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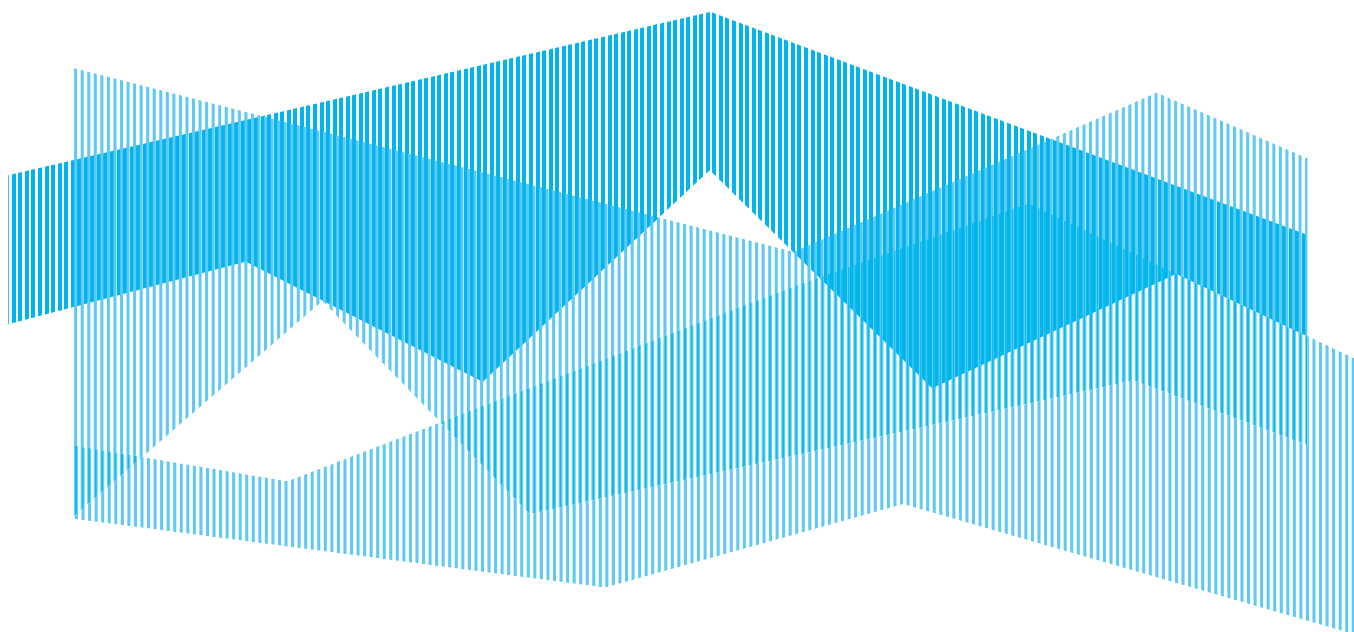
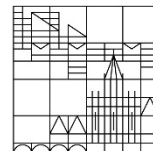
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Is My Wage Fair? Validating Fairness Perceptions Among Women and Men

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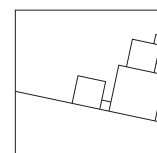
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Is My Wage Fair? Validating Fairness Perceptions Among Women and Men

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Abstract

This paper examines gender differences in perceptions of the fairness of one's own pay. Theoretically, we draw on two so far separate strands of literature, on women's alleged greater tolerance for lower wages ("contented female worker paradox"), and on perceived discrimination among ethnic minorities ("integration paradox"). Empirically, we depart from previous studies by not simply assessing whether women are as likely as men to perceive their pay as unfair. Instead, we use an innovative methodology based on linked employer-employee data from about 500 German firms. This makes it possible to validate subjective perceptions of (un)fair pay by comparing them to the actual (un)fairness of someone's pay. The latter is measured as the difference between one's own pay and the predicted pay of comparable others with the same individual, job, and firm-related characteristics. Overall, women are as likely as men to perceive a fair wage as unfair – or an unfair wage as fair. However, university-educated women are somewhat less likely than men to perceive their pay as fair when they earn less than comparable employees. They might be more aware of the societal debate about gender discrimination and "aim higher" in setting their aspirations for appropriate rewards for their skills.

Introduction: Gender differences in perceptions of fairness of one's own wages

The gender wage gap is not only one of the most prominent findings in empirical social research, it is also at the center of a lively public debate. Numerous studies have shown which factors contribute to this gap that persists even though women have surpassed men in educational achievements (DiPrete & Buchmann, 2013). This research has, on the one hand, identified factors related to the supply side, such as women's lower working hours (Schmitt & Auspurg, 2022), often for family reasons, or their employment in female-dominated occupations. In this respect, one important reason for the persistence of the gender pay gap is that occupational segregation has remained rather stable over time (Levanon & Grusky, 2016). On the other hand, demand side factors play a role, that include gender-based discrimination by employers (Bertogg et al., 2020).

An empirically more limited sub-strand of this literature focuses on gender-differences in employees' evaluation of *their own* pay. The dominant framework for describing and explaining this phenomenon is the so-called "paradox of the contented female worker" (termed by Crosby, 1982). It relates to the more general finding that "despite having poorer objective working conditions than men, women are more satisfied than men with their jobs" (Smyth et al., 2021). In line with this, women seem to be more likely than men to believe that their own pay is fair even though on average it is not, as the gender wage gap shows (Pfeifer & Stephan, 2019). However, recent evidence about this phenomenon is mixed and raises the question of whether this paradox still holds (Adriaans & Targa, 2023; Brüggemann & Hinz, 2023; Valet, 2018).

Our paper starts from the fact that existing studies on whether women perceive their own pay as more or less fair than men provide contradictory results and share a crucial shortcoming: They cannot validate these perceptions with information about whether the individual's pay is actually fair in the empirical sense of being higher or lower than the pay of comparable workers. Thus, it is not yet known whether these perceptions of the fairness of one's own pay are biased - and if so, whether there are gender differences in this bias.

Like several previous studies, we first explore gender differences in employees' assessment of the fairness of their own wages. We do so based on novel data from a survey that was conducted in 538 firms in Germany (Strauß et al., 2022). We then move beyond previous research by assessing, secondly, for each respondent in the survey, whether they earn less or as much as comparable employees with similar individual (e.g. level of education and work experience) and work-related characteristics (e.g. part-time or fulltime job) who work in the same occupations in the same firms. We are able to do so by linking survey data with administrative data for *all* 142,000 employees from the same 538 firms. Taken together, this information allows us to assess whether women are as likely, more likely or less likely than men to perceive their own pay as fair or unfair, given that they are - or are not - paid the same as comparable workers.

