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My Wage is Unfair! Just a Feeling or Comparison with Peers?

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Abstract

This paper analyzes the nexus between income comparisons and perceptions of unfair pay. We apply a large German household survey and conduct wage regressions to conclude whether individuals who perceive their wages as unfair earn significantly lower wages than fairly paid individuals with similar characteristics. We find that unfairly paid individuals earn significantly less than fairly paid counterparts. This suggests that unfairness perceptions with respect to wages are based on sound income comparisons with peers. We also contribute findings to the literature on reference points. When asked about a subjectively fair amount in Euros, unfairly paid individuals tend to claim much higher wages than fairly paid individuals with identical characteristics. Wage claims, thus, rest on additional factors.

JEL-Classification: J30, J31

Keywords: Fairness, Wages, Reference points

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1 Introduction

Economists frequently refer to the *homo reciprocans*, who participates in partial gift exchanges [Dohmen *et al.*, 2009]. For this reason, treatments and reactions between different parties are central for the understanding of economic behavior [Fehr and Gächter, 2000]. In labor economics, reciprocity is mostly linked to the relationship between payment and effort. According to Gächter *et al.* [2012], the fair wage-effort hypothesis [Akerlof, 1982, Akerlof and Yellen, 1990] can be described as a reciprocal gift exchange where workers respond to unfair wages with lower effort. Payment of fair wages, in turn, is paid back by higher effort of employees. The economic importance of the fair wage-effort hypothesis is strikingly demonstrated by the fact that it contributes to an explanation for involuntary unemployment [Akerlof and Yellen, 1990]. Moreover, Gerlach *et al.* [2008, p. 433] showed that "there is a nexus between fairness norms and institutions where norms influence institutions and institutions strengthen norms".¹

In the light of reciprocal behavior, it is important to understand why individuals assess their wages as fair or unfair. That is why the underlying paper interrelates subjective fairness perceptions with literature about income comparisons with peers. The framework of comparisons with peers is established in economic as well as in psychological theory. In fact, early psychological literature [Festinger, 1954] and economic studies [Smith, 1759/1976, Marx, 1849/2006, Hamermesh, 1975] considered comparison with others as a key feature in human thinking, individual needs, and behavior. Adams [1965] defined justice or fairness as a result of a comparison process.² Caporale *et al.* [2009] analyzed the impact of comparison income on happiness and found evidence for upward as well as down-

¹Excellent surveys of the literature highlighting fairness as an economic key variable can be found in Akerlof and Yellen [1990], Fehr and Gächter [2000], or Gerlach *et al.* [2008], whereas these papers also cite a magnitude of studies from the field of psychology. Falk *et al.* [2011] interrelated physiological effects to perceptions of unfair pay.

²A magnitude of literature on social and income comparisons referred to comparison with peers. For recent literature see, among others, Greenberg *et al.* [2007], Brown *et al.* [2008], Clark *et al.* [2008], Clark *et al.* [2009], Clark and Senik [2010], Card *et al.* [2012], or Pfeifer and Schneck [2012].

ward comparisons. Clark *et al.* [2010] provided experimental as well as survey evidence that the individual rank in the income distribution is a strong predictor of effort. Purely experimental studies also linked social comparisons to the fair-wage effort hypothesis [see, e.g., Gächter and Thoeni, 2010]. In a nutshell, a magnitude of papers strikingly revealed the importance of social comparisons for happiness or effort. The examination of the subjective evaluation of unfair pay, however, attracted low attention in the (non-experimental) literature, although the fair wage-effort hypothesis suggests that fairness perceptions are the main predictor of individual labor market commitments. For this reason, this paper abstracts from an examination of effort, but examines the subjective evaluation of unfair pay in the framework of social comparison theory.

The first goal of this paper is to assess whether comparison theory helps to explain the perception of unfair pay. So far, survey evidence about the underlying rationale of unfairness perceptions is scarce because such studies commonly relied on rather small data sets or field studies [see, e.g., Dornstein, 1989, Tremblay *et al.*, 1997]. We, in turn, utilize a large German household panel data set that contains information about fair and unfair salaries to study the nexus between income comparisons and fairness perceptions. Mumford [1983] suggested that individuals who share similar backgrounds or perform similar tasks seem to be especially attractive peers. That is why we follow Clark and Oswald [1996] and Senik [2008] and predict comparison wages conditional on schooling, occupation, sector, region, and other variables. Precisely, we conduct wage regression for the fairly paid and utilize the corresponding coefficients to calculate reliable fair reference salaries for the unfairly paid. This innovative empirical procedure allows for the assessment whether the subjective evaluation of fairness matches the predicted fair wage based on economic and socio-demographic factors. We show that individuals, who perceive their wages as unfair, earn on average significantly less than identical workers with fair wages.³ This

³The term *identical* refers to individuals that we can identify as identical with respect to the charac-

suggests that the subjective evaluations of workers on unfairness in pay are based on wage differences for identical workers. For this reason, income comparisons seem to provide a proper explanation for unfairness perceptions.

Psychological literature is also aware of the goal-setting theory, which suggests that individual goals frequently enter the development of reference-points [see, e.g., Heath *et al.*, 1999].⁴ Economists study the consequences of reference-dependency.⁵ Our data comprise information about one important individual goal and reference point. Precisely, unfairly paid individuals are asked to state a just amount of pay. Economists, however, do not know exactly how individual reference points are formed in the actual (non-experimental) environment, as most evidence is based on experiments or is of theoretical nature. Some papers, however, are aware of the fact that others' income provides a signal about own future income prospects [see, e.g., Clark *et al.*, 2009, Card *et al.*, 2012]. For this reason, income comparison theory might be a promising approach in explaining income targets also in the current situation. Here, we utilize survey data to ask whether the perceived fair salary in Euros, which can be understood as a major reference point in economics is based on income comparisons with peers.

The second goal of this paper is the examination whether income comparison theory is adequate to explain individual income targets. Such a research question can also be addressed by our empirical procedure. On the one hand, if estimated fair wages of individuals who state unfair payment are in line with the income target of the unfairly paid, then reference points seem to be determined by peers' salaries. On the other hand, if wage targets of the unfairly paid are not in accordance with average salaries of the fairly paid

teristics included into our model.

⁴Heath *et al.* [1999] showed that their findings are consistent with prospect theory [Kahneman and Tversky, 1979, Tversky and Kahneman, 1992] and help to explain empirical findings in the literature on effort or performance. In this line Camerer *et al.* [1997] found that New York taxi drivers' decision to stop working is related to their individual income target.

⁵Köszegi and Rabin [2006] and Köszegi and Rabin [2009] referred to reference-dependent preferences or consumption plans. Using a real-effort experiment, Abeler *et al.* [2011] found that effort is affected by reference points.

peers, income comparison theory is not sufficient to explain this reference point adequately. We find that the subjectively stated fair pay of the unfairly paid frequently exceeds the average pay of identical workers with fair salaries. This reveals that income targets are not properly explained by income comparisons with fairly paid peers.

