Gender Differences in Wage Expectations and Negotiation*

Lukas Kiessling, Pia Pinger, Philipp Seegers, and Jan Bergerhoff

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Abstract

This paper presents evidence from a large-scale study on gender differences in expected wages before labor market entry. Based on data for over 15,000 students, we document a significant and large gender gap in wage expectations that closely resembles actual wage differences, prevails across subgroups, and along the entire distribution. Over the life-cycle this gap amounts to roughly half a million Euros. Our findings further suggest that expected wages closely relate to expected asking and reservation wages and that a difference in "boldness" during wage negotiations pertains to gender difference in expected wages. Given the importance of wage expectations for labor market decisions, household bargaining, and wage setting, our results provide an explanation for persistent gender inequalities.

Keywords: Subjective wage expectations, gender gap, negotiations
JEL-Codes: D81, D84, I21, I23, J13, J30

*Lukas Kiessling: Max Planck Institute for Research on Collective Goods, lkiessling@coll.mpg.de; Pia Pinger (corresponding author): University of Cologne and Institute on Behavior and Inequality (briq), pia.pinger@gmail.com; Philipp Seegers: Maastricht University, pks@candidate-select.com; Jan Bergerhoff: Maastricht University, jb@candidate-select.de. An earlier version of this paper titled "Gender Differences in Wage Expectations: Sorting, Children, and Negotiation Styles" was published as IZA Discussion Paper No. 12522 in August 2019. Funding by the German Research Foundation (DFG) through CRC TR 224 (Project A02), and through Germany's Excellence Strategy (EXC 2126/1–390838866), as well as funding through the European Regional Development Fund and the state of North Rhine-Westphalia (project FAIR, EFRE no 08011872) is gratefully acknowledged.

1 Introduction

The gender gap in labor earnings ranges among the best documented facts in the empirical economic literature and is subject to regular policy debates.[1] Overall, the unconditional gap ranges from 5 to 35% across different OECD countries and in both absolute and relative terms it tends to be particularly large for individuals with a college degree or higher (OECD, 2015). Moreover, convergence in male-female wages remains slow despite sustained efforts towards achieving gender-based equality of opportunity.

A closely-related gender gap is the gap in *ex-ante* wage *expectations*, i.e., male-female differences in expectations about labor market returns *before* entering the labor market (see, e.g., Blau and Ferber (1991); Brunello, Lucifora, and Winter-Ebmer (2004) for initial and Reuben, Wiswall, and Zafar (2017) for more recent evidence). Such male-female gaps in labor market expectations are important as they potentially determine education and labor market choices, household bargaining, and wage setting. They are also an important component in financial decision-making, e.g., regarding the optimal choice of retirement and savings plans. Moreover, there may exist important feedback effects whereby expected wages drive actual wage differences (e.g., through wage negotiations), and actual observable wage disparities affect expectations, thus providing a rationale for persistent gender wage gaps.

The aim of this paper is to provide first encompassing and large-scale descriptive evidence on gender wage expectations, as well as investigating how male and female expected wages relate to plans about initial wage bargaining. For this purpose, we have elicited wage expectations for counterfactual study trajectories among more than 15,000 German students from all regions, universities, study fields and over the entire prospective working life. In addition, the data contain elicited expectations about future labor force participation, working hours, child-rearing plans, and wage negotiations, as well as information on perceived and actual ability, personality, IQ, beliefs and preferences.

In a first instance, we document a range of stylized facts about male-female wage expectations, including population-wide and subgroup-specific gaps in expected wages, distributional differences in ranks and levels, and differences in expected life-cycle wage trajectories. We show that the gender gap in expected wages is significant and large across all subgroups and along the entire distribution. Moreover, it is simi-

[1] For a recent summary of the literature, see Blau and Kahn (2017) and Kunze (2018).

lar to the observed actual wage gap among recent graduates.[2] In terms of life-cycle wage developments, females expect flatter wage trajectories, with an initial gap of 14 percent increasing to 27 percent at the age of 55. The accumulated life-cycle gap in expected wages hence amounts more than 500,000 EUR. In terms of magnitude, this "perceived return to being male" is close to the actual return of obtaining a university degree.

In a second instance, we provide first empirical evidence on prospective wage negotiations as a link between expected and actual wages. We document pronounced gender gaps in initial wage claims (19%) and reservation wages (18%). Based on these, we construct a measure of boldness in wage negotiations and show that females envisage substantially less scope for wage negotiations. Differences in boldness during wage negotiations drive around 14-15% of the gender gap in expected starting wages and thus hold similar importance as differences in major choice or occupational sorting.

This paper makes several contributions. First, the size and diversity of our sample allows us to make claims about the overall magnitude of the gender gap in wage expectations, and to explore heterogeneities across study fields, aspired occupations, regional labor markets, and numerous background characteristics. Second, by asking about expected wages at three points in the future and for different study scenarios, we can construct within-individual life-cycle wage trajectories to obtain expected differences in growth rates, relative ranks, and expected lifetime labor earnings. Third, information about prospective wage negotiations permits us to document the importance of gender differences in anticipated wage negotiations and to relate wage claims and negotiation strategies to expected wage outcomes. Since wage negotiations are an important component of the wage-setting process, our results provide an important link between expected and actual wages, and an explanation why the gender gap in expected wages mirrors the gender gap in actual wages.

This study thus relates to a buoyant literature on wage expectations, which, pioneered by Manski (Dominitz and Manski, 1997; Manski, 2004), has repeatedly documented the importance of elicited expectations and beliefs for explaining education choices and labor market behaviors (e.g., Arcidiacono, Hotz, and Kang, 2012; Boneva and Rauh, 2020; Jensen, 2010; Kaufmann, 2014; Stinebrickner and Stinebrickner, 2014; Zafar, 2011). It also relates to a range of prior studies documenting the existence of a gender gap in ex-ante wage expectations in a number of specialized samples, i.e., containing information from students enrolled in particular colleges/universities

[2]Among German college graduates, the gender wage gap is 20% overall and reduces to 5-10% after accounting for a large number of controls (Destatis, 2014, 2017; Francesconi and Parey, 2018). It is thus comparatively large.

or fields of study. These studies have separately identified several potential drivers of the gender gap in wage expectations, including differences in major choice, personality traits, and economic preferences (Reuben, Wiswall, and Zafar, 2017; Zambre, 2018).

We also speak to a literature on bargaining and male-female wage negotiations. While previous research suggests that females are less likely to initiate negotiations (Bowles, Babcock, and Lai, 2007; Babcock and Laschever, 2009; Leibbrandt and List, 2015; Exley, Niederle, and Vesterlund, 2020), we provide evidence suggesting that females claim lower initial wages and are less bold in wage negotiations, and that this variation captures an important part of the male-female gap in expected wages. Our findings thus complement recent evidence on gender differences in negotiation behavior from laboratory experiments (Rigdon, 2012) and the field (Säve-Söderbergh, 2019; Andersen et al., 2020).

The remainder of the paper is organized as follows. In the next section, we discuss the sample, questionnaire measures and construction of life-cycle wage trajectories. Section 3 documents male-female differences in wage expectations both for starting wages and over the life cycle. This section also shows that differences in expected wages relate to differences in actual wages. In Section 4, we then we study the role of boldness in wage negotiations and how it relates to the gender gap in expected wages. Finally, section 5 concludes.

2 Data

This section reports on our sample and questionnaire measures. We start out by describing our sample and questionnaire measures of expected wages, labor supply and children, initial wage claims and reservation wages, sorting, and background characteristics. Then, we explain how we construct expected wage trajectories and measures of negotiation strategies.

2.1 Sample

Our sample comprises 15,348 students and 1,155 recent graduates (since our focus is on student expectations, we will henceforth use the word “students”). All individuals were recruited as part of the German student study “Fachkraft 2020” (now called Fachkraft 2030; Seegers et al., 2016), surveyed in the second half of March 2015. In addition, a subsample of 10,790 students (70.3%) completed a supplemen-

tary psychological questionnaire comprising measures of personality traits, economic preferences, and IQ.

Students were contacted via the mailing list of a popular nationwide job board.[3] They were contacted via email and took part in an online questionnaire.[4] The sample closely compares to the overall population of German students in terms of their sociodemographic characteristics and major distribution (see Table 1).

Table 1: Descriptive statistics of the sample

	Full sample	Restricted sample	Sozial-erhebung	Statistical Office
Sociodemographic variables				
Female	0.57	0.58	0.48	0.48
Graduated from HS in East Germany	0.18	0.18	0.15	–
Migration background	0.18	0.18	0.20	–
Student assistence (*BAföG*)	0.25	0.26	0.21	–
Major				
STEM-related majors	0.34	0.34	0.41	0.38
Humanities, Social Sciences, Econ.	0.57	0.58	0.53	0.52
Medical-/Health sciences	0.09	0.08	0.06	0.09
Observations	15348	10790		

Notes: This table presents summary statistics of our student sample (full sample and subsample of respondents who completed the personality questionnaire) and compares these numbers to data from the *21. Sozialerhebung* (a representative survey of the German Ministry of Education and Research conducted in 2016; Middendorff et al., 2017) and the German Statistical Office (Destatis). We had to aggregate our major categories to obtain consistent definitions across the different data sources.

2.2 Measures

Individuals answered a comprehensive questionnaire regarding their own background and university enrollment, expectations about their course of studies, labor market expectations, expectations about child-rearing, and wage negotiation plans. They also provided information about expected future employment and student jobs. Finally, part of the sample completed a short IQ test, as well as a questionnaire about personality traits and preferences.

Wage expectations and realized wages. We asked subjects to indicate their expected yearly labor earnings in current Euros before taxes and at different points over

[3]The job board jobmensa.de is operated by Studitemps GmbH and is the largest platform for student jobs.

[4]The questionnaire was filled in by 8% of contacted students. Participation was incentivized using Amazon vouchers amounting to 5,000 EUR (1 x € 1,000, 4 x € 250, 10 x € 100, 40 x € 50 vouchers).

the life cycle: (i) in their first job after graduation ($w^s_{i,st}$), (ii) at the age of 40 ($w^s_{i,40}$), and (iii) at the age of 55 ($w^s_{i,55}$). We chose these time points for several reasons. First, starting wages are likely to be a natural reference point for many students and most related to their expected labor market negotiations. Starting wages are also most often elicited in the literature on wage expectations (Arcidiacono, Hotz, and Kang, 2012; Webbink and Hartog, 2004). Second, the age of 40 is the time when individuals will have likely completed their prospective family planning, such that child-related differences in expected wage trajectories should become apparent at this point. Third, the age of 55 is close to the time where wages peak but before early retirement sets in (Piopiunik, Kugler, and Wößmann, 2017).

We asked students to state these expected wages under three different scenarios, regarding their course of studies: (a) if they complete their current (*first*) studies ($w^f_{i,t}$), (b) if they change to their second most preferred *alternative* field of study ($w^a_{i,t}$), and (c) if they *dropout* and do not complete any further educational degree ($w^d_{i,t}$). Thus, given three scenarios (a)-(c), denoted by s, and three points over the life cycle (i)-(iii), denoted by t, we elicit a total of nine expected wages ($w^s_{i,t}$). In addition, we ask all individuals to state the probability of each of the respective scenarios materializing ($p^s_{i,t}$).

Assuming these scenarios to be mutually exclusive, i.e., that students either finish, change study fields or drop out, we can use the above information to construct our measure of *overall expected wages* as follows:

$$w_{i,t} = p^f_{i,t} w^f_{i,t} + p^a_{i,t} w^a_{i,t} + p^d_{i,t} w^d_{i,t} \quad \forall\, t \in \{st, 40, 55\}. \tag{1}$$

We reweigh probabilities in cases where the stated probabilities add up to more than one hundred percent (7 percent). Moreover, we exclude individuals (less than 1%) who indicated implausible large expected wages of more than 1,000,000 EUR per year.

Our measure of *realized wages* are actual labor earnings before taxes reported by the graduates in our sample. All expected and actual labor earnings variables were winsorized at the 1% and 99% level.

Initial wage claims, reservation wages, and discrimination. Respondents were asked about the initial salary students would demand as they enter a wage negotiation (initial wage claim, $w_{i,I}$).[5] We also inquired about the lowest wage rate at which a student would be willing to accept a job after finishing her studies (reservation wage,

[5]While not all jobs require wage negotiations, Hall and Krueger (2012) show that the incidence of wage negotiations is much higher for highly-educated individuals with college degrees compared

$w_{i,R}$).[6] Based on initial wage claims and reservation wages, we construct a measure of negotiation behavior capturing boldness (see section 4). Moreover, respondents stated whether they would expect to earn the same wage if they were a member of this opposite sex but with identical skills, characteristics, traits, and qualifications. If the answer is "no", we interpret this as an indicator of perceived gender discrimination.[7]

Additional measures. In addition to these wage expectations, our data include a series of additional variables. First, we elicited measures related to sorting into majors and occupations. Specifically, students could indicate their current field of study from a list of fifteen majors, which we subsequently aggregate to five broad fields (Medical/health sciences, STEM, law, economics/business, and humanities), and their aspired occupation out of 429 pre-defined occupations (or a free text field), which we subsequently code in terms of the ISCO-08 occupational classification. Second, we elicit measures of expected labor supply for each of the above-mentioned scenarios, as well as child-related career breaks. Third, we collected a rich set of variables related to students' perceived ability, personality traits, cognitive ability, and economic preferences, as research in personality psychology and economics shows that males and females display substantial differences in personality traits, economic and social preferences, and beliefs about one's own ability (Schmitt et al., 2008; Borghans et al., 2009; Bertrand, 2011; Croson and Gneezy, 2009; Bian, Leslie, and Cimpian, 2017). Appendix A.1 describes these measures in more detail.

2.3 Wage trajectories and life-time labor earnings

We use the elicited wage expectations to approximate lifetime wage trajectories as well as total lifetime labor earnings. For this purpose, we assume a Mincer-type earnings function where log-normally distributed wages are a quadratic function of potential experience:

$$\ln w_{i,t} = \alpha_i + \beta_i exp_{i,t} + \gamma_i exp_{i,t}^2. \tag{2}$$

to the general population. Moreover, it is common in Germany to state an initial wage claim when applying for a position.