It is not only of academic interest whether women are more accepting of lower wages than men. If this was the case, "the subjective motivation to start negotiations, that is, to ask for higher wages, or to start other activities (e.g. employer change) should also be lower for them" (Pfeifer and Stephan (2019)). Overall, our analyses show that women and men do not differ much in their perceptions of the fairness of their wages. However, there is some evidence that women with tertiary education are less likely than men to perceive their pay as fair if they earn less than comparable other workers. We argue that this suggests that they are less "naïve" than men about unfairly low wages. This, in turn, may be related to more educated women's greater awareness of gender discrimination in the labor market - and their higher aspirations for equal treatment.

Validating wage perceptions – the concept of “comparable others”

The gender wage gap is defined as “the difference between the average gross hourly earnings of men and women *expressed as a percentage of the average gross hourly earnings of men*” (Destatis, 2024, emphasis not in the original). Individual, work, occupation, and firm related characteristics have all been shown to contribute and thus partly explain the gender wage gap – in changing relative importance over time (Blau & Kahn, 2017). Based on this, numerous empirical studies calculate an adjusted (or “net”) gender wage gap that considers, among others, gender differences in human capital endowments, part time work, occupational segregation and employer characteristics. In Germany, this adjusted gender wage gap amounts to about 8%. Even though this is obviously much lower than the unadjusted gender wage gap of about 18%, there is thus a remaining, “unexplained” gender gap in wages, that has even increased at the top of the wage distribution according to a recent study (Bonaccolto-Töpfer et al., 2023).

This gap does not directly indicate gender-based individual discrimination, in the sense of the „difference between the treatment that a target group actually receives and the treatment they would receive if they were not members of the target group but were otherwise the same“ (Quillian, 2006, p. 302). This is because it could reflect differences between men and women, e.g. in psychological characteristics or non-cognitive skills, that are unobservable in census and most survey data (Blau & Kahn, 2017). This gap just indicates the “upper limit” for discriminatory treatment. Another caveat is just as important. Showing, for example, that female nurses earn as much as male nurses with the same human capital characteristics who work similar work hours in a comparable institution does not imply that there is no gender-based discrimination. After all, labor markets are strongly and persistently gender-segregated and male dominated jobs are usually better paid than female dominated jobs (Leuze & Strauß, 2016). This possible devaluation of ‘female-typical’ occupations (England, 1992) alone can be considered discriminatory.

The sociological literature has revealed, among others, that women and men perceive the gender wage gap as legitimate, i.e. believe that women *should* earn less (Auspurg et al., 2017). One important finding from this literature is that “both men and women consider somewhat lower earnings for female employees than for otherwise similar male employees to be fair” (Auspurg et al., 2017, p. 179). Less research has been conducted on men’s and women’s *own* perceptions of fairness of their wages. In addition, available studies yield mixed results. Some studies suggest that women are more likely than men to perceive their wages as fair (Pfeifer & Stephan, 2019). Others show that women are not more likely (Valet, 2018) or even less likely (Adriaans & Targa, 2023; Brüggemann & Hinz, 2023) than men to perceive their own wages as fair.

While these studies greatly enhance our understanding of the social dynamics behind the gender wage gap, they share – and suffer from – one fundamental shortcoming: they cannot validate these perceptions. While they typically control for self-reported wages and occupation, these findings thus say little about whether a female employee who feels treated (un-)fairly is actually treated (un-)fairly. This is a familiar challenge in any literature on perceptions of unfair treatment: do these perceptions reflect only unfair treatment, or are they biased, i.e., do they overestimate or underestimate it? This problem has been aptly described by authors who are interested in perceived discrimination among ethnic minorities (for a review see Schaeffer & Kas, 2023). Although we are studying a different ascriptive group that is not even a minority in quantitative terms, the underlying problem – and the starting point for this paper – is the same: “we require person-level data on reported experiences of discrimination among [...] minorities, compared against the actual discrimination they encounter” (Schaeffer et al., 2023). While these authors tackle this challenge experimentally, we take a different approach.

We validate women’s perceptions of unequal treatment with information on whether their wages are equally high or higher versus lower than the wages of comparable employees. Comparable employees can be defined as individuals who not only share the same productive

qualities, but also the same work (e.g. full time versus part time work), occupation (e.g. male versus female dominated or high versus low status job), and firm (e.g. firm size) related characteristics (Godechot & Senik, 2015, p. 401). The underlying assumption is thus that the same inputs should lead to the same rewards – in line with the key assumption of equity theory (Adams, 1965). This, in turn, allows for a more fine-grained analysis of the gender differences in how accurate or biased perceptions of experienced wage inequity are.

This strategy requires, first, information on whether an employee perceives their own wage as fair or unfairly low. According questions have been included in several surveys in the last years (e.g. European Social Survey, Round 9). Secondly, and more challenging, it is necessary to assess whether these individuals earn as much as comparable others in the above-mentioned sense or whether they earn less. As outlined in the introduction, this requires detailed data on the wages of others with comparable individual, work, occupational and firm characteristics. Based on this, it is possible to compare an employee's subjective perception of (un-)fairness with the actual disadvantage they face relative to comparable other employees. However, even in large surveys, information on all these factors is unavailable.

One of the few studies that have taken a similar approach is the one by Godechot and Senik (2015). The authors (that also provide a short review of similar studies) are interested in how social comparison processes affect wage satisfaction. Based on matched employer-employee data they analyze how employees' subjective satisfaction with their wage depends, among other factors, on the median and average income of comparable workers in the firm and in the region. They show that the latter is unrelated to one's own wage satisfaction (p. 401). Mohrenweiser and Pfeifer (2023) are interested in the link between firm wage structures, perceived wage fairness and job satisfaction. They use employer and employee surveys linked with the same administrative data we use and show that "internal" reference wages within firms and outside reference wages shape perceived wage fairness above and beyond one's own wage level. We take this approach a step further by using administrative data to calculate on the individual level whether respondents' wages are at least equal to or lower than the wages of comparable employees in the same firm.

Theoretical arguments: Perceived fairness of own wages among women and men who earn less or the same than comparable employees

Previous research suggests that comparisons with reference groups are key when employees think about the fairness of their own wages. Employees are most likely to compare themselves with others working in the same occupation or in the same firm (for a review see Brüggemann & Hinz, 2023, p. 2; Godechot & Senik, 2015). In addition, the reference groups for men and women differ (the following summary of mechanisms is based on Auspurg et al. (2017). Homophily and pronounced occupational segregation limit the opportunities for many women to compare themselves with men because they are surrounded by other women. They are thus more likely to compare themselves with other women rather than with men when they think about which level of pay would be fair – and men with other men. In other words: both groups use "gender-specific referents" (Auspurg et al., 2017, p. 181). For this reason, the wages women perceive as fair – for *both* men and women – tend to be lower than the ones men perceive as fair: "what is" becomes the basis of "what ought to be" (Auspurg et al., 2017, p. 184). An alternative mechanism suggests that both men and women have biased "gender status beliefs", including biased perceptions of female productivity. Women are thus evaluated as being less competent and productive on the labor market than men – and *both*, men and women, believe that women should earn less.