2 Data and Procedure

In order to analyze our research questions, we utilize the German Socio-Economic Panel [Wagner *et al.*, 2007, henceforth abbreviated as SOEP]. This particular survey collects data from a representative set of households in Germany. It is designed as panel study and contains information on the perception of own fair gross wages in the year 2009. We apply gross salaries because workers and firms bargain the gross wage. Precisely, the questionnaire asks: "Is the income that you earn at your current job just, from your point of view?". Respondents, then, are able to answer "yes" or "no". If the current wage is stated to be not fair, the questionnaire asks "How high would your gross income have to be in order to be just?", whereas respondents might state the amount in Euros per month or indicate that they "Don't know".⁶

The underlying sample is restricted to individuals aged between 25 and 55 years of age. Individuals at this age are expected to have at least some experience about fairness perceptions and the assessment of fair wages. We consider only blue and white collar workers in full-time jobs. In addition, only gross wages above 400 Euros are considered.⁷ We apply the International Standard Classification of Education (ISCED 1997 codes provided by the SOEP) for individuals, whereas we drop code 0 (in school). The industries (NACE codes) are coded in accordance with "ISIC Rev.3 (International Standard Industrial Classification of All Economic Activities, Rev.3)".

⁶Variables ZP47, ZP4801, and ZP4802.

⁷We utilize the SOEP generated variable *LABGRO09*: Current gross labor income in Euro.

In order to answer the question whether workers who perceive their wages as unfair rest their evaluation of fair wages on economical factors, we follow Clark and Oswald [1996] and Senik [2008] who predicted wages conditional on individual and job characteristics. This approach is expected to be especially feasible in a European country, where individuals attribute outcomes frequently to effort or skill [see Gerlach *et al.*, 2008, p. 421]. Here, we estimate a wage regression for the subsample of workers who perceive their wages as fair. This procedure is presumed to reveal rationally based fair wages which are based on human capital variables, occupation, industries, job characteristics, individual characteristics, and annual effects. In addition, we account for gender-related differences by separate estimation for males and females.⁸ The model is described in equation 1:

$$w_i = \alpha + \beta' X_i + \delta' V_i + \gamma' Z_i + \epsilon_i \quad \forall i \text{ with fair wages} \quad (1)$$

w_i stands for the log of the absolute gross wage of individual i with fair wage in period 2009. α is the constant to be estimated. β describes the vector of coefficients for human capital variables X_i (schooling (ISCED 1997 codes), experience in full-time (squared), experience in part-time (squared), tenure (squared), and occupational dummy variables), δ denotes the vector of coefficients of firm-specific characteristics V_i (dummy variables for firm-size and sectors), and γ stands for the vector of coefficients describing socio-demographic variables Z_i (age (squared), marital status, and federal state). ϵ_i denotes the error term.

Restriction to the subsample of individuals with fair pay enables estimation of average effects on fair wages with respect to individual characteristics. In other words, we estimate average fair wage markups or average fair wage cuts by individual characteristics. When we now combine these estimated coefficients with the individual characteristics of unfairly paid individuals, we expect to obtain a counterfactual fair wage given human capital, firm-

⁸For simplicity, we omit a gender-specific subscript in our equations.

specific characteristics, and socio-demographic variables. In other words, application of the estimated coefficients, thus, allow for a prediction of an average fair wage conditional on individual characteristics of the unfairly paid. For this reason, the estimated coefficients are utilized to predict \hat{w}_i (see equation 2). Technically speaking, we apply the estimated coefficients of equation 1 to conduct out-of-sample predictions of rationally based fair wages for individuals who perceive their wages as unfair.

$$\hat{w}_i = \hat{\alpha} + \hat{\beta}' X_i + \hat{\delta}' V_i + \hat{\gamma}' Z_i \quad (2)$$

This procedure allows comparison of the estimated fair wage (\hat{w}_i) for those who perceive their wages as unfair with 1) the log of their stated amount of fair wage (w_i^{fair}) and 2) with the log of their current wage (w_i). We also observe individuals who state that their fair wage is unfair, but a fair amount in Euros is not known. For this particular group we compare \hat{w}_i with w_i .⁹

For descriptive statistics see Table A.1, while the estimation results are presented in Table S.1. As many German women disrupt their career because of family responsibilities, we estimate and present our results for males and females separately. In addition, Mayraz *et al.* [2009] showed that gender-specific comparisons are most important. That implies that males are more likely to compare to other males while females are likely to compare themselves to female peers. Unfairness perceptions in wages seem to be common. About two in five female observations (43,74 percent) and about the same share of male observations (36.51 percent) correspond to unfair salaries (see Table A.1). This high number is somewhat surprising because of the generally known fair wage-effort hypothesis and publications on the *homo reciprocans* who might exhibit low work morale if wages are below

⁹Note that we cut off the stated amount of fair wages in Euros at the 99 percentile and drop 11 male and 1 female observations. This is reasoned in the fact that there are some outliers detected. For example, an individual earning 4,120 Euros states that the fair wage amounts to 80,000 Euros. In the consecutive analysis, the maximum considered amount of fair wages is 10,000 Euros.

the fair level [see Akerlof and Yellen, 1990]. Note that 128 of 688 females (14.46 percent) who perceive their wages as unfair do not survey a fair wage in Euros, while 193 of 1,058 considered males (18.24 percent) with unfair wages do not state a fair wage in Euros.

3 Results

The analysis starts with an examination of differences between gross wages of individuals who perceive their wages as fair and individuals with unfair wages in Table 1. Wages of individuals feeling fairly paid are, on average, significantly higher than the wages of those who perceive their wages as unfair. In fact, unfairly paid females earn an average of 71.62 percent of the fairly paid females. For males, the corresponding ratio is 68.91 percent. The absolute values presented in the table also advert to considerable differences.

Insert Table 1 about here

In a next step, we compare actual gross wages and stated fair gross wages of unfairly paid individuals in Table 2. The stated just wages are comparable to the ones presented in Table 1. In fact, the stated fair wage of females in Table 2 is only 84.60 Euros smaller than the wage of females who state that their wage is fair in Table 1. This indicates that unfairly paid individuals orientate themselves by other females. For males, we find a similar relationship, with a somewhat larger differential between the gross wages of individuals with fair salaries (Table 1) and stated fair wages (Table 2). This result is in line with the ones presented in Dornstein [1989], who found that the comparison with average salaries in the economy seems to be most important for the perception of fair salaries.