[6] Initial wage claims and reservation wages were elicited using the following question: *"You expect to earn XXX Euro in your first job. Now consider the wage negotiations for this first job. What would be your initial wage claim? How much would one have to pay you to accept a job offer?"* We then elicited wage claims and reservations wages similar to expected wages.

[7] The wording of the question is as follows: *"If you would be a male/female with identical skills, characteristics, and qualifications, would you also expect to earn XXX Euro upon graduation?"* Respondents could answer with "yes" or "no", where we define an indicator for perceived gender discrimination if the response to this question is "no".

Using the elicited information about wage expectations at three different points in time ($w_{i,st}$, $w_{i,40}$ and $w_{i,55}$), we can use equation (2) to determine the parameters α, β and γ for each individual separately. We then use this relationship to calculate individual-specific expected wages for each year ($\widehat{w}_{i,t}\ \forall t \notin \{st, 40, 55\}$).[8]

Based on these inferred expected wages for each year of an individual's working life, lifetime earnings can be calculated as the sum of expected yearly earnings, i.e.,

$$\widehat{w}_{i,life} = \sum_{st}^{65} \widehat{w}_{i,t}, \tag{3}$$

where all expected wages are given in current Euros and we assume an average retirement age of 65 years.

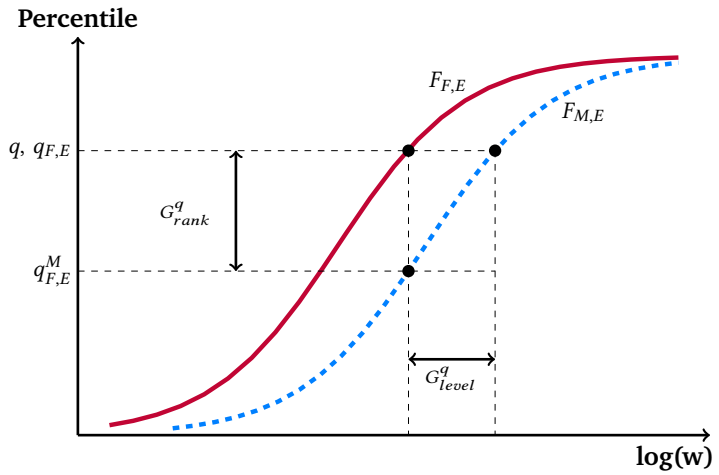
2.4 Distributional differences and negotiation strategies

Apart from analyzing gender differences at the mean, we also investigate the *gender gap in terms of levels and ranks* along the entire expected wage distribution. While studying differences at different levels or quantiles of the distribution is common, we follow Bayer and Charles (2018) and also analyze the gap in terms of an individual's position in the male and female distribution. More specifically, an individual with a given wage expectation takes up a different position (and hence rank) in the female expected wage distribution than in the distribution of male expected wages. As illustrated in Figure 1, we compare the difference between these two rank measures. Accordingly, for each quantile $q_{F,E}$ of the female (log) expected wage distribution $F_{F,E}$, we compute the rank $q^M_{F,E}$ in the male distribution $F_{M,E}$ that corresponds to the same (log) wage level. The rank gap for a given quantile is then given by $G^q_{rank} = q_{F,E} - q^M_{F,E}$ and the corresponding level gap by $G^q_{level} = F^{-1}_M(q) - F^{-1}_F(q)$ (see also Bayer and Charles, 2018, for details on this methodology). We thus express male and female wages on the same underlying scale, namely in terms of the expected wage distribution of males.

The analyses of gender gaps in terms of levels and ranks correspond to two different thought experiments. First, level differences are informative about the absolute (percentage) gain in wages that a female at a certain quantile could expect to receive if she were male. Second, rank differences reveal how much lower a respective female ranks on the male wage distribution given her respective expected wage. In

[8]Note that the expected starting year ($t = st$) differs across individuals. Since we know each individual's expected year of graduation as well as their age, we calculate $\widehat{w}_{i,t}$ for all years $t > st$. This implies that our sample changes during the initial prospective working period, i.e., up to the point where all students in our sample expect to have graduated (see also footnote 15).

Figure 1: Calculation of expected wage ranks



Notes: This figure illustrates the decomposition of the gender gap in terms of ranks and levels. For a given quantile in the female expected wage distribution F_F (red, solid), the rank gap is defined as the difference between a given quantile and the quantile position that a respective female would assume in the male distribution $F_{M,E}$ (blue, dashed): $G^q_{rank} = q_{F,E} - q^M_{F,E}$. Similarly, the level gap is defined as the expected wage difference between a male and a female both evaluated at the same quantile ($G^q_{level} = F^{-1}_M(q) - F^{-1}_F(q)$).

other terms, if the labor market was a competition with wages as a prize, then rank differences inform us about how much worse a female would expect to perform in that competition due to her gender.

3 The gap in male-female wage expectations

We begin our analysis by documenting gender differences in wage expectations across different scenarios (current major, alternative major, dropout) and at different points over the life-cycle (starting wage, age 40, age 55). In a second step, we then present results on the overall gap (weighted by different subjective probabilities for each scenario), and study differences in the distribution of wage expectations as well as individual trajectories over the life-cycle. Finally, we provide evidence on the accuracy of wage expectations.

3.1 The male-female gap in wage expectations

Panel A of Table 2 presents mean expected wages for each of the different scenarios (graduating in one's major, graduating with an alternative major, or dropping out) and at three points over the prospective working life. It shows that regardless of the scenario or age, all male-female differences in expected wages are statistically

different from zero and substantial in size. Thus for example, while male students expect to earn on average 40,582 EUR after graduating from their current major, females expect a mere 85% of this amount (34,331 EUR). Moreover, the wage gap increases at higher prospective ages and is more pronounced for the current major choice, where the lifetime gap in expected wages cumulates to almost 600,000 EUR. Besides, for both males and females, expected wages conditional on finishing the current major are higher compared to the starting wages of the alternative major or for dropping out of university.[9]

To simplify the analysis, we henceforth focus on overall expected wages, i.e., by taking into account the notion that with a certain probability students change majors or drop out as shown in equation (1). The resulting overall expected wage rates are presented in panel B of Table 2 and their respective distributions in Figures 3a to 3c. Again, the male-female gap in overall expected wages is statistically significant and large. At the beginning of their careers, male students expect to earn on average 39,076 EUR, while female students expect 33,434 EUR (86%). The difference in expectations increases until the age of 40, when most children will be born, and rises further until the age of 55, when wage trajectories tend to peak. Male students expect to earn 58,301 EUR at the age of 40 and 70,518 EUR at the age of 55, whereas females report wage expectations of 45,765 EUR (78%) and 51,291 EUR (73%). Over the life cycle, this gap in expectations cumulates to an average of more than half a million Euros when not taking discounting into account and about 400,000 EUR assuming a discounting rate of 1.5%. To put this number into perspective, the 525,969 EUR lifetime "expected return to being male" is close to the average lifetime return to obtaining a university degree (Piopiunik, Kugler, and Wößmann, 2017).[10]

When looking at gender gaps in expectations by major, a similar pattern emerges. While substantial heterogeneity exists in terms of levels – humanities majors on average expect the lowest starting wages, while law students expect the highest – female students always expect to earn substantially less than their male counterparts and the gap in expected wages increases over the life cycle. However, the expected wage gap tends to be smaller in majors with a larger share of females (e.g., medical/health sciences, humanities) relative to majors mostly chosen by males (e.g. STEM, eco-

[9]This finding is consistent with recent evidence that students select into majors according to their perceived comparative advantage (Kirkeboen, Leuven, and Mogstad, 2016).

[10]Lifetime returns in Piopiunik, Kugler, and Wößmann (2017) are discounted using a net discount rate of 1.5%. We thus approximate gross returns as 3568 EUR $\times$ 12 months $\times$ 37 years $-$ 1891 EUR $\times$ 12 months $\times$ 45 years $=$ 563,052 EUR using the numbers reported in Table 1 of their paper. Alternatively, we can apply the same discount rate of 1.5% to yearly expected incomes in our sample. Doing so results in a discounted expected lifetime earnings of 392,740 EUR compared to 387,431 EUR for the return to obtaining a university degree.

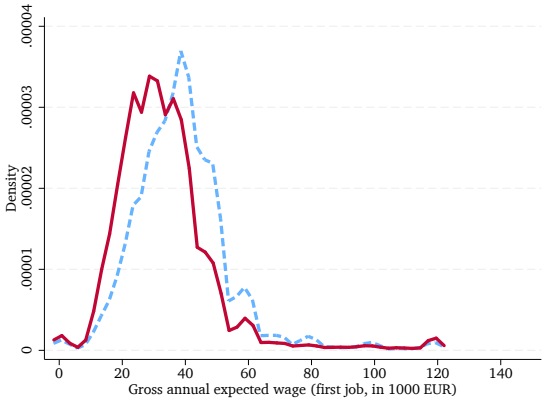
Table 2: Descriptive statistics of expected and actual gross annual wages in current Euros

	Summary statistics					
	Males	Females	Diff.	p-val. Diff.=0	Ratio	N
A. By scenario (expected wages)						
Current major						
Starting	40582	34331	6252	0.00	0.85	15348
Age 40	61475	47514	13961	0.00	0.77	15348
Age 55	74698	53361	21337	0.00	0.71	15348
Lifetime	2482233	1895315	586919	0.00	0.76	12734
Probability to finish major	81	84	-3	0.00	1.04	15348
Alternative major						
Starting	38156	33685	4471	0.00	0.88	15348
Age 40	53225	43665	9559	0.00	0.82	15348
Age 55	64048	48434	15614	0.00	0.76	15348
Lifetime	2165761	1744971	420790	0.00	0.81	12828
Probability to major change	9	7	1	0.00	0.86	15348
Dropout						
Starting	27017	24326	2690	0.00	0.90	15348
Age 40	34296	27980	6316	0.00	0.82	15348
Age 55	38892	30276	8616	0.00	0.78	15348
Lifetime	1369630	1132489	237141	0.00	0.83	12828
Probability of college dropout	11	9	2	0.00	0.82	15348
B. Overall (expected wages)						
Starting	39076	33434	5642	0.00	0.86	15348
Age 40	58301	45765	12536	0.00	0.78	15348
Age 55	70518	51291	19227	0.00	0.73	15348
Lifetime	2356291	1830322	525969	0.00	0.78	12734
C. Actual wages (graduates)						
Starting	38728	33945	4783	0.00	0.88	1155
Lifetime	2621885	1904946	716939	0.00	0.73	825

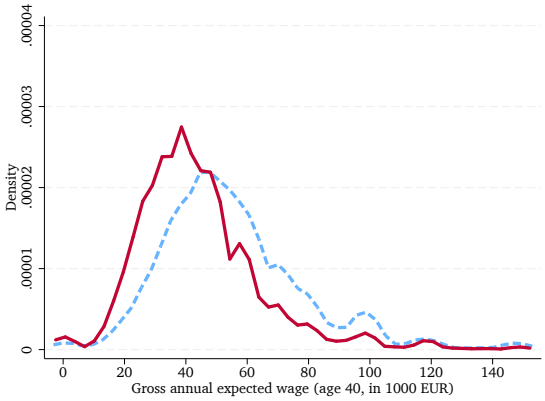
Notes: Ratio refers to the ratio of female to male expected wages/probabilities. Lifetime wages are constructed based on equations (2) and (3). Lifetime wages of graduates are based on actual starting wages and wage expectations at the age of 40 and 55. All wages are winsorized at the 1% and 99% level.

nomics/business; see section A.2 for details). Consistent with Goldin (2014), we also observe smaller gender differences for occupations that are characterized by a linear hours-earnings relationship (e.g. teachers) compared to occupations with nonlinear/convex hours-earnings profiles (e.g. lawyers; see Appendix Table A2).

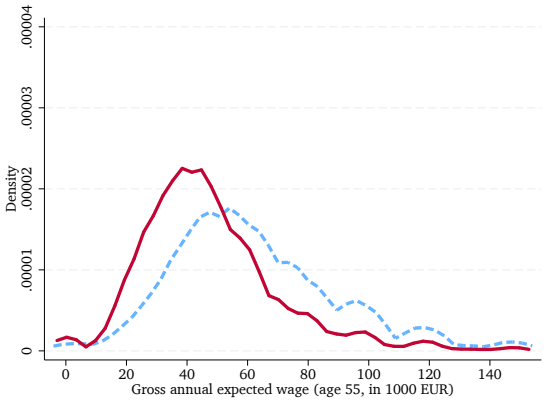
Figure 2: Distributions of expected yearly gross wages



(a) First job



(b) Age 40



(c) Age 55

Notes: Figure 3a–3c present kernel densities of expected overall wages upon graduation (3a), at the age of 40 (3b), and at the age of 55 (3c) of female (red, solid) and male (blue, dashed) students in our sample. All expected wages are winsorized at the 1% and 99% level.

3.2 Gender gaps along the expected wage distribution in levels and ranks

In the previous section, we described the gender gap at the mean. However, there might also be important distributional heterogeneities if, e.g., most of the gap was driven by differences at the very top or bottom of the distribution. Regarding actual wages, distributional differences are indeed heterogeneous. In Germany, the actual gender gap varies across the wage distribution, and decreases for university graduates with rising wage levels (Antonczyk, Fitzenberger, and Sommerfeld, 2010; Francesconi and Parey, 2018).[11] In the following, we characterize the gap in wage expectations at different points of the expected wage distribution using quantile regressions in terms of both log levels and ranks.[12].

Table 3 describes the gender gap at five points along the expected wage distribution, namely the 10th, 25th, 50th, 75th and 90th percentiles. The estimates in the first row of panel A show that the gender gap in levels for lower quantiles is larger than for higher quantiles, decreasing from about 24 to 11 percentage points. The gap in expectations thus mirrors the actual distributional wage gap among students (see Figure 4 in Francesconi and Parey, 2018). Panel B characterizes the gap using ranks as introduced in section 2.4, revealing a somewhat larger, hump-shaped difference.[13] While the difference between males and females is on average five ranks at the 10th percentile, it increases to 21 ranks at the median and decreases again to nine ranks at the 90th percentile. However, the smaller rank difference at the lower end of the wage distribution reflects a lack of mass in lower tail of the male wage distribution. We thus conclude that both level and rank differences indicate a somewhat smaller gap at the top end of the distribution compared to the rest. Apart from heterogeneities in sorting, this finding might suggest that women at the middle and lower end of the distribution are less confident regarding their perceived or actual abilities. Indeed, after major choice as well perceived and actual ability (IQ, preferences, and personality) are accounted for, the gender gap in wage expectations becomes much more similar across quantiles.[14] The remaining gap thus seems to accrue to male-female differences that exist along the entire distribution.