Based on these mechanisms one would also expect that there are systematic differences in how women and men perceive the fairness of their *own wages*. In line with the "contented female

worker paradox”, women should perceive their own wages more often as fair than men. In fact, Pfeifer and Stephan (2019) find empirical evidence for this, based on panel-data from Germany.

In our analyses, we therefore test the hypotheses that:

Women are more “naïve” than men, i.e. more likely than men to perceive their own wages as fair if they receive lower wages than comparable others (H1a).

Women are less “suspicious” than men, i.e. less likely than men to perceive their own wages as unfair if they receive the same wages as comparable others (H1b).

Even though labor market segregation between men and women declines at best slowly and mostly at the upper end of the labor market (Blau et al., 2013), the argument about gender specific referents may no longer hold (in fact, Auspurg et al. 2017 find little empirical support for it). This is suggested by a different literature that focuses on ethnic minorities rather than on women and starts out from one aspect of the so-called “integration paradox” (Verkuyten, 2016). This term describes the puzzling finding that with increasing societal and individual integration, as indicated e.g. by higher levels of education, ethnic minority members have more negative attitudes about the host society and report more rather than less unequal treatment (for a review see Schaeffer & Kas, 2023). A key argument to explain this puzzle is that it is often difficult for an individual to judge whether they have been treated unfairly. As a result, negative incidents may be mistakenly attributed to discrimination, especially among those who are highly aware of the existence of discrimination and have high aspirations for equal treatment. Similarly, an individual employee often does not know whether his or her pay is fair in the sense that he or she earns more, less, or the same as comparable others. In the context of this ambiguity, perceptions of unfair treatment should reflect not only actual underpayment, but also high awareness of inequality and strong aspirations for equal treatment.

These aspirations are shaped by social comparisons with others. “Individuals look at others around them, and their experiences and achievements shape their desires and goals” (Genicot & Ray, 2017, p. 720). The less marginalized minority members are, “the more does the mainstream’s standard of life become their frame of reference” (Schaeffer & Kas, 2023, p. 7). Women’s educational achievement has increased over the last decades (Breen & Müller, 2020) and actually turned into an advantage (DiPrete & Buchmann, 2013). As a consequence, the reference group comparisons that shape women’s perceptions of fairness of one’s own wages may have become less gendered. Just like ethnic minority members are more likely to compare themselves with the majority when their societal integration proceeds, an increasing share of women could consider the better paid male mainstream as their reference group.

In a similar vein, status beliefs about women and men have become less gendered. In Germany, the country we focus on, there was the highest increase in the Gender Social Norms Index (gSni) between 2017 and 2022. The gSni “captures beliefs on gender equality in capabilities and rights” as share of individuals without gender bias (UNDP, 2023, p. 15). It is measured based on items such as: “Men make better business executives than women do” that capture rather directly perceptions of economic gender roles. More egalitarianism has also been described for other dimensions of gender role attitudes, such as attitudes about the gender division of labor (Düval, 2023). Due to societal change, gender-specific referents and gender status beliefs may no longer bias women’s perceptions of their own wages, so that these perceptions have converged between the sexes.

Possibly related to these developments, Valet does not find general gender differences in fairness evaluations of own wages. He argues that the „contented female worker paradox” applies only to female dominated fields (2018).

Contrary to the hypotheses formulated above, we thus need to test the “null hypothesis” that there are no gender differences in perceived fairness of own pay:

Women are equally likely as men to perceive their wages as unfair if they receive lower wages than comparable employees (H0).

Women are equally likely as men to perceive their wages as fair if they receive the same wages as comparable employees (H0).

Finally, the arguments from the “integration paradox” can be taken even further. When reference groups shift, e.g. due to increasing levels of education, aspirations may increase even faster than actual increases in income or upward mobility. This mechanism has been used to explain, for example, why rising levels of education do not lead to more life satisfaction (Clark et al., 2015). Half of the generally positive effect of education on life-satisfaction is “cancelled out” by aspirations that rise faster than actual achievements. At the same time, unmet aspirations are often attributed to unfair treatment, which can be a “self-protective” strategy that reduces cognitive-dissonance (Schaeffer, 2019; Thijs & Piscoi, 2016, p. 170). Such rising but unmet aspirations may also influence women’s assessment of the fairness of their own wages.

The so-called “Tocqueville paradox” leads to a similar conclusion. As social injustices are reduced, sensitivity to remaining inequalities increases. Greater political commitment to equality at the macro level plays an important role in this regard, as it can have a similar effect to increasing individual integration. In particular, “social and equal-treatment policies may increase the salience of remaining inequalities” (Schaeffer et al., 2023, p. 8). Broad anti-discrimination legislations may not only raise the awareness that inequalities based on gender or ethnicity violate meritocratic principles, but also the awareness of discrimination itself (Kislev, 2018). In many Western societies, discrimination based on ascriptive characteristics is increasingly framed as unfair in the media. This “reinforces the perception that these inequalities are driven more by processes of discrimination...” and are thus illegitimate (Jun et al., 2023, p. 7).

As a result, members of minority groups may be susceptible to perceptions of unfair treatment, regardless of whether this is the case. This could also affect women’s perceptions of fairness of their wages. After all, except in rare situation of full transparency, individuals do not know whether they are paid fairly as compared to others. The salient societal debate about the persistence and illegitimacy of gender-based discrimination and inequality may thus have flipped the “contented female worker bias” in a direction that women are less likely than men to perceive their own wages as fair and more likely to feel underpaid. And in fact, some of the studies cited above provide empirical evidence for this based on ESS data (Adriaans & Targa, 2023) and ponder whether “societal change has fostered the awareness of women for gender inequality” (Brüggemann & Hinz, 2023, p. 13).

Empirically, we thus assess whether:

Women are less “naïve” than men, i.e. less likely than men to perceive their own wages as fair if they receive lower wages than comparable others (H2a).

Women are more “suspicious” than men, i.e. more likely than men to perceive their own wages as unfair if they receive the same wages as comparable others (H2b).

However, the arguments suggesting that the “contented female worker paradox” has reversed may only apply to women with higher levels of education. Educated women in particular should be more exposed to and thus aware of the debate about gender-based discrimination in the media (for immigrants, see Steinmann 2019) and have higher (and often unmet) aspirations for equal treatment than lower educated women.

They should therefore be more likely to expect unfair treatment which could shape their perceptions:

Only educated women are less “naïve” than men, i.e. less likely than men to perceive their own wages as fair if they receive lower wages than comparable others (H3a).

Only educated women are more “suspicious” than men, i.e. more likely than men to perceive their own wages as unfair if they receive the same wages as comparable others (H3b).

The theoretical arguments and empirical findings presented so far have allowed us to come up with rather fine-grained expectations about gender differences in perceptions of wages that are equally high or lower than the wages of comparable employees (see Table 1). We will now explain in greater detail how we plan to test these arguments empirically.