Insert Table 2 about here

So far, the analysis does not account for any individual characteristics with exception of gender. This procedure is rather unsophisticated and lacks a lot of information that indi-

viduals are presumed to include into their information set for an evaluation of just wages. For this reason, we need to compare individual wages conditional on a magnitude of individual characteristics. Dornstein [1989] found a significant impact of similar individuals in the industry, although its impact on fairness perceptions is much smaller than comparisons to average wages in the economy. Clark and Senik [2010], moreover, show that workers compare themselves most likely with colleagues, which seem to perform similar tasks and have similar educational background. We, therefore, follow the above presented procedure, which concentrates on human capital, socio-demographics, and firm characteristics. The estimated coefficients of equation 1 are utilized to predict fair wages as shown in equation 2. This allows comparison of the actual log gross wages of unfairly paid individuals (w_i), the predicted fair wage (\hat{w}_i), which is based on individual characteristics, and the log of the subjectively stated amount of fair wages (w_i^{fair}). Table 3 shows descriptive statistics.

Insert Table 3 about here

As expected, w_i is smallest in Table 3 because the considered individuals perceive wages as unfair. For this reason, the actual average wages should be lower than the fair wages \hat{w}_i , which are obtained via our fair wage predictions and include a magnitude of individual and employment-related characteristics. This result implies that unfairness perceptions arise because of significant lower wages when compared with individuals with similar characteristics. As a result, unfairness perceptions are not just a feeling, but seem to be based on income comparisons with peers. This conclusion holds for males as well as for females. Table 3 also shows that the stated fair wage w_i^{fair} significantly exceeds \hat{w}_i , which leads to the conclusion that unfairness perceptions also provoke fair wage claims that are not based on income comparisons with peers.

In order to depict the relationships between w_i , \hat{w}_i , and w_i^{fair} more detailed, we present Figures 1, 2, 3, and 4. These scatter plots include the angle bisector line with respect to the x-variable, which helps to assess the discrepancy between our measures. Figures 1 and

2 clearly show that w_i^{fair} is to the largest extent above the current wage. There are only few observations where w_i exceeds w_i^{fair} . This pattern is evident for unfairly paid males as well as for unfairly paid females. It is, thus, shown that most individuals with unfair wages imagine higher wages as fair. Some individuals also report higher w_i than w_i^{fair} . This is in line with Adams [1965, p. 281] who argues that inequity results not only when individuals are relatively underpaid, but also when individuals feel relatively overpaid. For this reason, unfairness perceptions are feasible as well in case of overpayment.

Insert Figure 1 about here

Insert Figure 2 about here

Figures 1 and 2 also display the relationship between w_i and \hat{w}_i .¹⁰ It is illustrated that the majority of observations on \hat{w}_i are above the angle bisector line with respect to w_i . Precisely, \hat{w}_i exceeds w_i in 67.68 percent of 560 female observations and in 69.02 percent of 865 male observations. This implies that most observations correspond to cases where individuals should earn higher wages when individual characteristics are accounted for. For this reason, income comparisons with peers provide a reasonable explanation for unfairness perceptions.

Figures 3 and 4 address the relationship between \hat{w}_i and w_i^{fair} , where the angle bisector line with respect to \hat{w}_i is included. It is obvious that most perceived fair wages of females are higher than the fair wages based on their characteristics. In fact, in 71.79 percent of considered female observations the subjectively stated fair wages exceed higher than \hat{w}_i . For males, this pattern seems to be generally confirmed because in 72.14 percent of male observations w_i^{fair} exceeds \hat{w}_i . Unfairness perceptions, thus, also lead to wage claims that are generally not in accordance with comparisons to individuals with similar characteristics.

¹⁰Note that the left panel of Figure 1 includes an outlier, which is the main reason for the differences in the scales of the y-axes.

Insert Figure 3 about here

Insert Figure 4 about here

Comparison of gender-specific differences between w_i^{fair} and \hat{w}_i are displayed in Figure 5. We exclude the outlier shown in Figure 3 in Figure 5 and the following interpretations. Distinct differences between males and females are not to find. Female wage claims exceed \hat{w}_i by 0.1589 log points. For males we find an average of 0.1551 log points. The median wage difference between w_i^{fair} and \hat{w}_i amounts to 0.1461 log points for males and 0.1624 log points for females. Females exhibit higher variance than males. The tails, however, seem to be fatter for males when compared with females.

Insert Figure 5 about here

In a last step, we also examine individuals who state that their wage is unfair, but do not know about a fair amount in Euros. It might be hypothesized that this group of individuals does not know about a fair wage because their wage is already in accordance with their characteristics. This is to be rejected because Table 4 shows that the average actual wage (w_i) is significantly below the wage based on individual characteristics (\hat{w}_i). The above presented patterns are, thus, confirmed.

Insert Table 4 about here

Figures 6 and 7 refer to individuals who feel unfairly paid, but do not know a fair wage in Euros. In general, the pictures are similar for males as well as for females. Most of observations with small w_i exceed the angle bisector line while higher w_i is frequently associated with values below the angle bisector line. Values below the angle bisector line imply that w_i exceeds \hat{w}_i . This implies that the current wage is higher than the fair wage based on individual characteristics and holds for about one in three observations (females: 35.16 percent; males: 34.20 percent). At least these individuals should not perceive their

wage as unfair, when income comparisons are the major channel of feelings about unfair pay.

Insert Figure 6 about here

Insert Figure 7 about here

In order to check the robustness of our results, we also performed median regression. The results remain qualitatively robust to this kind of check.

4 Discussion of the results

The general finding that individual with unfair wages earn less than fairly paid individuals is generally corroborated. It seems, thus, reasonable that individuals compare themselves to the average salary of all other male or female workers. Our paper, however, goes beyond this simple idea and introduces an approach that allows for conclusions about a fair wage that is based on individual characteristics. For this reason, our paper allows for a much closer comparison to peers than other existing studies. We find that about seven in ten individuals earn lower wages than other individuals with fair wages and identical characteristics. We, therefore, conclude that unfairness perceptions with respect to wages are based on comparisons with similar others and corroborate the findings of Adams [1965], who suggested that fairness results from a comparison process. This is also good news for other studies that apply fair pay perceptions as an explanatory variable [see, e.g., Falk *et al.*, 2011, Gast *et al.*, 2013] because interpretation of fair wage perceptions seems to be economically straightforward.

Individuals who perceive their wage as unfair tend to claim higher fair wages when compared with an average fairly paid worker with identical characteristics. This does not directly fit into the frame of income comparisons. For this reason, it remains puzzling

how a subjectively fair salary is created. It might be suggested that individuals perform comparison with respect to productivity or outcome measures in the same firm. Another possibility is that individuals might recover their "wage losses" due to unfair pay. Also the desire for social upward mobility might play a role. Economic rationales are addressed in the following. It might be hypothesized that individuals just don't know what a fair wage should be in a world of bounded rationality so that there is a lot of noise surrounding individuals' perception of what a fair wage should be. A closely related point is that workers might be uncertain about peers' wages and might tend to overestimate the wages of peers. Another rationale for high wage claims might be wage bargaining. As individuals know that they will not always get their full wage claims, the workers start with higher wage claims which are reduced during the bargaining process. An indication for this phenomenon might be displayed in Figures Figures 1 and 2, which show that \hat{w}_i is smaller than w_i for about 30 percent of males and females. These individuals with unfair salaries, however, are on average better paid than their fairly paid counterparts. This seems to be a promising avenue for future research.