[11] These findings for Germany contrast evidence from Sweden and the United States, where gender gaps are more pronounced at the upper part of the wage distribution, and thus overall larger among college graduates (Albrecht, Björklund, and Vroman, 2003; Bertrand, Goldin, and Katz, 2010).

[12] Again, we use ranks of wages as measured in the male log wage distribution, following the approach introduced by Bayer and Charles (2018).

[13] This is in line with findings from Bayer and Charles (2018), who find that black-white gaps in earnings are more pronounced when analyzing them in terms of ranks rather than levels.

[14] In Table A3, we document pronounced absolute (measured in levels) and relative (in ranks) gaps across all majors and quantiles.

Table 3: Level and rank gaps

	Quantiles				
	10th	25th	50th	75th	90th
A. Level gap					
Female	-0.236***	-0.221***	-0.238***	-0.138***	-0.108***
	(0.012)	(0.003)	(0.009)	(0.005)	(0.011)
Including controls					
+ Majors	-0.178***	-0.148***	-0.129***	-0.137***	-0.121***
	(0.012)	(0.010)	(0.006)	(0.009)	(0.012)
+ IQ and personality	-0.156***	-0.114***	-0.103***	-0.091***	-0.071***
	(0.017)	(0.012)	(0.009)	(0.010)	(0.014)
+ Perceived ability	-0.154***	-0.108***	-0.098***	-0.082***	-0.077***
	(0.018)	(0.012)	(0.009)	(0.009)	(0.015)
B. Rank gap					
Female	-5.2***	-12.6***	-20.6***	-19.1***	-8.5***
	(0.3)	(0.5)	(0.7)	(0.8)	(0.8)
Including controls					
+ Majors	-4.0***	-8.1***	-12.4***	-13.7***	-7.0***
	(0.4)	(0.6)	(0.7)	(0.9)	(1.0)
+ IQ and personality	-3.9***	-6.3***	-10.3***	-10.3***	-5.3***
	(0.5)	(0.7)	(0.9)	(1.1)	(1.3)
+ Perceived ability	-3.9***	-6.4***	-9.8***	-9.5***	-5.1***
	(0.6)	(0.7)	(0.9)	(1.0)	(1.3)

Notes: Each cell of this table reports the female coefficient that characterizes the gender differences for different quantiles. Panel A uses log expected wages as an outcome and thus reports level gaps, while panel B uses percentile ranks of expected wages measured in the expected wage distribution of males and therefore reports rank gaps as outlined in section 2.4. Ability measures comprise IQ and personality traits and perceived ability comprises the subjective position in the distribution of academic and job-related skills, respectively. Log gross annual wages are winsorized at the 1% and 99% level. Robust standard errors in parantheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

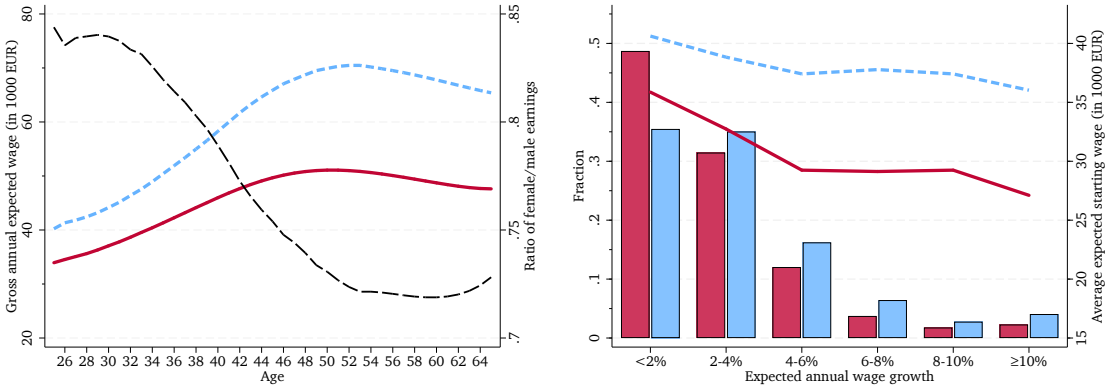
3.3 Life-cycle trajectories in expected wages

The evidence presented in section 3.1 indicates that the gender gap in wage expectations increases with potential experience. To investigate the magnitude and relative importance of rising expected wage gaps over time, we use the three wage expectations (after graduation, at the age of 40, and at the age of 55) to fit individual-specific Mincerian wage trajectories as described in section 2.3. Figure 4a presents how male and female graduates expect earning trajectories to evolve over their respective lifetimes.[15] The figure reveals that the gender gap increases over time and this increase

[15]Note that Figure 4a expresses all expected wages in terms of a respondent's age while Table 2 presents expected starting wages irrespective of age. As there are students who graduate in their late-twenties or early-thirties, the sample used for this figure thus changes at initial ages. At the age of 25, approximately 39% of all students expect to have graduated from university. At the age of 28, 72%, at 30 this share amounts to 85% and at the age of 32 to 92%. Approximately 98% of all students expect to have graduated from university by the age of 35.

accelerates in the early-thirties when individuals start a family. Moreover, it increases until the age of 50 and stabilizes at 72% (i.e., females expect to earn 72% of the male wage at the age of 50). Expressed in terms of labor market experience, females need about nine years of prospective experience (from the age of 25 to 34) to reach the wage level that males expect to receive upon graduation (approx. 40,000 EUR). Males in turn expect to earn on average 49,000 EUR after nine years of experience, which is almost as high as the highest average wage level that females expect to earn throughout their entire careers (51,000 EUR at the age of 50).

Figure 3: Life-cycle wage trajectories and wage growth



(a) Expected wages over the life-cycle

(b) Expected annual wage growth until age 40

Notes: Figure 4a shows the evolution of wages over the life cycle (females: red, solid; males: blue, dashed; measured on the left axis), including the female-male ratio (black, long-dashed; measured on the right axis). Figure 4b presents the expected annual wage growth until the age of 40 (bars measured on the left axis) and average expected starting wages (lines measured on the right axis) in each wage growth category separately for female (red, left bars) and male (blue, right bars) students in our sample. All wages are winsorized at the 1% and 99% level.

Figure 4b illustrates the distribution of annual wage growth by growth category (<2%, 2-4%, 4-6%, 6-8%, 8-10%, ≥10%). It shows that the vast majority of students expect annual wage growth rates of less than 4%. However, male students are more likely than females to expect larger growth rates. Thus, almost half of all female students expect their yearly wages to grow by less than 2%, compared to 35% of males. Moreover, students who expected high starting wages expect lower growth rates, and this pattern is more pronounced for females. Taken together, these patterns imply that expected wage trajectories of male and female students diverge over the life cycle. Nonetheless, while overall the gap in expected wages widens over the prospective life cycle at all parts of the expected starting wage distribution (see Figure A2a), rank differences persist or increase only slightly (Figure A2b). This implies that while the absolute gap in wage expectations increases over the life-cycle, i.e., females expect

to earn less for every Euro a male expects to earn, the relative gap and thereby their rank in the distribution remains fairly stable.[16]

3.4 Comparing expected wages to actual wages

The above-described gender gap in wage expectations might translate into male-female differences in career decisions or family planning. Nonetheless, in terms of distributional concerns, fairness, and policy-making, its empirical relevance also depends on the extent to which these expectations translate into actual gender wage differences.

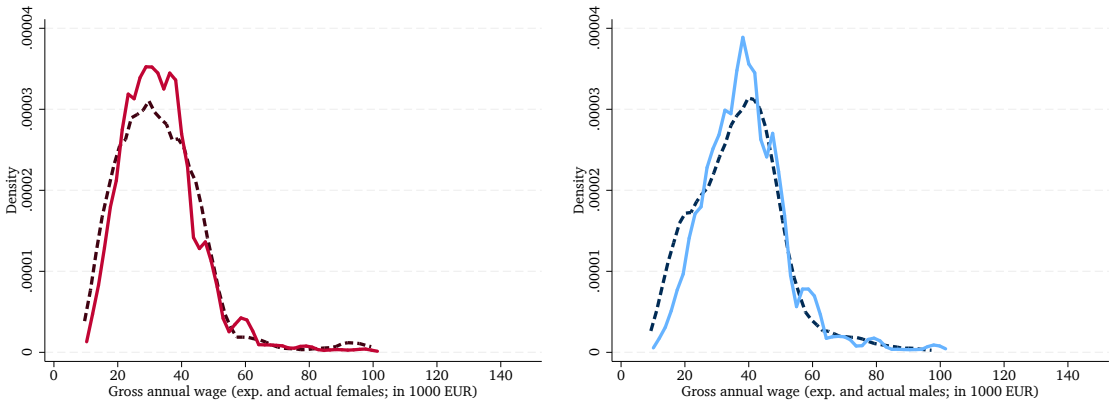
Several pieces of evidence suggest that this is indeed the case. First, follow-up surveys on graduates who were initially surveyed about their wage expectations during college show a close relation between the expectations and later realizations (Webbink and Hartog, 2004; Wiswall and Zafar, forthcoming).[17] Second, the wage gap in expectations that we observe mimics the actual (conditional and unconditional) wage gap in Germany, as well as the fact that women experience much flatter life-cycle wage profiles (Francesconi and Parey, 2018; Destatis, 2017). Thus, for example Francesconi and Parey (2018) report an overall actual gap among recent university graduates in Germany of 19.1%, while we find one of 15.5% in expectations. Besides, they report an actual gap of 10.5% among economics majors, whereas the gap in expectations among economics majors in our sample amounts to 10.45%. Third, the gender gap in starting wage expectations and the gender gap among recent graduates in our data are almost identical, and the same holds true for respective wage levels (see Table 2). Finally, we find that the respective distributions coincide (see Figure 4), aside from slightly more mass at the lower end of the distribution among recent graduates. In Appendix A.4, we compare log (expected) wages of graduates and students in a regression framework and can show that any of the observed differences stem from non-standard employment relationships after graduation (e.g., initial internships or part-time work). After controlling for gender, field of study, and working hours, there are no differences between expected and actual wages.

The empirical similarity of wage expectations and actual wages thus suggests that expectations reflect the expected outcome of (future) wage setting (Table A5 shows compelling evidence that this is indeed the case) and that women tend to anticipate lower wages mostly due to factors related to their gender. In the following, we will

[16] Figure A2 in the Appendix also confirms that the ranks in the starting wage distribution are highly correlated with ranks at the age of 40 and 55.

[17] See also Attanasio and Kaufmann (2014); Filippin and Ichino (2005); Schweri and Hartog (2017) for evidence that expectations predict subsequent real-life outcomes.

Figure 4: Comparison of expected and actual wages



(a) Females (b) Males

Notes: These figures present kernel densities of expected overall wages of female (red, solid; Figure 5a) and male (blue, solid; Figure 5b) students in our sample as well as the same distributions for actual wages of graduates (darker colors, dashed). All wages are winsorized at the 1% and 99% level.

investigate this claim by shedding particular light on a factor with importance for the wage setting: students' anticipated negotiation behavior.

4 Expectations about prospective wage negotiations

A job interview is the first time when individuals get in touch with the graduate labor market and an important instance for wage setting. Differential plans for wage negotiations may thus provide a rationale for expected wage differences and for the strong link between expected and actual wages documented in section 3.4. In this part, we demonstrate that wage expectations and asking or reservation wages are inherently linked. Moreover, we investigate the extent to which differences in expected wages relate to differential boldness in initial wage claims and how much individuals expect to be negotiated down towards their reservation wages.[18]

Panel A of Table 4 presents initial wage claims, expected wages, and reservation wages of males and females. Expected wages on average lie between the initial wage claim and the reservation wage, indicating that most individuals expect to start a wage negotiation by claiming salaries above what they expect to receive. Similarly, they expect to settle on a wage that lies above their reservation wage.[19] This is true for

[18]Since university graduates are usually asked to state their initial wage claim when applying for a position, we do not investigate differences in entering a negotiation at all (Babcock and Laschever, 2009; Small et al., 2007).

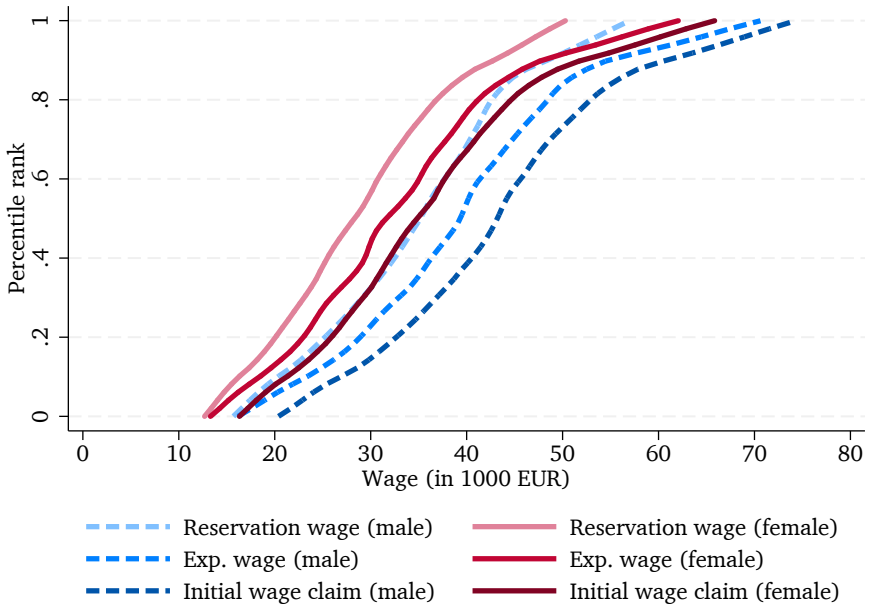
[19]For recent evidence on the importance of male-female differences in reservation wages for the gender gap, see Caliendo, Lee, and Mahlstedt (2017).