Table 1: Summary of theoretical arguments and derived hypotheses about gender differences in biased perceptions of fairness of own wage

Subjective perception of own wage as...	...unfairly low	...fair
Own wage compared to wages of comparable others:		
lower	<p><i>Converging reference groups between men and women and increasingly egalitarian gender norms</i></p> <p>W=M (H0)</p>	<p><i>Gender specific referent groups and gendered status beliefs</i> W>M (H1a: “women are more naïve”)</p> <p><i>Rising aspirations, increasing awareness for the illegitimacy of discrimination</i> W<M (H2a: “women are less naïve”)</p>
equally high	<p><i>Gender specific referent groups and gendered status beliefs</i> W<M (H1b: “women are less suspicious”)</p> <p><i>Rising aspirations, increasing awareness for the illegitimacy of discrimination</i> W>M (H2b: „women are more suspicious “)</p>	<p><i>Converging reference groups between men and women and increasingly egalitarian gender norms</i></p> <p>W=M (H0)</p>

Notes: H3a and H3b: H2a and H2b only apply to educated women. W</=>M indicates that, according to the respective hypothesis, women are found less frequently/just as frequently/more frequently in the respective cell than men.

Combining survey and administrative data to calculate fair wages in the predicted and in the perceived sense

We obtain the subjective perception of wage fairness from survey data that was conducted online between May and August 2021 (see Strauß et al. (2022) for detailed documentation). German employees were sampled based on two administrative data sources, the Establishment History Panel (BHP) and the Employee History (Beschäftigtenhistorik - BeH) of the Institute for Employment Research (IAB). They cover all firms with at least one employee and the complete working population *except* for self-employed individuals and civil servants in Germany. A stratified sampling approach was applied. In brief, 27 sampling cells were constructed based on terciles of firm Gini-coefficients, the share of female managers, and the gender pay gap (Strauß et al. (2022)). The final sample of persons invited to participate in the survey consisted of 54,000 employees from 538 firms with at least 100 employees subject to

social security contributions. 7,867 employees took part in the survey of which 6,836 gave their consent to link the survey data with administrative data. Among others, respondents were asked the following question: *Would you say your gross pay is unfairly low, fair, or unfairly high?* (9-point Likert from -4 to 4, distribution in Figure A1 in the Appendix).

We link data from this survey to administrative data on *all* workers from the 538 firms from which we drew our sample of invited employees. After excluding individuals with missing information for the wage regression in the administrative data, we are left with 6,661 survey respondents and 142,444 workers from the same firms who did not participate in the survey.¹ We use this extended sample to estimate wage regressions and to predict fair wages, i.e. wages given their observable individual, work, occupation and firm-related characteristics:

$$\ln(y_{iof}) = X_i\beta + \theta_o + \mu_f + \varepsilon_i$$

The dependent variable y is the logarithm of gross daily wages at the end of 2019 of individual i working in occupation o in firm f . The independent variables in these wage regressions include the following characteristics X for individual i : age, (non-)German nationality, highest educational degree, tenure with current employer, part-time job.² In addition, we include occupation fixed effects θ (at the 3-digit level) and firm-fixed effects μ to control for unobserved heterogeneity on the firm level. We do not include gender in the regressions to avoid replicating a gender bias.³ The predicted wages give us the wage that a specific person with given characteristics *should* earn if gender had no impact on wages.

Afterwards, we compare this predicted wage with their actual wage and define a dummy variable for wages as being equally high or higher than the predicted wage (“fair: predicted”). In robustness tests, we change the definition of predicted fair wages, limit the sample to full-time employees, and exclude employees who reported being over-rewarded (see Section on robustness tests).

Based on data from the survey, we construct a dummy variable (“fair: perceived”) if a respondent indicates that his or her wage is fair (0-4 on the 9-point Likert scale). We then compare this fairness-of-wage measure from administrative data to the measure of the subjectively perceived fairness of wages from the survey data.⁴ Based on these two wage fairness dummies, we construct two additional dummy variables, one for wages that are fair in the predicted sense but that individuals perceive as unfairly low, and one for wages that are unfair in the predicted sense but that individuals perceive as fair. After further data preparation (dropping important variables with missing values etc.) our final analysis sample consists of 3,984 employees.⁵

¹ Table A1 in the appendix shows that there is (positive) selection into the survey. For example, respondents are slightly better educated, earn more and are more likely to have German citizenship than non-respondents. However, the two groups do not differ in terms of the proportion of women or part-time employment.

² Unfortunately, the administrative data do not include information on working hours. Therefore, we can only distinguish full-time and part-time employment. However, in a robustness check we exclude part-time work and concentrate on fulltime employees (see Section on robustness checks and Table A6 in the Appendix).

³ The results of the wage regression based on the administrative data can be found in Table A2 in the Appendix.

⁴ Although the wage information from the administrative data is highly reliable in general, it is top-coded, and we only observe wages up to the social security contribution ceiling. Therefore, we apply an imputation procedure for top-coded values proposed by Gartner (2005).

⁵ As the latest wage information in the admin data is from December 2019 and the survey was conducted 1.5 years later, we further restrict our analysis sample to workers who did not change their employer within this period. This reduces our sample for the main analyses to 6,022 observations. We also drop all persons with missing values in our outcomes (16 observations with missing values for subjective and objective assessment of wages) and explanatory variables (152 observations) as well as individuals with implausible differences between actual and predicted wage (more than 100% difference based only on admin data information, 59 observations with missing values). For our analyses, we assume that the worker's own assessment of fair remuneration in the

Table 2: Construction of dependent variables

Administrative data Fair wage: predicted		Survey data Fair wage: perceived	
Is actual wage \geq predicted wage (based on employees' age, nationality, educational degree, tenure, occupation (3-digit), part-time work, firm (fixed effects))?		Would you say your gross pay is unfairly low, fair, or unfairly high? (9-point Likert from -4 to 4) → fair: 0-4	
yes	no	yes	no
		employee is "naïve"	
		employee is "suspicious"	

Analytical strategy

We proceed in four steps. *First*, we present descriptive findings on the distribution of wages and on the share of women and men who receive the same or a higher versus a lower wage than comparable employees and of the share of women and men who perceive their wage as fair under these conditions. We also run two descriptive linear probability models to show which characteristics make it more likely that someone receives the same or a higher wage than the predicted wage or a lower wage ("fair: predicted"), and that someone perceives their wage as fair or as unfair ("fair: perceived"). Based on this, we *secondly* analyze which characteristics make it more likely to belong to the group of "naïve" respondents, who receive an unfairly low wage in the predicted sense but perceive their wage as fair. This allows us to test our hypotheses that women are more (H1a), less (H2a) or equally likely (H0) than men to be "naïve". We *thirdly* assess which characteristics make it more likely to belong to the group of "suspicious" respondents, who receive a fair wage in the predicted sense but perceive their wage as unfair. This allows us to test our hypotheses that women are less (H1b), more (H2b) or equally likely (H0) than men to be "suspicious". *Fourth* and finally, we test our subgroup-related hypotheses (H3a and H3b) that state that only highly educated women are less "naïve" and more "suspicious" than men by presenting our results separately for respondent with and without a university degree.