5 Conclusion

The paper promotes the literature on fairness considerations by examination of large individual survey data and application of an innovative empirical procedure. It shows that unfair wage perceptions are based on comparisons with peers because individuals feel unfairly paid when their wage is lower than the predicted wage of fairly paid individuals with similar characteristics. The evaluation of unfair payment might also indicate that individuals assess their wage positions within their reference group adequately. For this reason, the assumption of Brown *et al.* [2008, p. 379] "that people act as though they are able to form a reasonable estimate of where, as individuals, they lie in the pay order-

ing” seems to be feasible. At least, our results suggest that individuals know that they are paid lower wages than the average fairly paid individual with similar economic and socio-demographic characteristics. The individual assessment of the amount of fair wages in Euros, however, reveals that individuals, on average, claim higher wages than the ones based on comparisons with peers. We, thus, recommend further research on the topic of fair wage claims.

Based on our results, we also suggest to communicate transparent and sound economic wage structures, which help to assess wages of coworkers rationally. Wage disclosure policies [see, e.g., Card *et al.*, 2012, Danziger and Katz, 1997], which might improve unfairness perceptions because of feelings or pure subjective reasoning might have contra-productive effects. It is possible that such politics increase subjective unfairness perceptions, which might increase economic costs of unfairness feelings. Note that transparent wage structures might also lead to a broad acceptance of differences in the wage distribution. It might also help to evaluate differences in relative standing and decrease the negative effects of low status. In fact, wage disclosure policies, which might prevent from worker fluctuations from an economic standpoint might increase worker fluctuations from a psychological viewpoint.¹¹ In other words, it is suggested that the norm of distribution [Austen, 2000] should become more transparent.

A major drawback of the underlying data is that individuals are not asked about their reference group. For this reason, some individuals might perceive their wages as unfair in comparison to the wages of their colleagues or their neighbors, while others might consider the grand average salary in the whole economy as reference [Dornstein, 1989, Luttmer, 2005, Clark and Senik, 2010]. We, however, are not able to identify colleagues or neighbors in our data, which enforces comparison to a more broadly defined reference group. Clark

¹¹Practical implementation of transparent wage structures might also include components which are not comparable across firms in order to reduce comparability of wages across firms. Within-firm wage structures should be comparable by clearly defined rules in order to avoid low work morale.

et al. [2010] also revealed the importance of the time dimension in relative comparisons and effort. The impact of individual income targets on possible changes in fairness perceptions over time might be addressed in future studies.

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Tables included in the text

Table 1: Unconditional average gross wages and t-test

	"my wage is fair"	"my wage is not fair"	difference
Females	2,974.260 (1735.714) [885]	2,130.096 (843.3093) [688]	844.164*
Males	3,740.377 (2168.552) [1,840]	2,577.418 (1145.472) [1,058]	1162.959*

T-test with nullhypothesis: $\text{mean}(\text{fair}) - \text{mean}(\text{unfair}) = 0$; * $p < 0.01$
Mean; standard deviations (in parentheses); number of observations [in brackets]

Table 2: Actual and perceived fair wages of unfairly paid individuals

	average	median	number of observations
Females			
Actual wage	2,142.280 (844.949)	2,000	560
Amount of stated fair wage in Euros	2,889.661 (1,109.414)	2,625	560
Males			
Actual wage	2,585.949 (1,156.781)	2,350	865
Amount of stated fair wage in Euros	3,451.618 (1,530.809)	3,000	865

Only unfairly paid individuals who state an amount of fair wages (w_i^{fair}) in Euro are considered
Standard deviations (in parentheses)

Table 3: Comparison of log current wage, predicted wage, and log amount of perceived fair wage for the sample of unfairly paid individuals

	log actual wage (w_i)	predicted wage (\hat{w}_i)	log stated amount fair wage (w_i^{fair})	number of observations
Females	7.593 (0.401) [7.601]	7.744 ^{*,+} (0.326) [7.728]	7.894 (0.434) [7.873]	560
Males	7.773 (0.407) [7.762]	7.912 ^{*,+} (0.345) [7.871]	8.067 (0.386) [8.006]	865

Only unfairly paid individuals who state an amount of fair wages in Euro are considered

Standard deviations (in parentheses); Median [in brackets]

T-test with nullhypothesis: $\text{mean}(w_i) - \text{mean}(\hat{w}_i) = 0$; * $p < 0.01$

T-test with nullhypothesis: $\text{mean}(\hat{w}_i) - \text{mean}(w_i^{fair}) = 0$; + $p < 0.01$

Table 4: Comparison of log current wage and predicted wage for the sample of unfairly paid individuals

	log actual wage (w_i)	predicted wage (\hat{w}_i)	number of observations
Females	7.556 (0.422) [7.601]	7.693 [*] (0.334) [7.658]	128
Males	7.754 (0.418) [7.783]	7.875 [*] (0.344) [7.864]	193

Only unfairly paid individuals who do not know a fair wage in Euros are considered

Standard deviations (in parentheses); Median [in brackets]

T-test with nullhypothesis: $\text{mean}(w_i) - \text{mean}(\hat{w}_i) = 0$; * $p < 0.01$

Figures included in the text

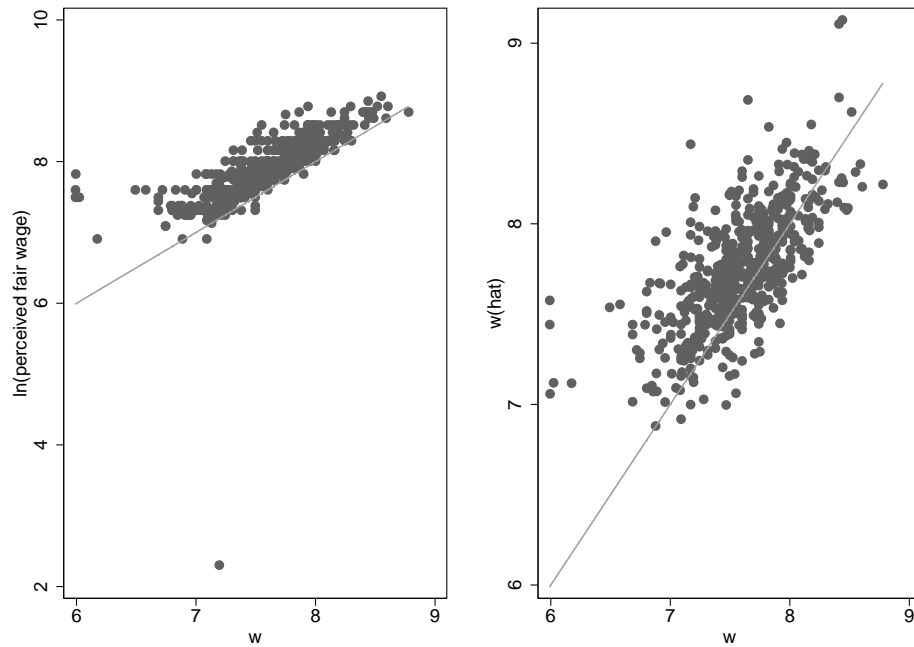


Figure 1: Scatter plot for comparison of w_i , w_i^{fair} , and \hat{w}_i . Unfairly paid females who state an amount of fair wages in Euro considered.