Table 4: Summary statistics on negotiation patterns

	Negotiation patterns				
	Males	Females	Diff.	p-val. Diff.$=0$	N
A. Expressed in levels/Euro					
Initial wage claim	41789	33714	8075	0.00	15348
Expected wage	39076	33434	5642	0.00	15348
Reservation wage	34355	28002	6352	0.00	15348
B. Expressed in ranks					
Initial wage claim	58	40	18	0.00	15348
Expected wage	50	37	14	0.00	15346
Reservation wage	42	28	14	0.00	15348
Boldness	16	13	3	0.00	15348

Notes: Panel A reports mean initial wage claims, expected and reservation wages in Euro for both males and females. Panel B expresses these in ranks measured on the male expected wage distribution. See text and section 2.4 for a description of how to calculate these ranks.

Figure 5: Initial wage claims, expected and reservation wages



Notes: Figure 5 presents reservation wages (w_R, light), expected wages (w_{exp}, medium) and initial wage claims (w_I, dark) ordered according to their percentile rank in the expected wage distribution of female (red, solid) and male (blue, dashed) students in our sample. All wages are winsorized at the 1% and 99% level.

both males and females and along the entire expected wage distribution (see Figure 5).[20]

[20]The close association between initial wage claims, reservation wages and expected wages is further confirmed by the results displayed in Appendix Table A5. It indicates that the difference between expected wages and initial wage claims remains constant along the expected wage distribution.

We analyze gender differences in initial wage claims in Table 5. Across the sample, females claim 27% lower initial wages when entering a wage negotiation for their first job. Once we control for sorting into specific majors, occupations, and industries, these difference remain roughly 16%, indicating large differences in negotiation behavior across genders. In columns (3)-(5), we also control for differences in reservation wages. While this reduces the gender gap in initial wage claims, there remains a gap, indicating that males consistently ask for more when stating their initial wage claims, both when compared to their expected and when compared to their reservation wages. Hence, men are bolder when entering a wage negotiation than females.

Table 5: Gender gap in initial wage claims

	log(Initial wage claim)				
	(1)	(2)	(3)	(4)	(5)
Female	-0.265***	-0.157***	-0.046***	-0.021***	-0.020***
	(0.013)	(0.017)	(0.005)	(0.005)	(0.005)
log(Reservation wage)			0.826***	0.864***	0.846***
			(0.011)	(0.012)	(0.019)
log(Expected wage)					0.048**
					(0.021)
Major	No	Yes	No	Yes	Yes
Occupation and industry	No	Yes	No	Yes	Yes
IQ, personality, econ. prefs.	No	Yes	No	Yes	Yes
R^2 (adj.)	.024	.091	.9	.93	.93
Observations	15348	10790	15348	10790	10788

Notes: All wages are winsorized at the 1% and 99% level. Robust standard errors in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

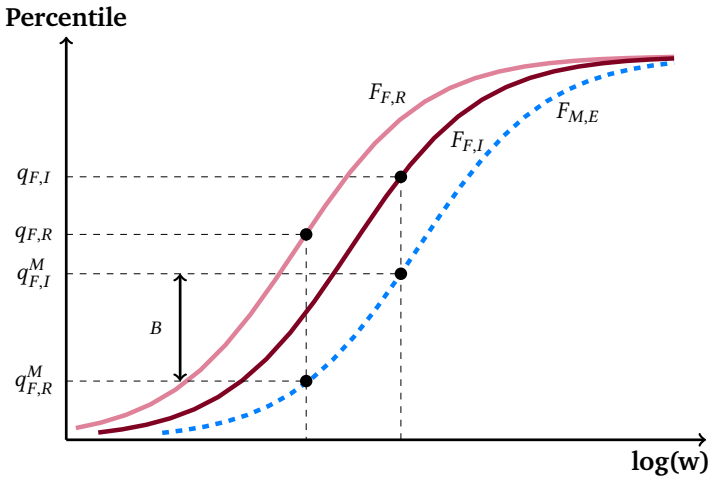
To shed more light onto this male-female difference in boldness, we construct a measure of negotiation strategies that is well-defined and comparable across genders. It is based on the rank methodology introduced in section 2.4. As comparisons across distributions require some form of anchoring, we express initial wage claims and reservation wages of both genders in terms of ranks of the male wage distribution. That is, given that the initial wage claim (reservation wage) of a given female in our sample lies on a certain quantile $q_{F,I}$ ($q_{F,R}$), we calculate the corresponding quantile in the male expected wage distribution $F_{M,E}$ (see Figure 6). Using this, we then determine the corresponding rank of initial wage claims and reservation wages with respect to the male wage distribution ($q^M_{F,I}$ and $q^M_{F,R}$). Next, we proceed analogously with the initial wage claims and reservation wages of males. Last, we define boldness of individual i as the difference between her transformed rank of initial wage claims

and reservation wages:

$$B_i = q^M_{i,g,I} - q^M_{i,g,R}, \tag{4}$$

where $g = F, M$ for females and males, respectively. This definition of boldness in wage negotiations yields a continuous measure between 0 and 100 capturing how much more an individual is willing to ask for, when compared to her minimum acceptable wage. Note that despite being based on initial wage claims, this measure likely captures a general willingness to ask for a relatively higher wage.

Figure 6: Constructing a measure of boldness

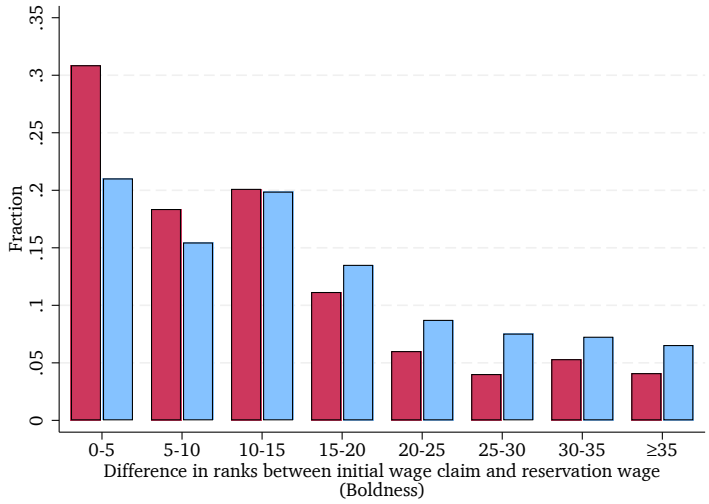


Notes: This figure illustrates how ranks of initial wage claims (dark red, solid) and reservation wages (light red, solid) of females are calculated using the male (log) expected wage distribution $F_{M,E}$ (blue, dashed). Our measure of negotiation strategies for individual i is given by the difference in ranks between her initial wage claim ($q^M_{i,g,I}$) and reservation wage ($q^M_{i,g,R}$): $B_i = q^M_{i,g,I} - q^M_{i,g,R}$ with $g = F, M$ depending on individual i's gender.

Figure 7 presents the distribution of negotiation patterns. About one third of female students in our sample leave very little scope for negotiations, as there are only five ranks or fewer between their initial wage claims and their respective reservation wages. By contrast, males tend to enter negotiations with much bolder wage claims, with the majority planning to claim a wage that lies fifteen ranks or more above their reservation wage.

These differences in negotiation patterns prompt the question whether a bolder negotiation strategy pay off, and to what extend gender differences in boldness contribute to gender gaps in wage expectations. While our data do not permit establishing causality, they allow us to provide interesting observational evidence on the relationship between negotiation strategies and expected wages. The results in Table 6 indicate that our measure of boldness is positively related to expected wages

Figure 7: Distribution of boldness



Notes: This figure presents boldness B_i defined by the difference in ranks measured on the male (log) expected wage distribution between the initial wage claims and reservation wages for both female (red, left bars) and male (blue, right bars) students in our sample.

and specifically so for females. Taken at face value they imply that an increase in boldness by a 20 rank difference (approx. 1.6 SD) between initial wage claims and reservation wages among females is associated with a closing of the gender gap. Next, we investigate how much of the overall gender wage gap is explained by differences in negotiation strategies. The size of the female indicator reduces by 17% once we take boldness into account, pointing towards an important role of negotiation strategies. Moreover, Oaxaca-Blinder decompositions, displayed in in Appendix Table A9 and Appendix Figure A6, confirm their role: Our boldness measure captures between 14 and 15% of the gender gap in starting wages (9-10% in terms of lifetime wages) after accounting for detailed measures of sorting, labor supply, and family planning.

What drives these male-female differences in boldness? We consider three potential explanations. First, there could be differences in the perceived ability to perform well on the job, e.g., males may overestimate their abilities in line with their tendency to display overconfidence (Croson and Gneezy, 2009; Niederle and Vesterlund, 2007). Second, females who expect discrimination may negotiate more modestly. This might even be a rational strategy if women anticipate punishment or retaliation for bold "man-like" behavior. Third, having a preference for children may impact negotiation behavior. Especially females who plan to have children rather soon might be less engaged negotiators, either because they anticipate shorter overall labor market participation or higher costs to employer (see Appendix A.6 for evidence that plans for early parenthood reflect lower labor market attachment).

Table 6: Association of boldness and expected wages

	log(Expected wages)			
	(1)	(2)	(3)	(4)
Female	-0.184***	-0.152***	-0.155***	-0.077***
	(0.009)	(0.009)	(0.009)	(0.012)
Boldness		0.010***	0.005***	0.004***
		(0.000)	(0.001)	(0.001)
Boldness × Female			0.008***	0.007***
			(0.001)	(0.001)
Major	No	No	No	Yes
Occupation and industry	No	No	No	Yes
IQ, personality, econ. prefs.	No	No	No	Yes
R^2 (adj.)	.025	.065	.073	.14
Observations	15346	15346	15346	10788

Notes: Boldness is measured by the rank difference between initial wage claims and reservation wages (see text for a description of how we construct this), which has a standard deviation of 12.2 and is demeaned for these regressions to obtain a comparable female indicator across specifications. All wages are winsorized at the 1% and 99% level. Robust standard errors in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

We jointly investigate the above explanations in Table 7. Perceived ability on the job is only loosely related to boldness and similar across genders. An increase of 20 points in perceived ability (corresponds to approx. one standard deviation) is associated with an increase of 0.36-0.52 in boldness corresponding to 11-16% of the unconditional gender gap. Both this association as well as the distribution of perceived ability is similar across genders. Specifically, males rate their on-the-job ability only two ranks higher than females.

Turning to the anticipation of discrimination in the labor market, we define a respondent to expect discrimination if she disagrees with the statement that they would expect to earn the same as a member of the opposite gender with the same skills, traits, and qualifications. Column (3) shows that expecting gender discrimination is associated with more pronounced boldness for males, but less for females. For those who expect discrimination, the gap in boldness is 1.5 points larger, corresponding to roughly half of the unconditional gender gap.[21] To the extent that negotiating is expected to pay off in general and in particular for female students, these findings are consistent with the notion that women "know when to ask" (Exley, Niederle, and Vesterlund, 2020).

[21]The marginal effect of $\mathbb{1}\{\text{Expected discrimination}\}$ for females amounts to -0.60 with a p-value of 0.03.

Table 7: Assessing Potential Explanations of Gender Differences in Boldness

	Boldness					
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-3.334***	-3.858***	-3.012***	-2.758***	-2.956***	-2.000**
	(0.200)	(0.730)	(0.228)	(0.299)	(0.766)	(0.911)
A. Perceived ability						
Perceived ability (0-100)		0.018**			0.018**	0.001
		(0.008)			(0.008)	(0.010)
Female		0.008			0.008	0.017
× Perceived ability (0-100)		(0.010)			(0.010)	(0.012)
B. Expect discrimination						
𝟙{Expect discrimination}			0.848**		0.849**	0.795*
			(0.411)		(0.410)	(0.480)
Female			-1.446***		-1.400***	-1.644***
×𝟙{Expect discrimination}			(0.491)		(0.490)	(0.566)
C. Wants to have children before the age of 30						
𝟙{Wants children before age 30}				0.573*	0.551*	1.081***
				(0.317)	(0.317)	(0.367)
Female				-1.048**	-1.015**	-1.209**
×𝟙{Wants children before age 30}				(0.408)	(0.408)	(0.473)
Wants to have children				0.281	0.249	0.084
				(0.335)	(0.336)	(0.392)
Major	No	No	No	No	No	Yes
Occupation and industry	No	No	No	No	No	Yes
IQ, personality, econ. prefs.	No	No	No	No	No	Yes
R^2 (adj.)	.018	.019	.019	.018	.02	.067
Observations	15348	15348	15348	15348	15348	10790

Notes: Boldness is measured by the rank difference between initial wage claims and reservation wages (see Section 2.4 and the description in this section) with a mean of 14.0 and a standard deviation of 12.2 pooled across genders. Perceived ability is the self-reported perceived on the job ability measured on a scale form 0 to 100. 𝟙{Expected discrimination} is an indicator whether an individual would expect to earn the same if he or she has the opposite gender, but the same skills, traits, and qualifications. 𝟙{Wants children before age 30} denotes an indicator denoting whether a respondent expects to have the first child before the age of 30. All wages are winsorized at the 1% and 99% level. Robust standard errors in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

In column (4) we turn to the preference for bearing and raising children, where we use child birth before age 30 as a proxy for high family preference and lower labor market attachment (see Appendix A.6 for evidence). We find that boldness in negotiations is consistently lower for females with strong family preferences. In column (5), we confirm that these results hold once we control jointly for all three explanations.

One concern might be that potential for boldness in negotiations depend on the career, industry, or occupation individuals want to enter. For instance, highly regulated jobs may not allow for wage negotiations. Similarly, individuals with certain traits or characteristics may have better negotiation skills translating into bolder wage claims. Column (6) therefore additionally controls for major, occupation and industry fixed effects, as well as a series of personality measures, economic preferences and IQ. These variables jointly capture determinants of sorting or realizations thereof and thus allow us to test whether the results for expected discrimination and child-rearing hold conditional on sorting. We find that our results, displayed in column (6), remain largely unchanged.