In all multivariate models, we control for wage to recognize that in the survey, respondents were just asked whether their pay is fair - without reference to gender inequality. We thus do not know with whom they compare themselves when answering this question. Available evidence suggests that the most important reference groups for wage related fairness evaluations are individuals with similar individual characteristics who work in the same occupation and firm (Brüggemann & Hinz, 2023, p. 4). But it is plausible that individuals with high wages in absolute terms are more content with their wages than individuals with low wages. In other words, evaluations of the fairness of one's own wage also reflect vertical rather than horizontal variation in wages (Kacperczyk & Balachandran, 2018). We also control for age, tenure and nationality (German versus non-German) of the employees, children, and working in a part-time job and include firm fixed-effects and occupation fixed-effects.

summer of 2021 and the objective assessment of December 2019 are for "the same wage". To ensure this, we also exclude individuals for whom the wage from the administrative data measured in December 2019 and the wage given in the survey 1.5 years later differs by more than 15 percent (1,811 observations). Finally, we end up with 3,984 observations for our main estimations.

Descriptive findings I: The distribution of wages

Table 3 shows the mean values of predicted and reported wages by gender (see Table A3 for descriptives of main variables used for estimations). We see that the gross monthly wage according to administrative data and the gross monthly wage reported in the survey differ only slightly. In both cases, women earn almost 1,000 Euro less than men. Women's predicted wages, i.e. the wage of a person with the average individual, work and firm related characteristics of female employees, are also lower, but with about 840 Euro the difference is slightly less pronounced than it is for actual wages.

Table 3: Mean values of wage variables by gender

	Women	Men	Difference
Administrative data			
Gross monthly wage	3491.13	4485.66	-994.53***
Predicted monthly wage	3471.26	4311.29	-840.03***
Survey data			
Gross monthly wage	3407.64	4386.72	-979.08***
N	1,749	2,235	

Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022).

Note: ***/**/*/+ indicate significant difference between men and women at the 0.1/1/5/10% level.

Table 4 shows that fewer women earn the predicted wage than men (48.89% versus 53.83% resp., $p < .01$) and that women also perceive their wage significantly (on the 5% level) more often as unfair than men (60.61% versus 56.69% resp.). When considering only employees who do not receive wages that are fair in the predicted sense, we see that the proportion of “naïve” employees who find this unfair wage to be fair is very similar between women and men (36.65% and 35.85% resp., difference is insignificant). For employees who do receive wages that are equally high or higher than the predicted wage, the table shows that the share of “suspicious” employees who still find their wages too low is higher for women than for men (57.43% and 50.29% resp., difference significant on the 1% level). Note, however, that we do not yet control for wages in these crosstabulations.

Descriptive findings II: Who gets fair wages in the predicted and perceived sense?

We now estimate the marginal effects of gender and other factors on the fairness assessment of wages simultaneously (see Table 5). The first two models show the determinants of fair wages in the predicted and in the perceived sense. We see that those with higher wages are also more likely to earn as much or more than comparable employees. In line with previous research (e.g. Mohrenweiser and Pfeifer 2023: 2299), the likelihood that employees perceive their wage to be fair also increases with wage levels. Once we control for wage, women are somewhat more likely to receive the predicted wage than men (see model (1) in Table 5, effect is significant on the 5% level). Figure A2 in the Appendix sheds light on this seemingly puzzling finding. Since the predicted wage for women is lower than for men (see Table 3 above), they receive the predicted wage “earlier”, i.e. at lower wage levels than men. In other words: A woman who earns 7,000 Euro is more likely to receive the predicted wage than a man who needs to earn about 8,000 Euro to receive the predicted wage with the same likelihood. Results also show that women are just as likely as men to believe that they are rewarded fairly once we control for wage level. Note that these descriptive results do not yet take into account whether someone earns what comparable others earn – or less.

Table 4: Joint distribution of fairness variables

Women

		Perceived: fair		
		No	Yes	
Predicted: fair	No	63.65%	36.35%	100.00%
		53.68%	47.17%	51.11%
	Yes	57.43%	42.57%	100.00%
		46.32%	52.83%	48.89%
		60.61%	39.39%	100.00%
		100.00%	100.00%	100.00%

Men

		Perceived: fair		
		No	Yes	
Predicted: fair	No	64.15%	35.85%	100.00%
		52.25%	38.22%	46.17%
	Yes	50.29%	49.71%	100.00%
		47.75%	61.78%	53.83%
		56.69%	43.31%	100.00%
		100.00%	100.00%	100.00%

Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022).

Hypotheses test I: Are women more, less or equally “naïve” or “suspicious” than men when evaluating the fairness of their wages?

We now turn to testing our hypotheses (see last two models in Table 5). We first look separately at the subsample of those employees who earn less than comparable others and assess whether women are more, less or equally likely than men to perceive these unfairly low wages as fair (column 3). We then look separately at the subsample of those employees who earn as much as comparable others and assess whether women are more, less or equally likely than men to perceive these fair wages as unfair (column 4). In short, we do not see gender differences in either direction. Women are neither more “naïve” than men nor more “suspicious” than men – in line with the null-hypotheses that there are no gender differences in (un-)fairness perceptions – and refuting H1a and H1b as well as H2a and H2b. Another important result is that the key determinant of whether someone perceives his or her wage as fair is the wage level. Consistent with previous evidence that higher wages increase wage satisfaction (Kacperczyk & Balachandran, 2018), employees who earn more tend to be more “naïve”. The same is true for those who work part-time and those with longer tenure with the current employer. Employees with foreign citizenship are more likely to be “suspicious”, i.e., to perceive their pay as unfair, even if they belong to the subsample that received fair pay in the predicted sense.

Table 5: Regression results – baseline models

	(1) Predicted: fair	(2) Perceived: fair	(3) Perceived: fair for subsample predicted: unfair “naïve”	(4) Perceived: unfair for subsample predicted: fair “suspicious”
Female	0.046* (0.019)	0.005 (0.024)	-0.036 (0.040)	-0.011 (0.039)
Wage (in 1000 €)	0.314*** (0.011)	0.086*** (0.010)	0.050+ (0.028)	-0.087*** (0.016)
Age (years)	-0.007*** (0.001)	-0.001 (0.001)	-0.003+ (0.002)	-0.001 (0.002)
Tenure (days)	-0.001 (0.001)	0.004*** (0.001)	0.005** (0.002)	-0.003+ (0.002)
Non-German nationality	0.013 (0.036)	-0.097* (0.040)	-0.006 (0.063)	0.162* (0.080)
University degree	-0.063** (0.022)	-0.042+ (0.023)	-0.044 (0.046)	0.042 (0.038)
Children	0.062*** (0.016)	-0.020 (0.017)	-0.016 (0.032)	0.031 (0.027)
Part-time	0.255*** (0.028)	0.120*** (0.026)	0.118* (0.048)	-0.094* (0.044)
Observations	3,984	3,984	1,926	2,058
R-squared	0.476	0.368	0.487	0.460

Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022).