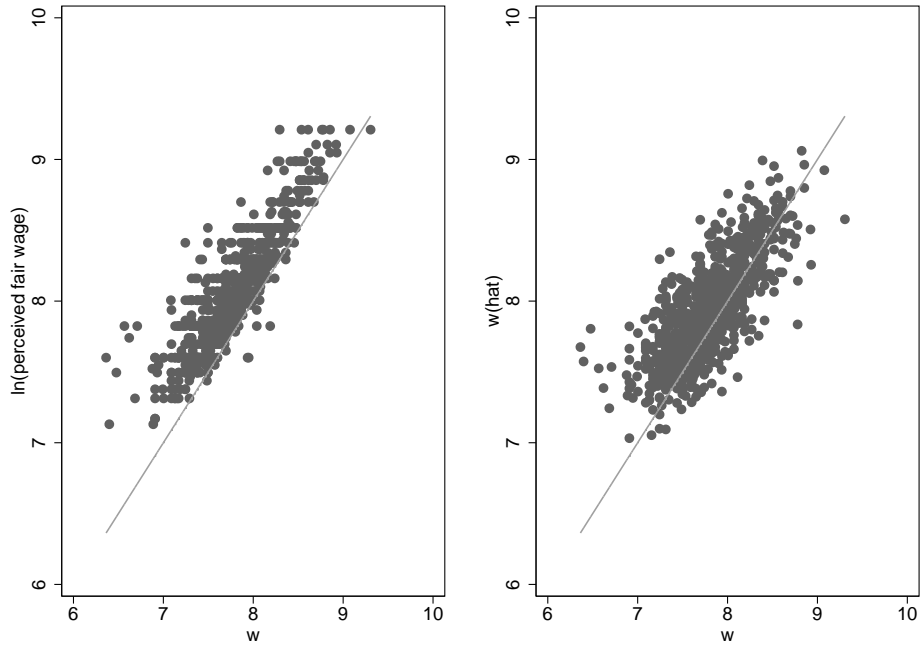


Figure 2: Scatter plot for comparison of w_i , w_i^{fair} , and \hat{w}_i . Unfairly paid males who state an amount of fair wages in Euro considered.

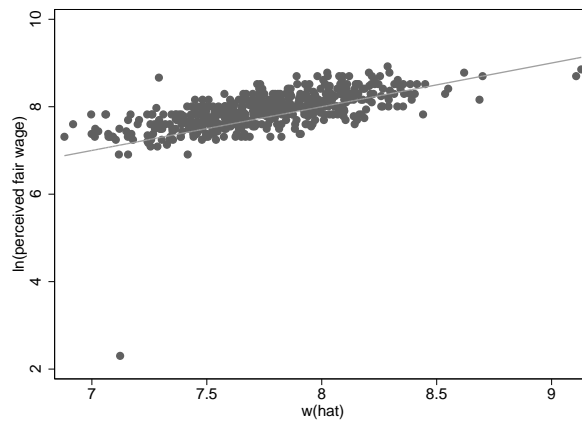


Figure 3: Scatter plot for comparison of \hat{w}_i , and w_i^{fair} . Unfairly paid females who state an amount of fair wages in Euro considered.

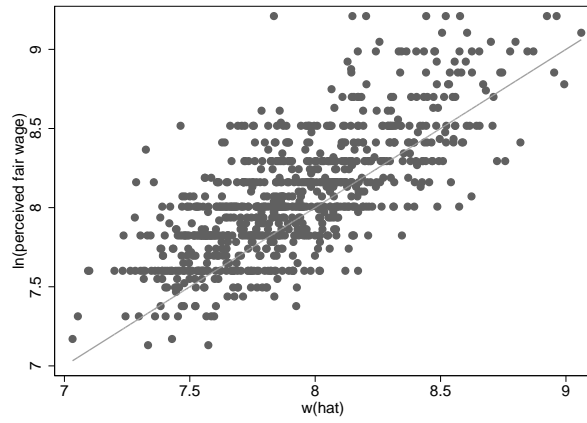


Figure 4: Scatter plot for comparison of \hat{w}_i , and w_i^{fair} . Unfairly paid males who state an amount of fair wages in Euro considered.

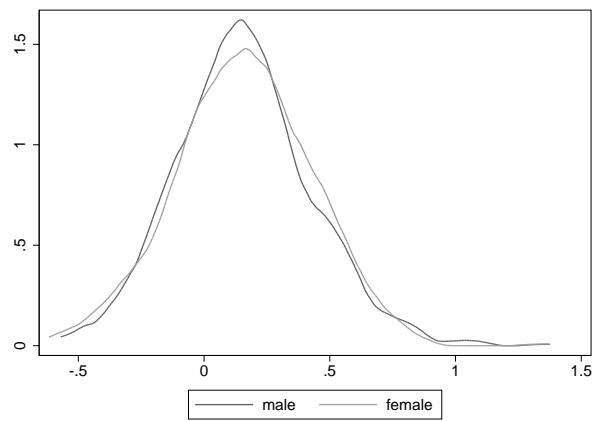


Figure 5: Kernel density estimate for $w_i^{fair} - \hat{w}_i$

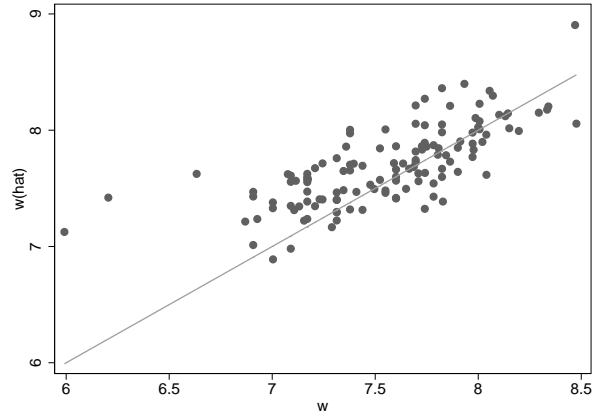


Figure 6: Scatter plot for comparison of w and \hat{w}_i . Unfairly paid females who do not know a fair wage in Euro are considered.