5 Conclusion

This study provides first large-scale evidence on the gender gap in wage expectations. Already prior to labor market entry, women expect much lower wages than men and this gender gap in expected wages is significant and large across all subgroups. Moreover, it prevails along the entire distribution, and increases over the prospective life cycle. In terms of relative magnitudes, females would need to work on average around four hours more per week in the same occupation and industry, or major for instance in medical sciences rather than humanities to catch up with the starting wages of their male peers. Similarly, in expectation, it would take them about nine years more of accumulated work experience to make up for the expected gender penalty.

We also document a striking relationship between expected wages, initial wage claims and reservation wages, and use this information to construct a measure of boldness in wage negotiations. Our results reveal that women plan to enter wage negotiations with more modest wage claims relative to their reservation wage, although boldness in negotiations is associated with higher expected wages and helps to explain gender differences in wage expectations. Our finding that females tend to be less bold compared to their male counterparts seems to be driven by anticipation

of gender discrimination as well as a preference for having children soon. By contrast, perceived on-the-job ability does not explain differential negotiation strategies.

The above findings have implications for our understanding of wage-setting processes, expectation formation, and economic modeling. In particular, the documented systematic and accurate gender differences in wage expectations and their strong relation with wage claims and reservation wages suggest that expected wages drive actual wage differences and persistent gender wage gaps. Given their size and accuracy, relative expected wage disparities likely matter for financial decision-making, household bargaining, as well as education and labor market choices. In this respect, our results also inform the economic modeling of such decisions and associated learning processes (see, e.g., Breen and Garcia-Penalosa, 2002; Xia, 2016; Reuben, Wiswall, and Zafar, 2017; Wiswall and Zafar, 2018).

In addition, our results suggest that reluctant negotiation behavior may lead to lower reference points and lower subsequent wage expectations. While we cannot make causal statements given the nature of our data, our evidence strongly supports the idea that initial negotiation strategies matters for starting wages and that differences in starting wages lead to different wage trajectories. Hence, these findings may explain why wage gaps are larger among university students entering labor markets in which unionized wage setting is rare and where employer-employee negotiations hold particular importance in the wage-setting process (Blau and Kahn, 2017).

Our results also deliver insights regarding the effective implementation of policies aimed at leveling the playing field between genders. In particular, our findings suggest that targeted negotiation trainings – rather than encouraging more negotiations per se (Exley, Niederle, and Vesterlund, 2020) – might be an effective measure to improve female labor market outcomes and reduce the gender wage gap (Ashraf et al., 2020). In fact, such measures seem to be more effective than policies that encourage women to enter male-dominated fields, for which the gender gap in expectations tends to be somewhat higher.

In future research, it would thus be informative to ascertain how our measure of negotiation elicited before labor market entry translates into actual asking wages, and whether randomly-assigned information treatments about negotiation strategies can reduce actual wage gaps to the same extent as suggested in this paper.

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A Appendix

A.1 Additional measures

In the following, we briefly describe additional measures elicited in the survey.

Major and occupational sorting. Students in Germany are required to enroll for a particular field of studies when they first enter a teaching college or university. Hence, at the time of the survey, students have already selected study fields in line with their academic interests and occupational preferences. We elicited the current study field as a choice out of a list of fifteen majors. In addition, we asked respondents for their career aspirations. They could choose out of 429 pre-defined occupations or make use of a free text field. All indicated occupations were subsequently classified in terms of the ISCO-08 occupational classification reflecting job tasks as well as skills and occupational hierarchies.[22]

Labor supply and children. Our data contain several measures of expected labor supply and child-related career breaks. First, expected labor supply is captured by the expected number of weekly working hours. To match the information about expected wages, we asked for the expected number of weekly working hours at the same points in time, i.e., right after graduation ($h^s_{i,st}$), at the age of 40 ($h^s_{i,40}$), and at the age of 55 ($h^s_{i,55}$) for each of the three scenarios $s = f, a, d$.[23] Second, we elicited whether the students in our sample already have children and, if not, at what age they expect the birth of their first child. Third, we asked how many children students expect to have in total and how many months they are planning to stay home with each child.

Personality traits, economic preferences, beliefs about ability, and IQ. Research in personality psychology and economics shows that males and females display substantial differences in personality traits, economic and social preferences, and beliefs about one's own ability (Schmitt et al., 2008; Borghans et al., 2009; Bertrand, 2011;

[22] For evidence on the importance of tasks for the gender wage gap, see Stinebrickner, Stinebrickner, and Sullivan (2020).

[23] We also elicit the subjective probability of not finding a suitable job. However, similar to what has been found in the literature (e.g., Baker et al., 2018), we the reported expected probability of not finding a suitable job is implausibly large in our sample for both males (25 percent at start and 15 percent at the age of 40) and females (32 percent at start and 19 percent at the age of 40) compared to employment rates of 93% for recent university graduates in Germany (Eurostat, 2018). We, therefore, do not use this variable in main part of the paper, acknowledging that this might lead to conservative estimates of the gender wage gap, as males report a 7 percent lower probability of not finding a suitable job at employment start and a 4 percent lower probability of not finding a suitable job at the age of 40.

Croson and Gneezy, 2009; Bian, Leslie, and Cimpian, 2017). Our data allow us to systematically account for these differences. In order to elicit beliefs about own ability, respondents marked their relative position in the distribution of students regarding their (a) perceived academic ability and (b) perceived work-related ability on a scale from 0 to 100. Four fifth of the sample additionally participated in a survey on personality, economic preferences, and IQ. First, we measured IQ based on ten items from a Raven-type Matrices IQ test (Raven and Court, 1998). Second, a student's Big Five personality traits (agreeableness, conscientiousness, emotional stability, extraversion and openness) were assessed using the 50 item IPIP test (Goldberg et al., 2006). Finally, to elicit altruism, impatience, positive and negative reciprocity, risk aversion and trust, we employed an experimentally-validated survey module (Falk et al., 2018). In the following, we use the term "Perceived/actual ability & personality" to refer to the set of these measures.

A.2 Expected wage gaps by major category and for selected occupations

The gender gap in wage expectations prevails within majors. To determine the respective gaps, we aggregate all majors into five categories (Medicine and health sciences, STEM, Law, Economics and business studies, humanities and social sciences) and present expected overall wages in Table A1. While there exists substantial heterogeneity in levels across majors female students expect to earn less than their male counterparts within each of the respective study fields. This holds both for starting wages and over the life cycle. However, the gender gap is slightly lower in fields that are traditionally chosen by females than in male-dominated subjects. Thus females on average expect to earn only 84% of the average male starting wage in legal studies, as compared to 93% in humanities. At the age of 55, the respective shares decrease to 72–80%.

Additionally, Table A2 presents the gender gap in wage expectations for different occupations. Goldin (2014) suggests that occupations for which earnings are a nonlinear/convex in working hours have larger gender gaps than those with fairly flat/linear relationships. Indeed, we observe the gender gap in wage expectations for occupations with nonlinear hours-earnings profiles (e.g. lawyers) to be larger than for, e.g., teachers, who tend to have very flat hours-earnings profiles.[24] Along these same lines the gap tends to be smallest for authors and journalists, who might even have de-

[24]The table does not include results for pharmacists, as we cannot distinguish individuals planning to work in pharmacies from those planning to work in the pharmaceutical industry.

Table A1: Descriptive statistics of gross annual expected wages by major

	Med./Health Sci.				**STEM**			
	Males	Females	Ratio	N	Males	Females	Ratio	N
Starting	38860	34282	0.88	1313	40620	35472	0.87	5234
Age 40	59589	49800	0.84	1313	58214	47314	0.81	5234
Age 55	70977	56474	0.80	1313	69692	52657	0.76	5234
	Law				**Econ./Business**			
	Males	Females	Ratio	N	Males	Females	Ratio	N
Starting	48511	40670	0.84	676	40352	36345	0.90	3427
Age 40	76524	60519	0.79	676	66612	52688	0.79	3427
Age 55	96180	69487	0.72	676	82717	60698	0.73	3427
	Human./Soc. Sci.				**All subjects**			
	Males	Females	Ratio	N	Males	Females	Ratio	N
Starting	31808	29480	0.93	4698	39076	33434	0.86	15348
Age 40	44822	38009	0.85	4698	58301	45765	0.78	15348
Age 55	53151	41489	0.78	4698	70518	51291	0.73	15348

Notes: This table shows average expected starting wages as well as expected wages at the age of 40 and 55 for males and females for majors aggregated into five categories. All wages are winsorized at the 1% and 99% level.

creasing hours/earnings profiles due to decreasing marginal productivity. Students thus correctly anticipate that flatter hours-earnings profiles are associated with lower earning gaps.

Table A2: Gender gap in wage expectations by occupations

	Gender gap by occupation				
	Journalists & authors	Teachers	Engineering professionals	Medical doctors	Lawyers
Gap in EUR	-1423	-1792	-3578	-6630	-9824
Gap in log-points	-0.071	-0.130	-0.123	-0.122	-0.225
Gap in ranks	-5.6	-9.7	-12.6	-13.0	-14.1
Observations	729	1141	1470	464	433

Notes: This table presents the gender gap in wage expectations measured in Euro, log-points and ranks for different occupations. Each coefficient corresponds stems from a regression of expected wages, log expected wages or ranks in the male expected wage distribution on an indicator for females. All wages are winsorized at the 1% and 99% level.

In Table A3, we calculate gender gaps across the distribution in terms of levels and ranks. We find that at all quantiles and across all majors, male wage expectations are higher than those of their female counterparts. In absolute terms (i.e., when

looking at gaps in levels), these differences are particularly pronounced for students studying STEM or law (Panel A), whereas pronounced relative differences (i.e., rank differences) also arise for the upper part of students studying medicine and other health sciences (see Panel B).

Table A3: Level and rank gaps by major

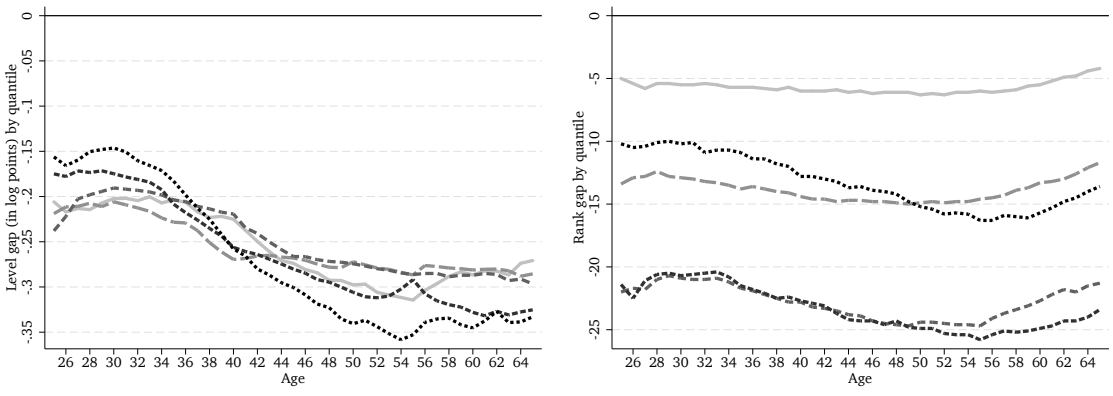
	Quantiles				
	10th	25th	50th	75th	90th
A. Level gap					
Baseline	-0.236	-0.221	-0.238	-0.138	-0.108
	(0.012)	(0.003)	(0.009)	(0.005)	(0.011)
Control for majors	-0.178	-0.148	-0.129	-0.137	-0.121
	(0.012)	(0.010)	(0.006)	(0.009)	(0.012)
Separately by major					
Med./Health Sciences	-0.135	-0.149	-0.071	-0.183	-0.179
	(0.058)	(0.036)	(0.031)	(0.025)	(0.028)
STEM	-0.219	-0.232	-0.134	-0.145	-0.114
	(0.019)	(0.022)	(0.008)	(0.013)	(0.015)
Law	-0.116	-0.131	-0.187	-0.220	-0.140
	(0.085)	(0.049)	(0.036)	(0.057)	(0.081)
Econ./Business	-0.128	-0.115	-0.109	-0.108	-0.092
	(0.028)	(0.017)	(0.007)	(0.012)	(0.020)
Hum./Soc. Sciences	-0.165	-0.124	-0.131	-0.078	-0.106
	(0.032)	(0.019)	(0.017)	(0.020)	(0.036)
B. Rank gap					
Baseline	-5.2	-12.6	-20.6	-19.1	-8.5
	(0.3)	(0.5)	(0.7)	(0.8)	(0.8)
Control for majors	-4.0	-8.1	-12.4	-13.7	-7.0
	(0.4)	(0.6)	(0.7)	(0.9)	(1.0)
Separately by major					
Med./Health Sciences	-3.0	-5.9	-9.5	-20.2	-10.1
	(1.2)	(1.8)	(3.1)	(3.3)	(2.5)
STEM	-7.9	-15.2	-17.7	-14.3	-6.3
	(1.0)	(1.2)	(1.3)	(1.2)	(1.0)
Law	-2.7	-12.4	-21.0	-14.0	-1.7
	(2.4)	(3.9)	(4.8)	(3.6)	(1.1)
Econ./Business	-7.3	-10.7	-12.7	-11.7	-7.5
	(1.1)	(1.2)	(1.2)	(1.4)	(1.3)
Hum./Soc. Sciences	-1.3	-2.6	-7.1	-11.0	-10.6
	(0.3)	(0.5)	(1.0)	(1.9)	(3.7)

Notes: Each cell of this table reports the female coefficient, which characterizes the gender differences for different quantiles and sample specification. Panel A uses log expected wages as an outcome and thus reports level gaps, while panel B uses percentile ranks of expected wages measured in the expected wage distribution of males and therefore reports rank gaps as outlined in section 2.4. All wages are winsorized at the 1% and 99% level. Robust standard errors in parentheses.