Note: ***/**/*/+ indicate significance at the 0.1/1/5/10% level. Regressions include firm fixed-effects. Robust standard errors in parentheses.

Hypotheses test II: Are educated women less “naïve” or more “suspicious” than men when evaluating the fairness of their wages?

In order to look into our hypothesis 4, that only female employees with high levels of education are less likely than men to be “naïve” and more likely than men to be “suspicious”, we re-run and graphically display models with an interaction effect between gender and university degree in Figure 1 (see Table A4 in the Appendix for results regressions by level of education).

Results for average marginal effects⁶ of gender (ref. men) and university degree show in line with H3a that women with tertiary education are slightly less “naïve” than men with the same education level. They are less likely to perceive unfairly low wages as fair. To be sure, these gender differences are not very pronounced and only marginally statistically significant at the 10% level (p-value of 0.085). There is no evidence that highly educated women are more “suspicious” than men and perceive their wages as unfair even when they are fair in the predicted sense so that we need to refute H3b.

⁶ The corresponding linear predictions of the fairness variables by gender and university degree are presented in Table A2 in the Appendix.

Figure 1: Linear predictions by gender and average marginal effects of gender (ref. men) for different fairness variables, by university degree



Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022).

Note: PM = Predictive margins; AME = Average marginal effects. Based on model (3) and (4) from table 5 including an interaction term between gender and university degree.

Robustness of the results

To check the robustness of our results, we made some modifications to our sample and our dependent variables. First, we change the threshold at which a predicted wage is coded as fair. For our main estimations, the threshold was exactly set at the actual wage. In this robustness test, we set the threshold more generously and define predicted wages as fair as soon as they are at least 95% of the actual wage. As a result, 384 more people receive predicted fair wages. Again, the results are very similar to the previous ones, see Table A5 in the Appendix. Second, we do not have information on hours worked in the administrative data. Therefore, we can only use information on whether a person worked fulltime or part-time for the wage estimations. Fulltime work is relatively unproblematic as there should be little variation in working hours but for part-time work, the number of hours may vary more. We therefore exclude part-time employees for a robustness test. The results are shown in table A6 in the Appendix. They are similar to our main results. However, women are not more likely to receive the predicted wage than men. Finally, we exclude employees who state that their wages are unfairly too high. This only affects 150 employees and the results hardly change, see Table A7 in the Appendix.

Conclusion and discussion

The gender wage gap has received a great deal of public attention. Previous studies have provided compelling theoretical arguments and empirical evidence for its persistence. It has been argued that women and men tend to accept this inequality due to gendered status beliefs about women's lower labor market productivity and women's tendency to compare their wages to those of men, who on average earn more (Auspurg *et al.* 2017). These arguments also provide an explanation for women's tendency to be satisfied with lower own earnings, an aspect of the so-called "contented female worker paradox". However, based on another strand of literature, namely research on perceived discrimination among ethnic and racial minorities (Schaeffer and Kas 2023), one might expect this to have changed. Salient public debates about the illegitimacy

of unequal treatment based on ascriptive characteristics (Jun et al. 2023) have raised awareness of such inequalities and aspirations for equal treatment have increased, especially among the less marginalized members of disadvantaged groups. As a result of these general dynamics, women today may "anxiously expect" and "readily perceive" (Mendoza-Denton et al. 2002) unfair treatment. This, in turn, may affect their perceptions of the fairness of their own wages. Because few employees know exactly how much comparable co-workers earn, these evaluations typically take place in highly ambiguous situations. They are therefore prone to bias, including a "naïve" underestimation and a "suspicious" overestimation of the unfairness of one's own pay.

We looked into this by not simply analyzing whether women are as likely as men to perceive their pay as unfair at a given wage-level, as several scholars have done before us. Rather, we used an innovative methodology based on linked employer-employee data that enabled us to validate these perceptions. We were able to compare them to an individual-level indicator of the actual unfairness of someone's pay: the difference between one's own pay and the predicted pay of comparable others, i.e., employees with the same individual, job, and firm-related characteristics. In doing so, we addressed a fundamental challenge for any scholar of the perceived unfair treatment of members of disadvantaged groups: the lack of information about whether an individual has actually been treated unfairly. We did so by moving away from general perceptions of unfair treatment (which are difficult to validate) to the more specific and measurable form of wage inequity on the labor market.

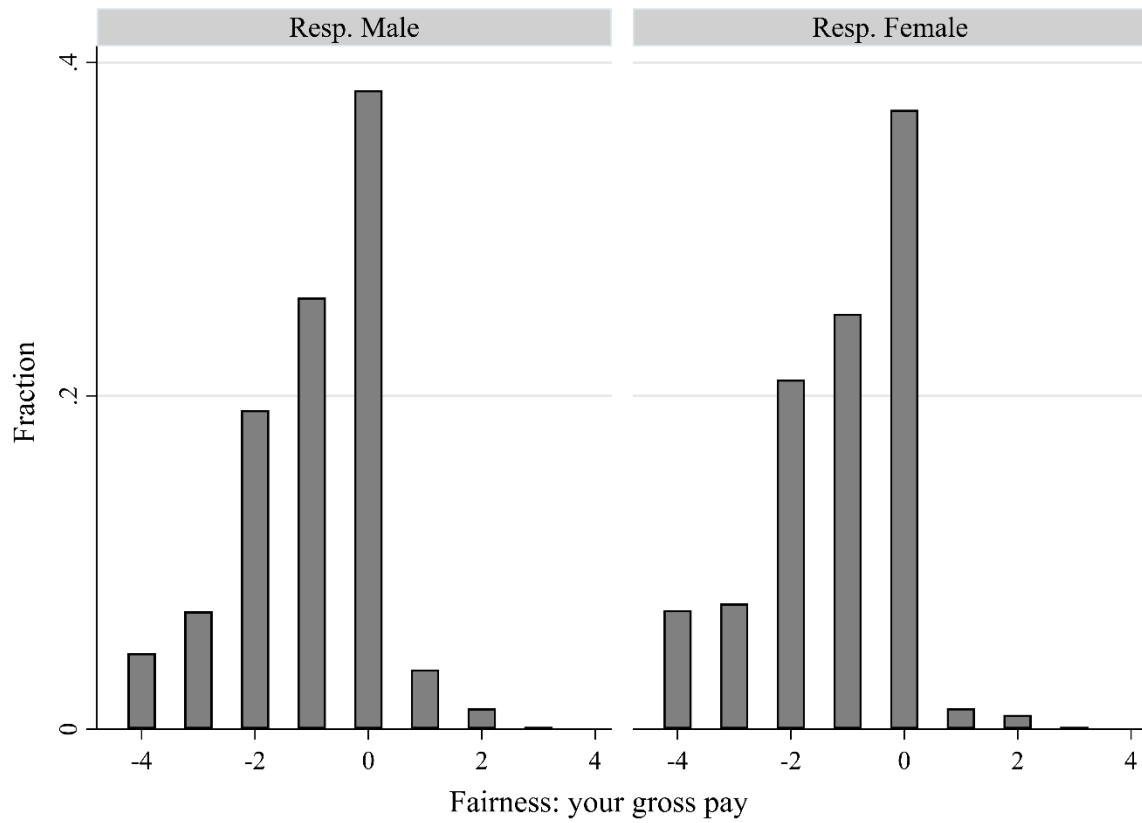
In line with other recent studies, our results show that women are not more accepting of lower wages than men. More fine-grained analyses revealed that they are neither more nor less "naïve" or "suspicious" than men when it comes to judging the fairness of their own pay. The only – rather weak – evidence of gender differences in perceptions of fairness is among university educated women. They are somewhat less likely than university educated men to perceive their pay as fair if they earn less than comparable colleagues. In other words, this subgroup of women is somewhat less "naïve" than men about their unfairly low pay. We believe this reflects that they are more aware of the societal debate about gender-based discrimination. In addition, they "aim high" in setting their aspirations for appropriate rewards corresponding to their skills and education. While we find that these women are less "naïve" in the sense described above, we find no evidence that they are more "suspicious", i.e. see unfairness where it does not exist.