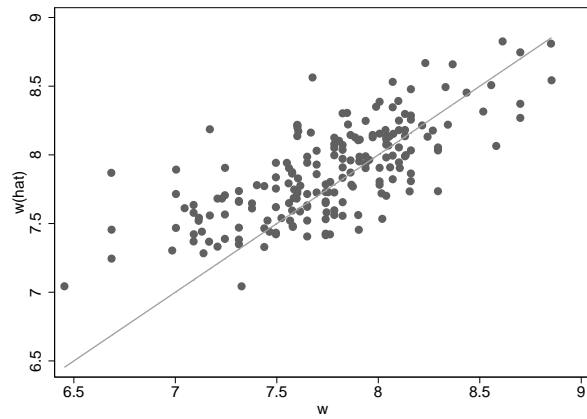


Figure 7: Scatter plot for comparison of w and \hat{w}_i . Unfairly paid males who do not know a fair wage in Euro are considered.

Appendix

Table A.1: Descriptive statistics

Variables	full-time working females		full-time working males	
	fair wages	unfair wages	fair wages	unfair wages
w_i	7.8847 (0.4643)	7.5861 (0.4052)	8.1078 (0.4755)	7.7691 (0.4091)
Dummy variable: no fair wage= 1_i	0.0000 (—)	1.000 (—)	0.0000 (—)	1.0000 (—)
Male $_i$	0.0000 (—)	0.0000 (—)	1.0000 (—)	1.0000 (—)
ISCED 1 $_i$ (dummy variable)	0.0023 (0.0475)	0.0044 (0.0659)	0.0071 (0.0838)	0.0113 (0.1059)
ISCED 2 $_i$ (dummy variable)	0.0712 (0.2573)	0.0625 (0.2422)	0.0571 (0.2320)	0.0671 (0.2503)
ISCED 3 $_i$ (dummy variable)	0.4542 (0.4982)	0.4855 (0.5002)	0.4793 (0.4997)	0.5926 (0.4916)
ISCED 4 $_i$ (dummy variable)	0.1062 (0.3083)	0.1134 (0.3173)	0.0723 (0.2590)	0.0633 (0.2437)
ISCED 5 $_i$ (dummy variable)	0.0599 (0.2374)	0.0727 (0.2598)	0.1027 (0.3037)	0.0851 (0.2791)
ISCED 6 $_i$ (dummy variable)	0.3062 (0.4612)	0.2616 (0.4398)	0.2815 (0.4499)	0.1805 (0.3848)
Age $_i$ (years)	41.2328 (9.0092)	40.4811 (9.2253)	42.1484 (7.8321)	40.8601 (8.4770)
Age $_i^2$	1,781.2147 (727.0831)	1,723.7020 (740.2156)	1,837.7929 (643.4521)	1,741.3403 (686.1814)
Experience in full-time $_i$ (years)	15.7499 (9.6068)	14.5826 (9.5154)	18.8901 (8.8269)	17.6703 (9.3263)
Experience in full-time $_i^2$	340.2472 (337.8805)	303.0630 (326.8558)	434.7085 (331.7344)	399.1381 (336.5207)
Experience in part-time $_i$ (years)	2.2406 (4.0235)	2.3295 (4.0086)	0.5083 (1.6399)	0.4648 (1.3260)
Experience in part-time $_i^2$	21.1901 (62.4681)	21.4723 (65.8155)	2.9461 (19.8289)	1.9727 (10.6839)
Tenure $_i$ (years)	11.5679 (9.4118)	9.2292 (8.3571)	12.0035 (9.3058)	9.9914 (8.5300)
Tenure $_i^2$	222.2991 (301.7690)	154.9186 (257.3419)	230.6359 (295.2248)	172.5205 (258.6517)
Untrained blue-collar worker $_i$	0.0136	0.0349	0.0163	0.0293

(dummy variable)	(0.1157)	(0.1836)	(0.1267)	(0.1687)
Semi-trained blue-collar worker _{<i>i</i>} (dummy variable)	0.0621 (0.2416)	0.0814 (0.2736)	0.1000 (0.3001)	0.1399 (0.3470)
Trained blue-collar worker _{<i>i</i>} (dummy variable)	0.0362 (0.1868)	0.0683 (0.2525)	0.2163 (0.4118)	0.2732 (0.4458)
Foreman _{<i>i</i>} (dummy variable)	0.0034 (0.0582)	0.0029 (0.0539)	0.0451 (0.2076)	0.0643 (0.2454)
Master craftsman _{<i>i</i>} (dummy variable)	0.0034 (0.0582)	0.0000 (0.0000)	0.0223 (0.1476)	0.0198 (0.1395)
Industry Foreman _{<i>i</i>} (dummy variable)	0.0011 (0.0336)	0.0015 (0.0381)	0.0130 (0.1135)	0.0066 (0.0811)
Untrained white-collar worker _{<i>i</i>} (dummy variable)	0.0362 (0.1868)	0.0392 (0.1943)	0.0114 (0.1062)	0.0236 (0.1520)
Trained white-collar worker _{<i>i</i>} (dummy variable)	0.1153 (0.3195)	0.1265 (0.3326)	0.0418 (0.2003)	0.0548 (0.2277)
Qualified professional _{<i>i</i>} (dummy variable)	0.4814 (0.4999)	0.4680 (0.4993)	0.1929 (0.3947)	0.1786 (0.3832)
Highly qualified professional _{<i>i</i>} (dummy variable)	0.2282 (0.4199)	0.1613 (0.3681)	0.2913 (0.4545)	0.1975 (0.3983)
Managerial tasks _{<i>i</i>} (dummy variable)	0.0192 (0.1373)	0.0160 (0.1255)	0.0495 (0.2169)	0.0123 (0.1102)
Married living together _{<i>i</i>} (dummy variable)	0.4678 (0.4992)	0.4375 (0.4964)	0.6701 (0.4703)	0.5775 (0.4942)
Married not living together _{<i>i</i>} (dummy variable)	0.0294 (0.1690)	0.0291 (0.1681)	0.0250 (0.1562)	0.0236 (0.1520)
Single _{<i>i</i>} (dummy variable)	0.3525 (0.4780)	0.3750 (0.4845)	0.2359 (0.4247)	0.3043 (0.4603)
Divorced _{<i>i</i>} (dummy variable)	0.1356 (0.3425)	0.1337 (0.3406)	0.0663 (0.2489)	0.0917 (0.2887)
Widow _{<i>i</i>} (dummy variable)	0.0147 (0.1204)	0.0247 (0.1554)	0.0027 (0.0521)	0.0028 (0.0532)
Workforce < 5 _{<i>i</i>} (dummy variable)	0.0508 (0.2198)	0.0828 (0.2759)	0.0435 (0.2040)	0.0567 (0.2314)
Workforce ∈ [5;10] _{<i>i</i>} (dummy variable)	0.0768 (0.2665)	0.0887 (0.2845)	0.0598 (0.2371)	0.0926 (0.2900)
Workforce ∈ [11; 19] _{<i>i</i>} (dummy variable)	0.0621 (0.2416)	0.0799 (0.2714)	0.0696 (0.2545)	0.0879 (0.2833)
Workforce ∈ [20; 99] _{<i>i</i>} (dummy variable)	0.1559 (0.3630)	0.2369 (0.4255)	0.1717 (0.3773)	0.2467 (0.4313)
Workforce ∈ [100; 199] _{<i>i</i>} (dummy variable)	0.0859 (0.2803)	0.1119 (0.3155)	0.0913 (0.2881)	0.1078 (0.3102)
Workforce ∈ [200; 1,999] _{<i>i</i>} (dummy variable)	0.2689 (0.4437)	0.2355 (0.4246)	0.2533 (0.4350)	0.2070 (0.4053)