A.3 Evolution of gender gaps over the life-cycle

Figure A1 shows that the expected wage gap between male and females widens across the life-cycle (Figure A2a), but that females' ranks are lower, but fairly stable over time (Figure A2b). Figure A2 presents the latter result in a different manner. Using plots of the rank-rank correlation, as often used in studies on the intergenerational mobility, we find that ranks are highly persistent over time, i.e., high correlations between ranks in the distribution of starting wages and ranks later in life.

Figure A1: Rank and level gaps over the life-cycle for different initial quantiles

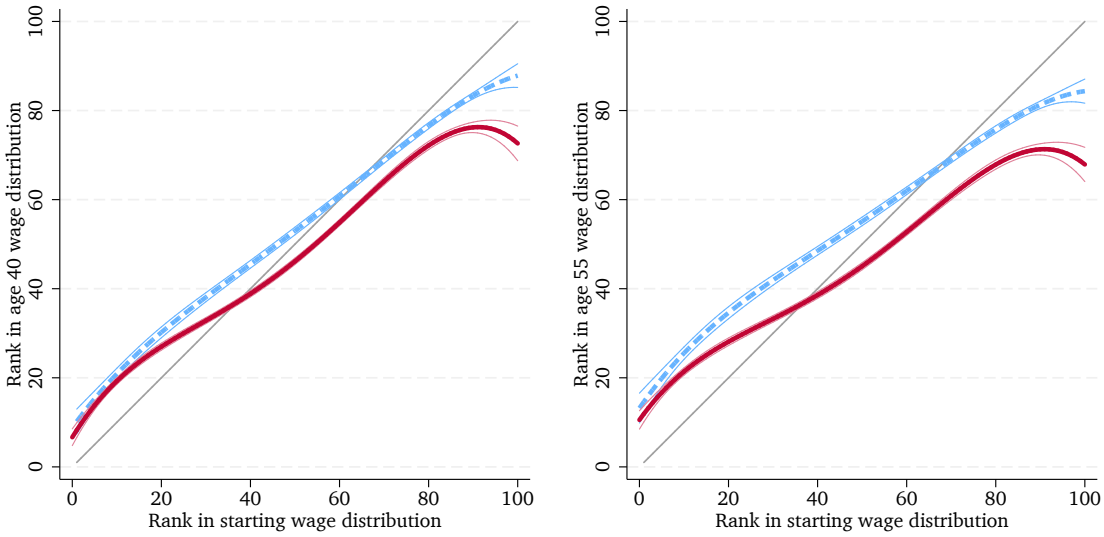


(a) Level gap

(b) Rank gap

Notes: This figure presents the evolution of the wage gap measured in levels ranks for females starting at the 10th (very light, solid), 25th (light, long-dashed), 50th (medium, dashed), 75th (dark, short-dashed), and 90th (very dark, dotted) percentile of their wage distribution over the life cycle. Gaps are estimated using quantile regressions at each age, similar to Table 3.

Figure A2: Marginal effects of increases in ranks of starting wages on later earnings



(a) Age 40

(b) Age 55

Notes: This figure presents the associations between the an individual's rank in the starting wage distribution (R_{st}) and the rank in the distribution of ranks later in life (R_a, $a = 40, 55$) including 95% confidence intervals. Marginal effects are from regressions of the type $R_{a,i} = \beta_0 + \beta_1 R_{st,i} + \beta_2 R^2_{st,i} + \beta_3 R^3_{st,i} + \beta_4 R^4_{st,i} + \epsilon_i$ ($a = 40, 55$) estimated separately for female (red, solid) and male (blue, dashed) students.

A.4 A regression-based comparison of expected and actual wages

We formally compare expected and actual wages by pooling them in a single regression on an indicator for being an actual graduate. Table A4 reveals that in terms of raw wages, graduates earn 11.2 percentage points lower wages when compared to the expected wages of students.[25] Nonetheless, once we control for gender, sorting patterns and hours worked the difference vanishes. In fact, this difference is entirely driven by differences in hours worked as some graduates start working part-time after finishing their studies and thus earn lower wages than graduates in full-time jobs. Similar to what has been found in the literature (e.g., Webbink and Hartog, 2004; Wiswall and Zafar, forthcoming), the wage expectations of students elicited in our survey thus tracks the distribution of realized earnings very well once we account for hours worked. This suggests that the gender gap in expected wages likely translates into differences in realized wages.

Table A4: Comparison of expected and actual log wages

	log wages (pooled)	
	(1)	(2)
Actual graduate	-0.112***	0.016
	(0.022)	(0.025)
Gender, major, occupation, industry, labor supply	No	Yes
R^2 (adj.)	.0022	.13
Observations	16501	16400

Notes: Robust standard errors in parentheses. Sample pools over log gross annual wages of both current students using expected wages and actual graduates with realized wages. All wages are winsorized at the 1% and 99% level. Robust standard errors in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

A.5 Initial wage claims, reservation, and expected wages

In Table A5, we investigate the relationship of students' initial wage claims as well as reservation wages with their expected wages. We find that both are strongly correlated, both unconditional and conditional on a rich set of covariates. The relationships hold both pooled across genders, as well as separately by gender.

[25]Note that we do not observe a difference in mean actual and expected wages but in log wages, given that taking the logarithm gives more weight on the lower end of the wage distribution. As can be seen from Figure 4, this is where the differences between actual and expected wages are more pronounced.

Table A5: Comparison of initial wage claims, reservation and expected wages

	log(Initial claim)		log(Reserv. wages)	
	(1)	(2)	(3)	(4)
A. Complete sample				
Log average expected wage (starting)	0.954***	0.903***	1.061***	1.012***
	(0.016)	(0.018)	(0.021)	(0.023)
Gender, major, occupation, industry, labor supply	No	Yes	No	Yes
R^2 (adj.)	.44	.44	.41	.42
Observations	15346	15346	15346	15346
p-value: Coefficient=1	0.00	0.00	0.00	0.60
	log(Initial claim)		**log(Reserv. wages)**	
	(1) Females	(2) Males	(3) Females	(4) Males
B. Subsamples by gender				
Log average expected wage (starting)	0.884***	0.931***	1.006***	1.014***
	(0.025)	(0.023)	(0.032)	(0.032)
Gender, major, occupation, industry, labor supply	Yes	Yes	Yes	Yes
R^2 (adj.)	.4	.49	.39	.45
Observations	8720	6626	8720	6626
p-value: Coefficient=1	0.00	0.00	0.85	0.65

Notes: This table presents the relation of expected starting wages to initial wage claims and reservation wages. In panel (a), we present results for the whole sample, while we replicate columns (2) and (4) of panel (a) for each gender separately. All wages are winsorized at the 1% and 99% level. Robust standard errors in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

A.6 Child rearing responsibilities and preferences for early parenthood

Biological and social differences in child bearing and rearing responsibilities are an important factor in explaining male-female differences in actual labor market outcomes (Bertrand, Goldin, and Katz, 2010; Daniel, Lacuesta, and Rodríguez-Planas, 2013; Goldin and Katz, 2016; Kleven, Landais, and Søgaard, 2019). First, women who intend to have children may select into occupations with flatter earnings profiles or linear pay structures, i.e., in anticipation of child-related wage penalties (Blau and Ferber, 1991; Goldin and Katz, 2016). Moreover, different fertility preferences may affect a woman's household bargaining position regarding her child-rearing responsibilities and prospective labor market attachment. Second, career breaks in the form of parental leave may lead to a reduction in human capital, work-related networks, and experience, inducing females with children to earn lower relative (expected) wages afterwards (Albrecht et al., 1999). Third, reduced working hours among women with children may exert an additional penalty in (expected) female wages, especially if long hours relate to promotions or increasing marginal returns (Angelov, Johansson, and Lindahl, 2016; Goldin, 2014). Fourth, as regards negotiation strategies women with a strong preference for children might negotiate less aggressively, because they anticipate early career breaks and increased household specialization.

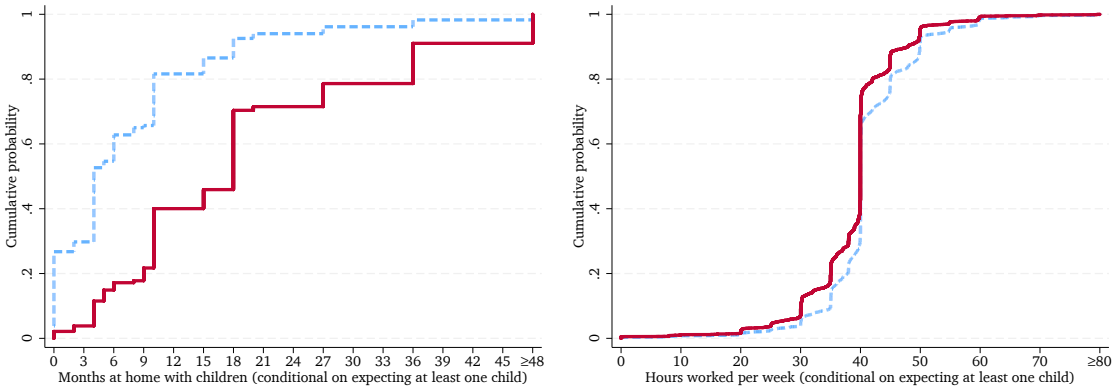
Table A6: Summary statistics on family planning

	Males	Females	Diff.	N
A. All respondents				
Wants to have children	0.88	0.87	0.02	15,348
Already has at least one child	0.03	0.02	0.01	15,256
Exp. working hours per week (age 40)	41.04	39.20	1.85	15,348
B. Conditional on wanting at least one child				
Age at birth of first child	30.59	29.38	1.21	13,370
Early parent (before age 30)	0.54	0.71	-0.16	13,427
Exp. number of children	2.27	2.20	0.07	13,427
Expected months at home per child	4.87	9.65	-4.78	11,666
Exp. working hours per week (age 40)	41.04	39.01	2.03	13,427

Notes: Panel A presents information on family planning and labor supply for all students in the sample, while panel B conditions on those respondents who want to have at least one child.

Table A6 summarizes male-female differences in fertility preferences, expected child-related career breaks, and expected weekly working hours. Regarding fertility preferences, the differences across genders are minor. 87% of females and 88% of males want to have children and conditional on parenthood, both genders prefer to have on

Figure A3: CDFs of expected time at home with kids and working hours



(a) Expected time home with kids

(b) Expected hours worked per week

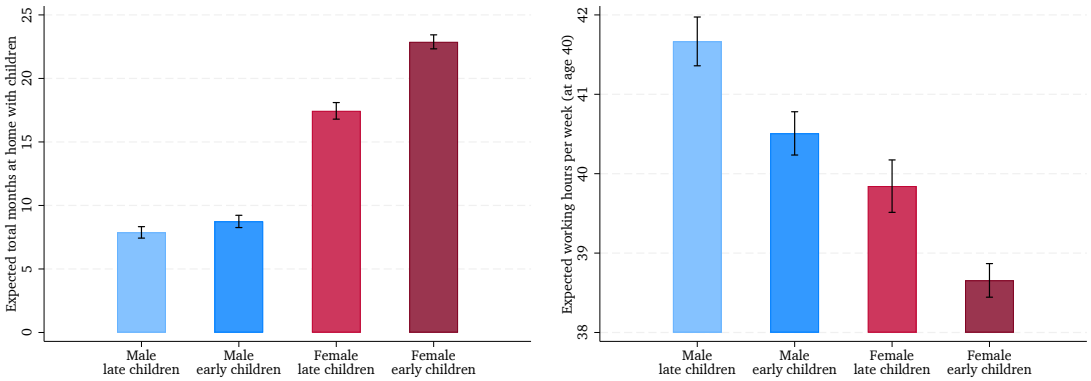
Notes: This figure presents cumulative distribution functions of (a) time spent at home with children (career break) and (b) hours worked per week at the age of 40 conditional on expecting at least one child for both female (red, solid) and male (blue, dashed) students in our sample.

average around 2.2 children. However, women expect to have children about one year earlier than men and a much larger fraction (71% versus 54%) would like to have children before turning 30 years old. This age difference matches reality to the extent that males tend to be at least one year older in three quarters of all couples (German microcensus, 2010). Larger differences emerge when it comes to child-related career breaks. Males expect to stay home for around 5 months per child as opposed to females, who estimate that they will stay home for around 10 months with each child (see also Figure A4b). Expected differences in working hours at the age of 40 are again minor. The average expected number of working hours at the age of 40 among all individuals (panel A of Table A6) is almost identical to that for individuals who expect to have children (panel B of Table A6 and Figure A4b) and there is no significant difference if we restrict the sample to individuals with and without (expectant) children. Arguably, the age of 40 might be too late to capture a reduction in working times among individuals who expect to have children in their late-twenties. However, even among individuals who plan to have children in their late-thirties we do not find significant differences.

The desired timing of first birth might reflect important differences in how much individuals desire to have children (soon) and this in turn might matter for gender differences in negotiation patterns and expected wages. Figure A4 reveals that both males and females who expect to have children early expect longer career breaks and are also planning to work fewer hours. Young prospective parents thus seem to (rationally) anticipate less time-consuming careers. Nonetheless, as can be seen in

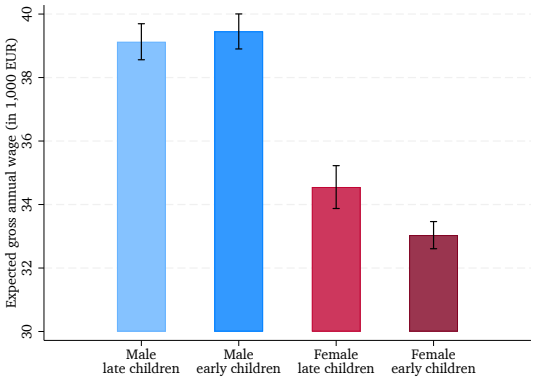
panel (c) of Figure A4, females expect a substantial wage penalty for early parenthood (penalty of 1,514 EUR, p-value < 0.01), while for males there is no difference (premium of 324 EUR, p-value $= 0.42$). In Figure A5, we additionally condition on a rich set of controls for majors, occupations and industries, IQ, personality measures and economic preferences. The results remain virtually unaffected.