To be sure, our approach has its limitations. Most importantly, fairness is a big concept, and even assessing whether an individual is actually being paid (un)fairly is challenging. Our approach is as innovative as pragmatic. It captures unfairness in terms of an individual being underpaid relative to others. It completely ignores - and we want to be very clear about that - the fact that wages are lower in many female-dominated occupations. Secondly, only firms with at least 100 employees are included in our sample. Finally, future studies should assess the generalizability of our findings beyond the German context.

In addition, we were not able to look at trends over time or to directly assess the role of awareness of unequal treatment and aspirations for equal treatment. The argument that our findings reflect a growing societal debate about the illegitimacy of inequality based, for example, on gender or ethnicity thus remains tentative. We are confident, however, that they highlight a declining acceptance of previously unquestioned inequalities. Since this is an important step toward their elimination, they are ultimately good news.

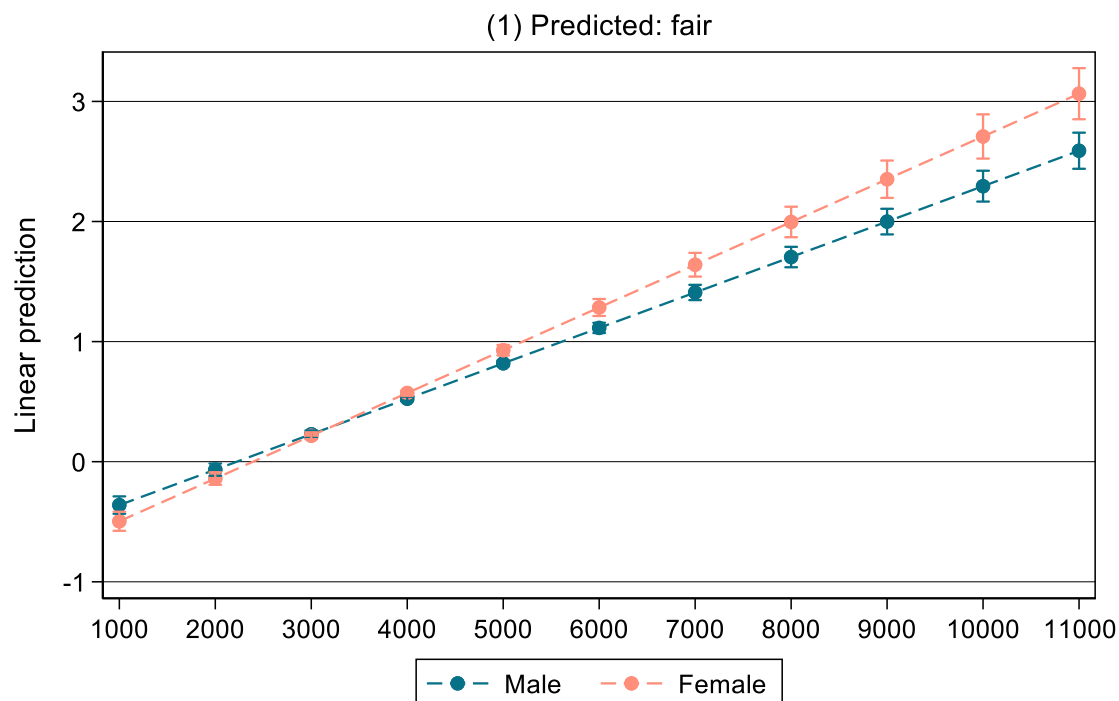
Appendix

Figure A1: Distribution of assessment of fairness of own wage in survey (9-point Likert from -4: unfairly too low to 4: unfairly too high).



Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022).

Figure A2: Linear predictions of wages predicted as fair by gender and actual wage level



Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022).

Note: This figure shows the predictive margins of men's and women's actual wages on wages predicted as fair. For this purpose, an estimation was carried out with the interaction of gender and wage and the following additional control variables were included: University degree, age, tenure, children, Non-German nationality, part-time job, firm-fixed effects

Table A1: Mean values of selected variables in administrative data, by survey participation

Variable	Non-participants	Respondents
Monthly wage	4036.06	4244.46***
Female	0.42	0.43
Non-German nationality	0.10	0.05***
Part-time job	0.24	0.23
Tenure (years)	6.85	7.44***
Highest vocational degree		
No degree	0.04	0.01***
Vocational degree	0.43	0.38***
Higher education entrance qualification	0.01	0.01
Higher education entrance qualification + vocational degree	0.12	0.15***
University degree	0.19	0.30***
Highest degree unknown	0.21	0.15***
Age (years)	43.50	45.48***
Observations	142,444	6,661

Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022).

Note: ***/**/*/+ indicate significant difference between the mean values of the two groups at the 0.11/5/10% level.

Table A2: Regression results of wage estimation with administrative data

	ln(wage)
Non-German nationality	-0.038*** (0.002)
Part-time job	-0.378*** (0.002)
Tenure	0.008*** (0.000)
Highest vocational degree (ref.: no degree)	
Vocational degree	0.060*** (0.003)
Higher education entrance qualification	0.012 (0.008)
Higher education entrance qualification + vocational degree	0.096*** (0.004)
University degree	0.208*** (0.004)
Highest degree unknown	0.054*** (0.004)
Age	0.004*** (0.000)
Observations	142,444
R-squared	0.746

Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022).

Note: ***/**/*/+ indicate significance at the 0.1/1/5/10% level. Regressions include firm fixed-effects and occupation fixed-effects. Robust standard errors in parentheses.