Workforce $\geq 2,000_i$ (dummy variable)	0.2994 (0.4583)	0.1642 (0.3708)	0.3109 (0.4630)	0.2013 (0.4012)
Sector A _{<i>i</i>} (dummy variable)	0.0068 (0.0821)	0.0131 (0.1137)	0.0060 (0.0771)	0.0265 (0.1606)
Sector B _{<i>i</i>} (dummy variable)	0.0000 (—)	0.0000 (—)	0.0011 (0.0330)	0.0000 (—)
Sector C _{<i>i</i>} (dummy variable)	0.0023 (0.0475)	0.0000 (—)	0.0054 (0.0735)	0.0019 (0.0435)
Sector D _{<i>i</i>} (dummy variable)	0.2362 (0.4250)	0.1453 (0.3527)	0.4283 (0.4950)	0.3535 (0.4783)
Sector E _{<i>i</i>} (dummy variable)	0.0113 (0.1058)	0.0029 (0.0539)	0.0239 (0.1528)	0.0142 (0.1183)
Sector F _{<i>i</i>} (dummy variable)	0.0124 (0.1109)	0.0073 (0.0850)	0.0929 (0.2904)	0.1248 (0.3306)
Sector G _{<i>i</i>} (dummy variable)	0.1051 (0.3068)	0.1395 (0.3468)	0.0859 (0.2802)	0.1229 (0.3284)
Sector H _{<i>i</i>} (dummy variable)	0.0215 (0.1450)	0.0407 (0.1977)	0.0114 (0.1062)	0.0227 (0.1490)
Sector I _{<i>i</i>} (dummy variable)	0.0508 (0.2198)	0.0334 (0.1799)	0.0685 (0.2526)	0.0917 (0.2887)
Sector J _{<i>i</i>} (dummy variable)	0.0768 (0.2665)	0.0291 (0.1681)	0.0603 (0.2382)	0.0246 (0.1549)
Sector K _{<i>i</i>} (dummy variable)	0.1119 (0.3154)	0.1003 (0.3006)	0.0815 (0.2737)	0.0803 (0.2719)
Sector L _{<i>i</i>} (dummy variable)	0.1006 (0.3009)	0.0465 (0.2107)	0.0435 (0.2040)	0.0246 (0.1549)
Sector M _{<i>i</i>} (dummy variable)	0.0667 (0.2496)	0.0959 (0.2947)	0.0185 (0.1347)	0.0246 (0.1549)
Sector N _{<i>i</i>} (dummy variable)	0.1605 (0.3672)	0.2834 (0.4510)	0.0413 (0.1990)	0.0624 (0.2420)
Sector O _{<i>i</i>} (dummy variable)	0.0350 (0.1840)	0.0610 (0.2396)	0.0299 (0.1703)	0.0255 (0.1578)
Sector P _{<i>i</i>} (dummy variable)	0.0023 (0.0475)	0.0000 (—)	0.0000 (—)	0.0000 (—)
Sector Q _{<i>i</i>} (dummy variable)	0.0000 (—)	0.0015 (0.0381)	0.0016 (0.0404)	0.0000 (—)
Federal state: Schleswig-Holstein _{<i>i</i>} (dummy variable)	0.0169 (0.1292)	0.0189 (0.1363)	0.0266 (0.1610)	0.0170 (0.1294)
Federal state: Hamburg _{<i>i</i>} (dummy variable)	0.0215 (0.1450)	0.0160 (0.1255)	0.0147 (0.1203)	0.0123 (0.1102)
Federal state: Niedersachsen _{<i>i</i>} (dummy variable)	0.0757 (0.2647)	0.0727 (0.2598)	0.0940 (0.2919)	0.0756 (0.2645)
Federal state: Bremen _{<i>i</i>} (dummy variable)	0.0068	0.0058	0.0060	0.0076

variable)	(0.0821)	(0.0761)	(0.0771)	(0.0867)
Federal state: Nordrhein-Westfalen _{<i>i</i>} (dummy variable)	0.1876 (0.3906)	0.1453 (0.3527)	0.2141 (0.4103)	0.1805 (0.3848)
Federal state: Hessen _{<i>i</i>} (dummy variable)	0.0734 (0.2610)	0.0625 (0.2422)	0.0783 (0.2687)	0.0662 (0.2487)
Federal state: Rheinland-Pfalz _{<i>i</i>} (dummy variable)	0.0395 (0.1950)	0.0451 (0.2076)	0.0446 (0.2064)	0.0359 (0.1862)
Federal state: Baden-Wuerttemberg _{<i>i</i>} (dummy variable)	0.1277 (0.3339)	0.0959 (0.2947)	0.1533 (0.3603)	0.1125 (0.3161)
Federal state: Bayern _{<i>i</i>} (dummy variable)	0.1503 (0.3576)	0.1541 (0.3613)	0.1739 (0.3791)	0.1276 (0.3338)
Federal state: Saarland _{<i>i</i>} (dummy variable)	0.0102 (0.1004)	0.0102 (0.1004)	0.0114 (0.1062)	0.0123 (0.1102)
Federal state: Berlin _{<i>i</i>} (dummy variable)	0.0441 (0.2054)	0.0451 (0.2076)	0.0212 (0.1441)	0.0425 (0.2019)
Federal state: Brandenburg _{<i>i</i>} (dummy variable)	0.0508 (0.2198)	0.0625 (0.2422)	0.0283 (0.1658)	0.0548 (0.2277)
Federal state: Mecklenburg-Vorpommern _{<i>i</i>} (dummy variable)	0.0373 (0.1896)	0.0203 (0.1413)	0.0179 (0.1328)	0.0255 (0.1578)
Federal state: Sachsen _{<i>i</i>} (dummy variable)	0.0655 (0.2476)	0.1148 (0.3190)	0.0576 (0.2331)	0.1040 (0.3054)
Federal state: Sachsen-Anhalt _{<i>i</i>} (dummy variable)	0.0542 (0.2266)	0.0712 (0.2574)	0.0310 (0.1733)	0.0595 (0.2368)
Federal state: Thueringen _{<i>i</i>} (dummy variable)	0.0384 (0.1923)	0.0596 (0.2369)	0.0272 (0.1626)	0.0662 (0.2487)
Number of observations	885	688	1,840	1,058