Figure A4: Expected time at home with children, working hours, and wages for younger and older parents



(a) Time at home with children

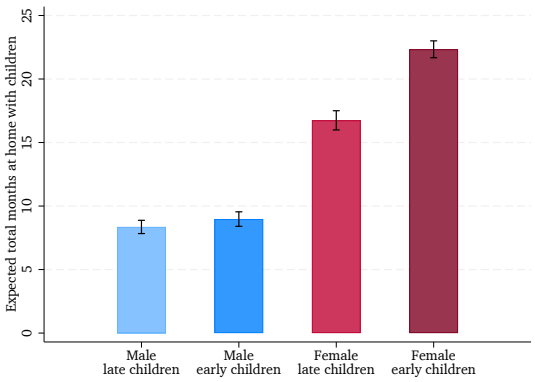
(b) Hours worked



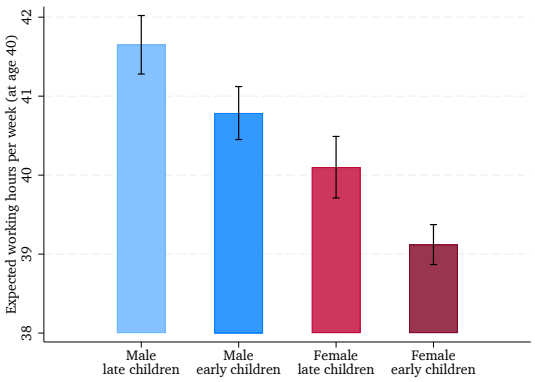
(c) Expected wages

Notes: This figure presents bar graphs of (a) time spent at home with children (career break) and of (b) hours worked per week at the age of 40, and (c) expected wages of younger and older parents conditional on expecting at least one child for both female (red) and male (blue, dark lines) students in our sample including 95% confidence intervals. Lighter colors indicate that females or males expect their first child after the age of 30, darker colors before the age of 30.

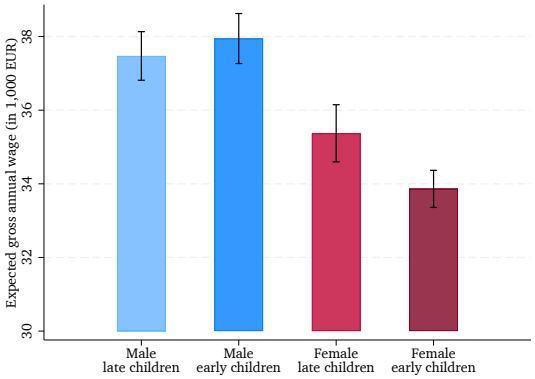
Figure A5: Expected time at home with children, working hours, and wages for younger and older parents



(a) Time at home with children



(b) Hours worked



(c) Expected wages

Notes: This figure presents bar graphs of (a) time spent at home with children (career break) and of (b) hours worked per week at the age of 40, and (c) expected wages of younger and older parents conditional on expecting at least one child for both female (red) and male (blue, dark lines) students in our sample including 95% confidence intervals. In contrast to Figure A4 the estimates presented here are conditional on controls for majors, industries and occupations, as well as IQ, personality measures and economic preferences. Lighter colors indicate that females or males expect their first child after the age of 30, darker colors before the age of 30.

A.7 Decomposing the gender gap in wage expectations

While the main part of the paper documents the extent to which males and females differ in their prospective child-rearing and negotiation patterns, we now want to quantify how much these factors help to explain the gender gap in wage expectations using Oaxaca-Blinder decompositions. We consider several factors that potentially explain expected wage disparities. For example, sorting into specific academic majors has been shown to hold particular importance for expected and actual wage gaps (Francesconi and Parey, 2018; Zafar, 2013), as is sorting into different occupations and industries (Goldin, 2014; Wiswall and Zafar, 2018). Nonetheless, sorting into occupations and industries might not only reflect preferences, but might also be driven by individual perceptions about discrimination or class ceilings (Blau and Kahn, 2017), ability, perceived relative ability, personality or economic preferences (Cortes and Pan, 2018; Fouarge, Kriechel, and Dohmen, 2014), all of which may also have a direct effect on expected wages. We thus subsume all potential drivers of the gender wage gap by forming three groups: (A) sorting into majors, occupations, industries as well as perceived/actual ability and personality, (B) labor supply and family planning, and (C) negotiation strategies.

To obtain relative shares of these factors, we compute the share of the gap that is attributable to sorting (comprised of sorting into majors, occupations, and industries as well as perceived relative ability, personality and economic preferences), family planning, and negotiation strategies based on a twofold Oaxaca-Blinder decomposition using regression coefficients from a pooled regression model.[26] The results of this model suggest that each of the above factors matter for expected wages and that the estimated relationship mimics results of models with actual wages as dependent variable (see Tables A7 and A8). Thus, for example, majors in medical sciences, law, economics/business, and STEM each yield a large and significant premium over a major in humanities. Similarly, conscientiousness and extraversion yield a wage premium, while agreeableness is associated with lower wages (for a comparison using actual wages, see Heineck and Anger, 2010). Finally, working hours are positively associated with expected wages as is boldness in wage negotiations.

Table A9 and Figure A7a present the results from an Oaxaca-Blinder decomposition of the gender gap in wage expectations for both starting wages as well as expected wages earned over the life cycle (see Figure A7b). Consistent with previous research

[26] We use pooled coefficients to obtain an estimate about the importance of differences in characteristics rather than their (perceived) prices. Differences in coefficients enter the unexplained difference. Note that this yields a lower bound of the estimated effect of wage negotiations, given our estimates displayed. There are no differences in the pricing of child-related labor force interruptions.

Table A7: Determinants of the gender gap in starting wage expectations

	log(expected starting wage)				
	(1) Pooled	(2) Pooled	(3) Females	(4) Males	(5) p-value
Female	-0.184***	-0.052***			
	(0.009)	(0.012)			
A. Sorting					
Medical/health sciences		0.107***	0.080*	0.167***	0.162
		(0.033)	(0.041)	(0.048)	(1.000)
STEM		0.114***	0.066**	0.186***	0.002
		(0.020)	(0.027)	(0.030)	(0.033)
Law		0.079	0.145***	-0.024	0.137
		(0.050)	(0.044)	(0.107)	(1.000)
Economics/business		0.133***	0.112***	0.179***	0.073
		(0.018)	(0.023)	(0.030)	(1.000)
Civil servant		-0.020	-0.020	-0.019	0.970
		(0.014)	(0.021)	(0.019)	(1.000)
Agreeableness		-0.006	-0.004	-0.006	0.899
		(0.006)	(0.009)	(0.008)	(1.000)
Conscientiousness		0.019***	0.016*	0.018**	0.858
		(0.007)	(0.009)	(0.009)	(1.000)
Emotional Stability		-0.003	-0.008	0.001	0.476
		(0.006)	(0.009)	(0.009)	(1.000)
Extraversion		0.020***	0.018**	0.022***	0.694
		(0.006)	(0.008)	(0.008)	(1.000)
Openness		-0.005	-0.006	-0.005	0.952
		(0.005)	(0.007)	(0.008)	(1.000)
B. Labor supply/family planning					
Exp. working hours per week		0.015***	0.016***	0.013***	0.407
		(0.002)	(0.002)	(0.002)	(1.000)
Exp. number of children		0.011*	-0.001	0.023***	0.062
		(0.007)	(0.010)	(0.009)	(0.927)
Exp. months at home		-0.000	0.000	-0.001	0.428
		(0.000)	(0.000)	(0.001)	(1.000)
Exp. children before age 30		-0.008	-0.016	0.012	0.175
		(0.010)	(0.016)	(0.013)	(1.000)
C. Negotiation Strategy					
Boldness		0.007***	0.011***	0.003***	0.000
		(0.000)	(0.001)	(0.001)	(0.000)
Occupation and industry	No	Yes	Yes	Yes	No
Subjective ability/perc. discrimination	No	Yes	Yes	Yes	No
IQ and economic preferences	No	Yes	Yes	Yes	No
R^2 (adj.)	.025	.18	.16	.18	
Observations	15346	10788	6240	4548	

Notes: This table presents regressions of log expected starting wages on varying sets of controls: variables that relate to (A) sorting based on majors (with humanities as the omitted baseline major category), occupations, industries and standardized measures of personality, (B) labor supply and family planning, and (C) negotiation strategies. Column (5) corresponds to the specification underlying the decomposition in Table A9. Column (5) presents p-values of a test of equality of coefficients in columns (3) and (4). Parantheses present robust standard errors in columns (1)–(4) or Bonferroni-adjusted p-values in column (5). All wages are winsorized at the 1% and 99% level. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table A8: Determinants of the gender gap in lifetime wage expectations

	log(expected lifetime wage)				
	(1) Pooled	(2) Pooled	(3) Females	(4) Males	(5) p-value
Female	-0.239***	-0.088***			
	(0.009)	(0.012)			
A. Sorting					
Medical/health sciences		0.182***	0.180***	0.190***	0.857
		(0.023)	(0.026)	(0.048)	(1.000)
STEM		0.127***	0.071***	0.212***	0.000
		(0.017)	(0.022)	(0.031)	(0.003)
Law		0.131***	0.172***	0.059	0.292
		(0.051)	(0.055)	(0.095)	(1.000)
Economics/business		0.165***	0.132***	0.238***	0.005
		(0.017)	(0.021)	(0.032)	(0.069)
Civil servant		-0.066***	-0.032*	-0.102***	0.010
		(0.014)	(0.020)	(0.019)	(0.151)
Agreeableness		-0.020***	-0.015**	-0.025***	0.350
		(0.006)	(0.007)	(0.009)	(1.000)
Conscientiousness		0.015***	0.008	0.023***	0.196
		(0.006)	(0.007)	(0.009)	(1.000)
Emotional Stability		0.000	-0.003	0.002	0.642
		(0.005)	(0.007)	(0.008)	(1.000)
Extraversion		0.029***	0.030***	0.027***	0.724
		(0.005)	(0.007)	(0.009)	(1.000)
Openness		0.017***	0.016**	0.016*	0.967
		(0.005)	(0.007)	(0.008)	(1.000)
B. Labor supply/family planning					
Exp. working hours per week (age 40)		0.010***	0.008***	0.012***	0.075
		(0.001)	(0.001)	(0.002)	(1.000)
Exp. number of children		0.019***	0.004	0.032***	0.018
		(0.006)	(0.008)	(0.009)	(0.273)
Exp. months at home		-0.000	0.000	0.000	0.749
		(0.000)	(0.000)	(0.001)	(1.000)
Exp. children before age 30		0.036***	0.026*	0.057***	0.108
		(0.010)	(0.013)	(0.015)	(1.000)
C. Negotiation Strategy					
Boldness		0.006***	0.009***	0.004***	0.000
		(0.000)	(0.001)	(0.001)	(0.000)
Occupation and industry	No	Yes	Yes	Yes	No
Subjective ability/perc. discrimination	No	Yes	Yes	Yes	No
IQ and economic preferences	No	Yes	Yes	Yes	No
R^2 (adj.)	.052	.28	.23	.26	
Observations	12734	9146	5236	3910	

Notes: This table presents regressions of log expected starting wages on varying sets of controls: variables that relate to (A) sorting based on majors (with humanities as the omitted baseline major category), occupations, industries and standardized measures of personality, (B) labor supply and family planning, and (C) negotiation strate´gies. Column (2) corresponds to the specification underlying the decomposition in Table A9. Column (5) presents p-values of a test of equality of coefficients in columns (3) and (4). Parentheses present robust standard errors in columns (1)–(4) or Bonferroni-adjusted p-values in column (5). All wages are winsorized at the 1% and 99% level. *, **, and *** denote significance at the 10%, 5%, and 1% level.

(Arcidiacono, Hotz, and Kang, 2012; Wiswall and Zafar, 2015; Zafar, 2013), we find that a sizable share of the gender gap in wage expectations relates to differential sorting into majors, occupations, and industries, with occupations as the finest category being most important. By contrast, our vast battery of perceived/actual ability, personality and economic preference measures explains only 3% of the male-female difference in expected starting wages.[27] However, this share rises to 10% once we decompose expected lifetime wages. We interpret this as suggestive evidence of anticipated employer learning (see, e.g., Altonji and Pierret, 2001), i.e., the idea that employers are unable to fully price a graduate's non-cognitive characteristics at the beginning of the career, but only with increasing experience. The notion that majors explain a smaller share of the gap in lifetime wages relatively to starting wages is also consistent with this idea.

Compared to sorting, labor supply and family planning together make up for a somewhat smaller share of around 12%, where most of the variance is explained by anticipated working hours rather than child-related career breaks. In fact, we observe hardly any expected child penalty after we control for occupations and industries, indicating that women may opt for somewhat more family-friendly occupations (with flatter wage trajectories as described in section 3.3), but then do not experience a relative decline in expected wages due to family planning and child-related career breaks (see Kuziemko et al., 2020, for related evidence). Finally, negotiation strategies explains 14% of the gender gap and this is true on average even within occupation categories and after controlling for measures of perceived and actual ability. Moreover, the importance of negotiation strategies remains similar at 9% over the life cycle, indicating that negotiation strategies set individuals on different initial wage trajectories with important ramification throughout their entire career.

We conduct several additional analyses and robustness checks. First, we notice that the above Oaxaca-Blinder decomposition explains a substantial portion, but not all of the difference in male-female expected starting (lifetime) wages. Given the breadth of available measures on individual characteristics in our data, unmeasured differences in personal characteristics are unlikely to account for the remaining difference. Instead, we investigate the importance of having experienced different degrees of female wage discrimination in previous student jobs. Here, again we find that the wage earned in previous student jobs does not explain the wage differences as shown in Table A10. Third, we replicate Table A9 for students who do not aim to enter the public sector as for them wage negotiations might be more important than for prospective

[27] Overconfidence, measured by perceived and actual ability, thus proves much less important in our data than suggested by some of the previous evidence on elite students (see, e.g., Reuben, Wiswall, and Zafar, 2017).