Table A3: Mean values of variables in analysis sample

Variable	Mean	Std. dev.	Min	Max
Administrative data				
Gross monthly wage	4049.05	1600.86	997.20	11182.82
Predicted monthly wage	3942.51	1370.58	1174.68	8847.75
Predicted fair wage	0.52		0	1
Survey data				
Female	0.44		0	1
Monthly wage	3956.90	1569.83	1000	11666
Perceived fair wage	0.42		0	1
Age (years)	47.12	11.07	20	67
Tenure (years)	14.63	10.98	1.17	50.03
Non-German nationality	0.04		0	1
University degree	0.37		0	1
Children	0.41		0	1
Part-time job	0.21		0	1
Observations	3984			

Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022).

Table A4: Regression results – with interaction between gender and education

	(1) Predicted: fair	(2) Perceived: fair	(3) Perceived: fair for subsample predicted: unfair	(4) Perceived: unfair for subsample predicted: fair
Female	-0.008 (0.024)	0.004 (0.026)	0.007 (0.046)	0.025 (0.045)
University degree	-0.124*** (0.027)	-0.043 (0.030)	0.011 (0.057)	0.076 (0.047)
Female#University degree	0.124*** (0.031)	0.003 (0.039)	-0.102 (0.063)	-0.073 (0.062)
Wage (in 1000 €)	0.317*** (0.011)	0.086*** (0.010)	0.045 (0.028)	-0.088*** (0.016)
Age (years)	-0.006*** (0.001)	-0.001 (0.001)	-0.003* (0.002)	-0.001 (0.002)
Tenure (days)	-0.001 (0.001)	0.004*** (0.001)	0.006** (0.002)	-0.003 (0.002)
Non-German nationality	0.014 (0.036)	-0.097* (0.040)	-0.007 (0.063)	0.160* (0.080)
Children	0.063*** (0.016)	-0.020 (0.017)	-0.017 (0.032)	0.031 (0.027)
Parttime	0.260*** (0.028)	0.120*** (0.026)	0.112* (0.049)	-0.098* (0.044)
Observations	3,984	3,984	1,926	2,058
R-squared	0.479	0.368	0.488	0.461

Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022).

Note: ***/**/*/+ indicate significance at the 0.1/1/5/10% level. Regressions include firm fixed-effects and occupation fixed-effects. Robust standard errors in parentheses.

Table A5: Regression results – robustness: different threshold^{a)} for predicted fair wages

	(1) Predicted: fair	(2) Perceived: fair	(3) Perceived: fair for subsample predicted: unfair	(4) Perceived: unfair for subsample predicted: fair
Female	0.036+ (0.020)	0.005 (0.024)	-0.020 (0.046)	0.001 (0.034)
Wage (in 1000 €)	0.296*** (0.010)	0.086*** (0.010)	0.072* (0.033)	-0.084*** (0.015)
Age (years)	-0.007*** (0.001)	-0.001 (0.001)	-0.004* (0.002)	-0.000 (0.002)
Tenure (days)	-0.000 (0.001)	0.004*** (0.001)	0.004+ (0.002)	-0.004* (0.002)
Non-German nationality	0.015 (0.036)	-0.097* (0.040)	0.020 (0.077)	0.135* (0.065)
University degree	-0.068*** (0.020)	-0.042+ (0.023)	-0.070 (0.056)	0.052 (0.033)
Children	0.073*** (0.015)	-0.020 (0.017)	-0.022 (0.040)	0.027 (0.024)
Parttime	0.213*** (0.027)	0.120*** (0.026)	0.127* (0.059)	-0.095* (0.038)
Observations	3,984	3,984	1,547	2,437
R-squared	0.466	0.368	0.545	0.427

Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022).

Note: ^{a)} The threshold is set at 0.95% of the actual wage of an employee. ***/**/*/+ indicate significance at the 0.1/1/5/10% level. Regressions include firm fixed-effects and occupation fixed-effects. Robust standard errors in parentheses.

Table A6: Regression results – robustness: fulltime employees only

	(1) Predicted: fair	(2) Perceived: fair	(3) Perceived: fair for subsample predicted: unfair	(4) Perceived: unfair for subsample predicted: fair
Female	0.006 (0.023)	0.014 (0.029)	-0.041 (0.047)	-0.045 (0.052)
Wage (in 1000 €)	0.328*** (0.013)	0.089*** (0.012)	0.076** (0.035)	-0.067*** (0.021)
Age (years)	-0.009*** (0.001)	-0.002 (0.001)	-0.004** (0.002)	-0.001 (0.002)
Tenure (days)	-0.000 (0.001)	0.003*** (0.001)	0.006*** (0.002)	-0.003 (0.002)
Non-German nationality	-0.008 (0.043)	-0.093** (0.046)	0.022 (0.067)	0.168* (0.096)
University degree	-0.102*** (0.027)	-0.053* (0.029)	-0.086 (0.057)	0.035 (0.056)
Children	0.053*** (0.019)	-0.018 (0.021)	0.014 (0.042)	0.034 (0.037)
Observations	2,951	2,951	1,464	1,487
R-squared	0.553	0.404	0.539	0.511

Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022)

Note: ***/**/* indicate significance at the 1/5/10% level. Regressions include firm fixed-effects and occupation fixed-effects. Robust standard errors in parentheses.

Table A7: Regression results – robustness: exclusion of perceived over-reward

	(1) Predicted: fair	(2) Perceived: fair	(3) Perceived: fair for subsample predicted: unfair	(4) Perceived: unfair for subsample predicted: fair
Female	0.046* (0.020)	0.012 (0.024)	-0.035 (0.041)	-0.028 (0.041)
Wage (in 1000 €)	0.317*** (0.011)	0.085*** (0.010)	0.049+ (0.030)	-0.092*** (0.017)
Age (years)	-0.007*** (0.001)	-0.000 (0.001)	-0.003 (0.002)	-0.002 (0.002)
Tenure (days)	-0.001 (0.001)	0.004*** (0.001)	0.006** (0.002)	-0.002 (0.002)
Non-German nationality	0.007 (0.037)	-0.095* (0.040)	0.006 (0.063)	0.179* (0.082)
University degree	-0.060** (0.022)	-0.045+ (0.024)	-0.054 (0.047)	0.052 (0.040)
Children	0.062*** (0.017)	-0.018 (0.018)	-0.014 (0.033)	0.022 (0.029)
Parttime	0.263*** (0.028)	0.116*** (0.027)	0.109* (0.049)	-0.101* (0.045)
Observations	3,834	3,834	1,872	1,962
R-squared	0.479	0.359	0.481	0.460

Source: BeH, Survey „Fair: Arbeiten in Deutschland“ (Strauß *et al.* 2022).

Note: ***/**/*/+ indicate significance at the 0.1/1/5/10% level. Regressions include firm fixed-effects and occupation fixed-effects. Robust standard errors in parentheses.

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