job in T3: T5S)

At each period, you will have to perform the task.

For this task, your payment will depend on your performance against the performance of your colleagues in this room. If you scored in the top 25% compared to the others in the previous task (Stage 4 (T4S)), the remuneration for each correctly copied word is 56 cents.

You will not be informed of the outcome of the tournament until the end of the session.

Type rr: 10 periods , Piece-rate payment with the risk of unemployment (T1 or T2 : randomly assigned)

At the start of each period, you will play a lottery which will determine whether or not you can perform the task for the current period. In each lottery there is a 30% probability that you will not be able to perform the task, in which case your compensation will be 0 euros for the period concerned.

If you will be able to do the task, the remuneration for each correctly copied word is 20 cents.

Type rc: 10 periods, the tournament with the risk of unemployment (assigned : T4 if chosen risky job in T3: T4R)

At the start of each period, you will play a lottery which will determine whether or not you can perform the task for the current period. In each lottery there is a 30% probability that you will not be able to perform the task, in which case your compensation will be 0 euros for the period concerned.

If you will be able to perform the task, your payment will depend on your performance against the performance of your colleagues in that room. If you scored in the top 25% of others in this room, the pay for each correctly copied word is 80 cents.

You will not be informed of the outcome of the tournament until the end of the session.

Type rc: 10 periods, the tournament with the risk of unemployment (choice : T5 if chosen risky job in T3: T5R)

At the start of each period, you will play a lottery which will determine whether or not you can perform the task for the current period. In each lottery there is a 30% probability that you will not be able to perform the task, in which case your winning will be 0 euros for the period concerned.

If you will be able to perform the task, your payment will depend on your performance against the performance of your colleagues in that room. If you scored in the top 25% compared to the others in the previous task (Stage 4 (T4R)), the remuneration for each correctly copied word is 80 cents.

You will not be informed of the outcome of the tournament until the end of the session.

Choice: T3

In this stage, you are going to perform the task type of your choice that you have experienced. Please choose one type that you would like to perform in this stage

-Type ss (*give information which stage it was assigned*): remuneration: 14 cents

-Type rr: remuneration: 20 cents, 30% of unemployment

Choice: T5S

In this stage, you are going to perform the task type of your choice that you have experienced. Please choose one type that you would like to perform in this stage

-Type ss (*give information which stage it was assigned*): remuneration: 14 cents

-Type sc: remuneration: 56 cents if in top 25%

Choice: T5R

In this stage, you are going to perform the task type of your choice that you have experienced. Please choose one type that you would like to perform in this stage

-Type rr (*give information which stage it was assigned*): remuneration: 20 cents, 30% of unemployment

-Type rc: remuneration: 80 cents in in top 25%, 30% of unemployment

[**Control group 1**]

Each participant in the control group 1 takes 5 stages as follows:

C1S: ss

C2S: sc

C3S: Randomly assigned between ss and sc

C4S: ss or sc in reverse of the assignment of C3S

C5S: Choice of ss vs. sc

[At the beginning of each type of tasks]

Type ss: 10 periods, piece-rate payment

The remuneration for each correctly copied word is 14 cents. At each period, you will have to perform the task.

Type sc: 10 periods, the tournament (assigned: C2S)

At each period, you will have to perform the task.

For this task, your payment will depend on your performance against the performance of your colleagues in this room. If you scored in the top 25% of others in this room, the pay for each correctly copied word is 56 cents.

You will not be informed of the outcome of the tournament until the end of the session.

Type sc: 10 periods, the tournament (after C3S)

At each period, you will have to perform the task.

For this task, your payment will depend on your performance against the performance of your colleagues in this room. If you mark in the top 25% compared to the others in the previous task (Stage 2 (C2S)) , the remuneration for each word correctly copy is 56 cents.

You will not be informed of the outcome of the tournament until the end of the session.

Choice: C5S

In this stage, you are going to perform the task type of your choice that you have experienced. Please choose one type that you would like to perform in this stage

-Type ss (*give information which stage it was assigned*): remuneration: 14 cents

-Type sc: remuneration: 56 cents if in top 25%

[**Control group 2**]

Each participant in the control group 2 takes 5 stages as follows:

C1R: rr

C2R: rc

C3R: Randomly assigned between rr and rc

C4R: rr or rc in reverse of the assignment of C3R

C5R: Choice of rr vs. rc

[At the beginning of each type of tasks]

Type rr: 10 periods, Piece-rate payment with the risk of unemployment

At the start of each period, you will play a lottery which will determine whether or not you can perform the task for the current period. In each lottery there is a 30% probability that you will not be able to perform the task, in which case your compensation will be 0 euros for the period concerned.

If you can perform the task, the remuneration for each correctly copied word is 20 cents.

Type rc: 10 periods, the tournament with the risk of unemployment (assigned: C2R)

At the start of each period, you will play a lottery which will determine whether or not you can perform the task for the current period. In each lottery there is a 30% probability that you will not be able to perform the task, in which case your compensation will be 0 euros for the period concerned.

If you will be able to perform the task, your payment will depend on your performance against the performance of your colleagues in that room. If you scored in the top 25% of others in this room, the pay for each correctly copied word is 80 cents.

You will not be informed of the outcome of the tournament until the end of the session.

Type rc: 10 periods, the tournament with the risk of unemployment (after C3R)

At the start of each period, you will play a lottery which will determine whether or not you can perform the task for the current period. In each lottery there is a 30% probability that you will not be able to perform the task, in which case your compensation will be 0 euros for the period concerned.

If you will be able to perform the task, your payment will depend on your performance against the performance of your colleagues in that room. If you scored in the top 25% compared to the others in the previous task (Stage 2 (C2R)), the remuneration for each correctly copied word is 80 cents.

You will not be informed of the outcome of the tournament until the end of the session.

<u>Choice: C5R</u>

In this stage, you are going to perform the task type of your choice that you have experienced. Please choose one type that you would like to perform in this stage

-Type rr (*give information which stage it was assigned*): remuneration: 20 cents, 30% of unemployment

-Type rc: remuneration: 80 cents in in top 25%, 30% of unemployment

[The end]

Finally, please answer the questions carefully, and then go to the administrator to collect your final prize.

-5 questions.

Age / Gender / Education / Self Risk Preference / Self Competition Preference

Thank you very much for your participation!