Table A9: Oaxaca-Blinder decomposition of the gender gap in wage expectations

	log(Expected starting wage)				log(Expected lifetime wage)			
	(1) with occ. sorting		(2) without occ. sorting		(3) with occ. sorting		(4) without occ. sorting	
Unadjusted difference	0.181	100.000	0.181	100.000	0.230	100.000	0.230	100.000
	(0.010)		(0.010)		(0.011)		(0.011)	
Explained difference	0.129	71.104	0.101	55.752	0.142	61.812	0.119	51.740
	(0.009)		(0.008)		(0.009)		(0.008)	
Composition effects attributable to								
A. Sorting								
Major	0.024	13.143	0.044	24.535	0.024	10.504	0.046	19.944
	(0.005)		(0.004)		(0.004)		(0.004)	
Occupation	0.029	16.165			0.041	17.653		
	(0.006)				(0.006)			
Industry	0.023	12.708			0.017	7.195		
	(0.004)				(0.004)			
Perc./actual ability & personality	0.004	2.432	0.005	2.899	0.024	10.443	0.027	11.786
	(0.005)		(0.005)		(0.005)		(0.005)	
B. Labor supply/family planning								
Hours worked	0.018	9.783	0.018	9.714	0.017	7.299	0.019	8.234
	(0.003)		(0.003)		(0.002)		(0.003)	
Children	0.005	2.969	0.007	4.065	-0.002	-0.723	0.003	1.388
	(0.005)		(0.005)		(0.004)		(0.004)	
C. Negotiation strategy								
Boldness	0.025	13.904	0.026	14.539	0.022	9.440	0.024	10.388
	(0.002)		(0.002)		(0.002)		(0.002)	
Observations	10788		10788		9146		9146	

Notes: This table decomposes the differences in log expected starting or lifetime wages into components attributable to (A) sorting into majors, occupations, and industries as well as perceived ability, personality and economic preferences (perceived ability on the job and in university, IQ, Big Five personality traits, altruism, impatience, positive and negative reciprocity, risk aversion and trust), (B) labor supply and family planning (expected hours per week, expected number of children, months at home with children, indicator for early parenthood), and (C) negotiation strategies (as defined in section 2.4) using Oaxaca-Blinder decompositions. For each decomposition, we also present the share of the difference that is attributable to the respective component and present results with and without controls for sorting into occupation and industries. Robust standard errors in parentheses. Log gross annual wages are winsorized at the 1% and 99% level.

civil servants. As Table A11 documents, we do not find substantial differences when focusing on this subsample. Finally, in Table A7 and A8, we also present unconditional quantile decompositions corresponding to the decompositions in Table A9 at different points along the distribution. The results of these decompositions are similar to the Oaxaca-Blinder decompositions at the mean, with one exception: the importance of negotiation strategies decreases along the distribution, while personality traits become more important in explaining the gap.

Table A10: Oaxaca-Blinder decomposition of the gender gap in wage expectations including past wages in student jobs

	log(Expected starting wage)				log(Expected lifetime wage)			
	(1) with occ. sorting		(2) without occ. sorting		(3) with occ. sorting		(4) without occ. sorting	
Unadjusted difference	0.181	100.000	0.181	100.000	0.230	100.000	0.230	100.000
	(0.010)		(0.010)		(0.011)		(0.011)	
Explained difference	0.129	71.295	0.102	56.106	0.142	61.832	0.119	51.784
	(0.009)		(0.008)		(0.009)		(0.008)	
Composition effects attributable to								
A. Sorting								
Major	0.024	13.507	0.045	24.921	0.024	10.535	0.046	19.989
	(0.005)		(0.004)		(0.004)		(0.004)	
Occupation	0.029	16.052			0.041	17.646		
	(0.006)				(0.006)			
Industry	0.023	12.673			0.017	7.192		
	(0.004)				(0.004)			
Perc./actual ability & personality	0.004	2.227	0.005	2.659	0.024	10.421	0.027	11.751
	(0.005)		(0.005)		(0.005)		(0.005)	
B. Labor supply/family planning								
Hours worked	0.018	9.764	0.018	9.709	0.017	7.302	0.019	8.239
	(0.003)		(0.003)		(0.002)		(0.003)	
Children	0.005	2.694	0.007	3.766	-0.002	-0.747	0.003	1.354
	(0.005)		(0.005)		(0.004)		(0.004)	
C. Negotiation strategy								
Boldness	0.025	13.838	0.026	14.477	0.022	9.433	0.024	10.379
	(0.002)		(0.002)		(0.002)		(0.002)	
D. Student jobs								
Wage in student jobs	0.001	0.538	0.001	0.574	0.000	0.050	0.000	0.072
	(0.000)		(0.001)		(0.000)		(0.000)	
Observations	10788		10788		9146		9146	

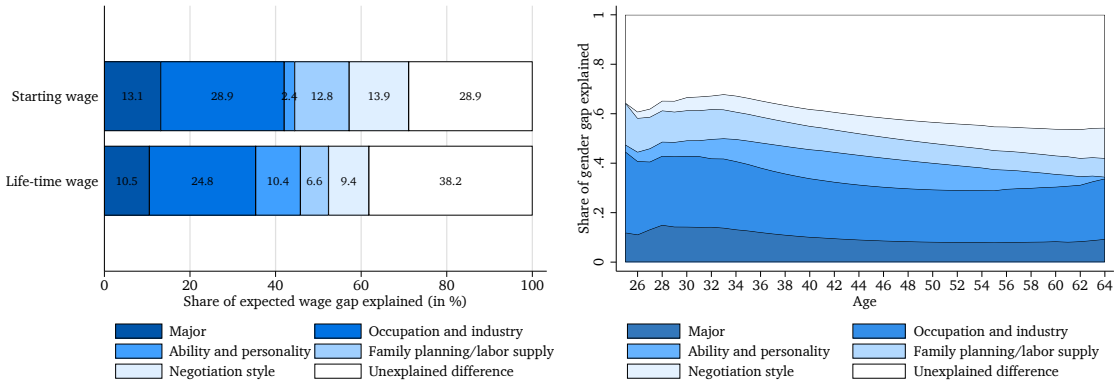
Notes: This table decomposes the differences in log expected starting or lifetime wages into components attributable to (A) sorting into majors, occupations, and industries as well as perceived ability, personality and economic preferences (perceived ability on the job and in university, IQ, Big Five personality traits, altruism, impatience, positive and negative reciprocity, risk aversion and trust), (B) labor supply and family planning (expected hours per week, expected number of children, months at home with children, indicator for early parenthood), (C) negotiation strategies (as defined in section 2.4), and (D) past wages in student jobs using Oaxaca-Blinder decompositions. For each decomposition, we also present the share of the difference that is attributable to the respective component and present results with and without controls for sorting into occupation and industries. All wages are winsorized at the 1% and 99% level. Robust standard errors in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table A11: Oaxaca-Blinder decomposition of the gender gap in wage expectations for students who want to enter the private sector

	log(Expected starting wage)				log(Expected lifetime wage)			
	(1) with occ. sorting		(2) without occ. sorting		(3) with occ. sorting		(4) without occ. sorting	
Unadjusted difference	0.186	100.000	0.186	100.000	0.252	100.000	0.252	100.000
	(0.012)		(0.012)		(0.012)		(0.012)	
Explained difference	0.143	77.001	0.114	61.436	0.158	62.583	0.130	51.349
	(0.011)		(0.010)		(0.010)		(0.010)	
Composition effects attributable to								
A. Sorting								
Major	0.026	14.139	0.051	27.425	0.022	8.816	0.048	19.212
	(0.006)		(0.004)		(0.005)		(0.004)	
Occupation	0.034	18.483			0.046	18.169		
	(0.007)				(0.007)			
Industry	0.023	12.096			0.020	7.966		
	(0.005)				(0.005)			
Perc./actual ability & personality	0.009	5.082	0.011	5.663	0.029	11.639	0.034	13.414
	(0.006)		(0.006)		(0.006)		(0.006)	
B. Labor supply/family planning								
Hours worked	0.019	10.271	0.019	10.042	0.016	6.508	0.018	7.312
	(0.004)		(0.004)		(0.003)		(0.003)	
Children	0.008	4.515	0.010	5.206	0.003	1.071	0.005	2.123
	(0.005)		(0.005)		(0.004)		(0.005)	
C. Negotiation strategy								
Boldness	0.023	12.416	0.024	13.099	0.021	8.414	0.023	9.289
	(0.002)		(0.003)		(0.002)		(0.003)	
Observations	8340		8340		7079		7079	

Notes: This table decomposes the differences in log expected starting or lifetime wages into components attributable to (A) sorting into majors, occupations, and industries as well as perceived ability, personality and economic preferences (perceived ability on the job and in university, IQ, Big Five personality traits, altruism, impatience, positive and negative reciprocity, risk aversion and trust), (B) labor supply and family planning (expected hours per week, expected number of children, months at home with children, indicator for early parenthood), and (C) negotiation strategies (as defined in section 2.4) for individuals who want to enter the public sector (i.e., excluding those who aim for the public sector) using Oaxaca-Blinder decompositions. For each decomposition, we also present the share of the difference that is attributable to the respective component and present results with and without controls for sorting into occupation and industries. Robust standard errors in parentheses. Log gross annual wages are winsorized at the 1% and 99% level.

Figure A6: Decomposition of expected wages



(a) Decomposition of starting and lifetime wages

(b) Decomposition over the life-cycle

Notes: Figure A7a illustrates the decomposition of expected starting and lifetime wages presented in Table A9. Figure A7b presents this decomposition for all ages over the life cycle. Categories are aggregated such that labor supply/children corresponds to the sum of hours worked and children, negotiation style/personality corresponds to negotiation strategies, perceived ability/discrimination as well as personality.

Figure A7: Quantile decomposition

	Quantiles										OB	
	10th		25th		50th		75th		90th		Mean	
Unadjusted difference	0.225	100.000	0.208	100.000	0.225	100.000	0.122	100.000	0.086	100.000	0.181	100.000
	(0.016)		(0.010)		(0.008)		(0.009)		(0.014)		(0.010)	
Difference explained	0.183	81.465	0.124	59.396	0.119	52.743	0.085	69.452	0.058	67.731	0.129	71.104
	(0.013)		(0.008)		(0.007)		(0.007)		(0.011)		(0.009)	
Composition effects attributable to												
A. Sorting												
Major	0.023	10.302	0.021	10.208	0.026	11.564	0.017	13.810	0.011	12.933	0.024	13.143
	(0.007)		(0.005)		(0.005)		(0.005)		(0.006)		(0.005)	
Occupation	0.046	20.285	0.028	13.556	0.028	12.279	0.018	14.513	0.017	19.616	0.029	16.165
	(0.008)		(0.005)		(0.005)		(0.005)		(0.008)		(0.006)	
Industry	0.032	14.308	0.026	12.611	0.024	10.833	0.022	17.894	0.012	13.607	0.023	12.708
	(0.006)		(0.004)		(0.004)		(0.004)		(0.006)		(0.004)	
Perc./actual ability & personality	0.004	1.951	0.007	3.357	0.013	5.617	0.016	13.492	0.029	33.793	0.004	2.432
	(0.008)		(0.004)		(0.004)		(0.004)		(0.007)		(0.005)	
B. Labor supply/family planning												
Hours worked	0.014	6.307	0.008	3.824	0.006	2.639	0.005	4.291	0.007	8.044	0.018	9.783
	(0.003)		(0.002)		(0.001)		(0.001)		(0.002)		(0.003)	
Children	0.009	4.209	-0.001	-0.675	0.002	0.987	0.006	4.975	0.005	5.563	0.005	2.969
	(0.006)		(0.004)		(0.003)		(0.003)		(0.005)		(0.005)	
C. Negotiation strategy												
Boldness	0.054	24.102	0.034	16.517	0.020	8.824	0.001	0.477	-0.022	-25.825	0.025	13.904
	(0.004)		(0.003)		(0.002)		(0.001)		(0.003)		(0.002)	

Notes: Quantile decomposition (using unconditional quantile regressions based on Firpo, Fortin, and Lemieux, 2009) of the gender gap in expected starting wages using the same variables as in Table A9. The final column presents results from an Oaxaca-Blinder decomposition at the mean for reference. Log gross annual wages are winsorized at the 1% and 99% level. Robust standard errors in parentheses.

Figure A8: Quantile decomposition without sorting

	Quantiles										OB	
	10th		25th		50th		75th		90th		Mean	
Unadjusted difference	0.225	100.000	0.208	100.000	0.225	100.000	0.122	100.000	0.086	100.000	0.181	100.000
	(0.016)		(0.010)		(0.008)		(0.009)		(0.014)		(0.010)	
Difference explained	0.147	65.167	0.098	47.336	0.091	40.473	0.065	53.260	0.045	52.244	0.101	55.752
	(0.012)		(0.007)		(0.006)		(0.006)		(0.010)		(0.008)	
Composition effects attributable to												
A. Sorting												
Major	0.060	26.634	0.047	22.460	0.046	20.542	0.031	25.838	0.020	23.207	0.044	24.535
	(0.005)		(0.003)		(0.003)		(0.003)		(0.004)		(0.004)	
Perc./actual ability & personality	0.005	2.433	0.008	4.034	0.014	6.259	0.017	14.147	0.030	34.730	0.005	2.899
	(0.008)		(0.005)		(0.004)		(0.004)		(0.007)		(0.005)	
B. Labor supply/family planning												
Hours worked	0.014	6.238	0.008	3.817	0.006	2.688	0.006	4.748	0.008	9.024	0.018	9.714
	(0.003)		(0.002)		(0.001)		(0.001)		(0.002)		(0.003)	
Children	0.011	5.091	0.000	0.006	0.004	1.758	0.009	7.072	0.008	8.969	0.007	4.065
	(0.006)		(0.004)		(0.003)		(0.003)		(0.005)		(0.005)	
C. Negotiation strategy												
Boldness	0.056	24.770	0.035	17.020	0.021	9.226	0.002	1.455	-0.020	-23.685	0.026	14.539
	(0.004)		(0.003)		(0.002)		(0.001)		(0.003)		(0.002)	

Notes: Quantile decomposition (using unconditional quantile regressions based on Firpo, Fortin, and Lemieux, 2009) of the gender gap in expected starting wages using the same variables as in Table A9 without controls for sorting into occupations and industries. The last column presents results from an Oaxaca-Blinder decomposition at the mean for reference. Log gross annual wages are winsorized at the 1% and 99% level. Robust standard errors in parentheses.