Means and standard deviations (in parentheses)

Supplementary Material

Table S.1: OLS Regression results

Variables	(1)	(2)
	linear regression	
	females	males
ISCED 1 _{<i>i</i>}	-0.0286 (0.207)	0.0241 (0.102)
ISCED 2 _{<i>i</i>}	-0.153*** (0.0522)	-0.0440 (0.0316)
ISCED 4 _{<i>i</i>}	0.0447 (0.0311)	0.0593** (0.0273)
ISCED 5 _{<i>i</i>}	0.0813* (0.0445)	0.000497 (0.0273)
ISCED 6 _{<i>i</i>}	0.223*** (0.0340)	0.181*** (0.0307)
Age _{<i>i</i>}	0.0110 (0.0173)	-0.0271* (0.0154)
Age _{<i>i</i>} ²	-0.000134 (0.000206)	0.000299 (0.000184)
Experience in full-time _{<i>i</i>}	0.0183** (0.00731)	0.0379*** (0.00617)
Experience in full-time _{<i>i</i>} ²	-0.000278 (0.000176)	-0.000794*** (0.000137)
Experience in part-time _{<i>i</i>}	-0.00958 (0.00709)	0.00827 (0.00976)
Experience in part-time _{<i>i</i>} ²	0.000443 (0.000412)	0.000354 (0.00104)
Tenure _{<i>i</i>}	0.00850** (0.00429)	0.00740*** (0.00272)
Tenure _{<i>i</i>} ²	-0.000151 (0.000134)	-0.000140* (8.29e-05)
Untrained blue-collar worker _{<i>i</i>}	-0.279** (0.137)	-0.332*** (0.0545)
Semi-trained blue-collar worker _{<i>i</i>}	-0.337*** (0.0520)	-0.286*** (0.0285)
Trained blue-collar worker _{<i>i</i>}	-0.168*** (0.0589)	-0.148*** (0.0229)
Foreman _{<i>i</i>}	-0.0765 (0.188)	-0.0771** (0.0339)

Master craftsman _{<i>i</i>}	-0.182** (0.0721)	0.0482 (0.0488)
Industry Foreman _{<i>i</i>}	-0.126* (0.0705)	0.123* (0.0737)
Untrained white-collar worker _{<i>i</i>}	-0.269*** (0.0627)	-0.229*** (0.0585)
Trained white-collar worker _{<i>i</i>}	-0.194*** (0.0369)	-0.221*** (0.0518)
Highly qualified professional _{<i>i</i>}	0.214*** (0.0335)	0.291*** (0.0243)
Managerial tasks _{<i>i</i>}	0.732*** (0.115)	0.705*** (0.0521)
Married not living together _{<i>i</i>}	0.0402 (0.0616)	-0.0356 (0.0474)
Single _{<i>i</i>} (dummy variable)	-0.0324 (0.0255)	-0.0453** (0.0191)
Divorced _{<i>i</i>}	0.00465 (0.0316)	0.0116 (0.0345)
Widow _{<i>i</i>}	-0.00389 (0.124)	0.115 (0.0774)
Workforce < 5 _{<i>i</i>}	-0.426*** (0.0692)	-0.387*** (0.0557)
Workforce ∈ [5;10] _{<i>i</i>}	-0.352*** (0.0510)	-0.226*** (0.0352)
Workforce ∈ [11; 19] _{<i>i</i>}	-0.224*** (0.0479)	-0.230*** (0.0316)
Workforce ∈ [20; 99] _{<i>i</i>}	-0.225*** (0.0341)	-0.173*** (0.0209)
Workforce ∈ [100; 199] _{<i>i</i>}	-0.145*** (0.0438)	-0.102*** (0.0273)
Workforce ∈ [200; 1,999] _{<i>i</i>}	-0.134*** (0.0288)	-0.0534*** (0.0181)
Sector A _{<i>i</i>}	-0.346** (0.143)	-0.195** (0.0909)
Sector B _{<i>i</i>}		-0.232** (0.104)
Sector C _{<i>i</i>}	-0.179** (0.0885)	-0.0367 (0.0726)
Sector E _{<i>i</i>}	0.124* (0.0689)	0.0374 (0.0493)
Sector F _{<i>i</i>}	0.00542 (0.0922)	0.0536** (0.0259)
Sector G _{<i>i</i>}	-0.0443	-0.0890***

	(0.0429)	(0.0284)
Sector H_i	-0.137*	-0.168**
	(0.0699)	(0.0672)
Sector I_i	-0.0739	-0.0121
	(0.0549)	(0.0287)
Sector J_i	0.135***	0.0141
	(0.0423)	(0.0340)
Sector K_i	0.00171	0.0231
	(0.0497)	(0.0343)
Sector L_i	-0.0627	-0.0624
	(0.0395)	(0.0404)
Sector M_i	-0.124**	-0.185***
	(0.0527)	(0.0639)
Sector N_i	-0.0869**	-0.0942**
	(0.0398)	(0.0475)
Sector O_i	-0.107	-0.0675
	(0.0682)	(0.0443)
Sector P_i	0.0408	-0.217***
	(0.202)	(0.0782)
Federal state: Schleswig-Holstein $_i$	0.0864	0.0414
	(0.0795)	(0.0344)
Federal state: Hamburg $_i$	0.0852	-0.0375
	(0.0601)	(0.0932)
Federal state: Niedersachsen $_i$	-0.0566	0.00284
	(0.0425)	(0.0264)
Federal state: Bremen $_i$	-0.180	0.00618
	(0.130)	(0.0726)
Federal state: Hessen $_i$	0.0429	0.0633**
	(0.0461)	(0.0290)
Federal state: Rheinland-Pfalz $_i$	0.0177	-0.0148
	(0.0491)	(0.0399)
Federal state: Baden-Wuerttemberg	0.0543	0.0849***
	(0.0394)	(0.0242)
Federal state: Bayern $_i$	-0.00402	-0.0106
	(0.0381)	(0.0218)
Federal state: Saarland $_i$	-0.0345	-0.116*
	(0.0711)	(0.0593)
Federal state: Berlin $_i$	-0.136***	-0.0327
	(0.0519)	(0.0538)
Federal state: Brandenburg $_i$	-0.192***	-0.168***
	(0.0614)	(0.0495)
Federal state: Mecklenburg-Vorpommern	-0.213***	-0.258***
	(0.0566)	(0.0555)

Federal state: Sachsen _{<i>i</i>}	-0.220*** (0.0436)	-0.272*** (0.0344)
Federal state: Sachsen-Anhalt _{<i>i</i>}	-0.147*** (0.0472)	-0.145*** (0.0529)
Federal state: Thuringen _{<i>i</i>}	-0.185** (0.0743)	-0.241*** (0.0448)
Constant	7.591*** (0.323)	8.322*** (0.291)
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Number of observations	885	1,840
R^2	0.595	0.626
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Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1