J Labour Market Res. (2013) 46:19–34
DOI 10.1007/s12651-012-0113-y

ARTICLE

The distribution of the gender wage gap in Austria: evidence from matched employer-employee data and tax records

René Böheim · Klemens Himpele · Helmut Mahringer · Christine Zulehner

Accepted: 3 August 2012 / Published online: 21 September 2012

Abstract We examine the gender wage gap in Austria using new matched employer-employee data from 2007. We estimate quantile regressions and investigate the gender wage gap at the conditional wage distribution of men and women. We decompose the gender wage gap into the parts which are due to different characteristics and different returns to these characteristics. About 60 % of the gender wage gap cannot be explained by differences in human capital or other observable indicators of productivity. Taking differences in the characteristics into account, we find that women earn on average about 11 % less than men. We further estimate that differences in the returns for women and men increase over the wage distribution.

Keywords Gender wage gap · Quantile regressions · Decomposition · Matched employer-employee data

JEL Classification J31 · J71

Eine Auswertung von Steuer- und Sozialversicherungsdaten zur Untersuchung der Verteilung des geschlechtsspezifischen Lohnunterschiedes in Österreich

Zusammenfassung Wir untersuchen geschlechtsspezifische Lohnunterschiede in Österreich anhand eines neuen Datensatzes, der aus der Verknüpfung von Lohnsteuerdaten des Jahres 2007, Daten des Mikrozensus und Daten der Sozialversicherungen gewonnen wurde. Mit diesen Daten können wir auch für Arbeitslosigkeit, Elternzeit und anderen Auszeiten unterscheiden und deren Beitrag zum geschlechtsspezifischen Lohndifferenzial schätzen. Mit Quantilsregressionen zerlegen wir die Lohndifferenzen zu unterschiedlichen Punkten der Lohnverteilungen in Komponenten die angeben, welche Teile auf unterschiedliche Merkmale bzw. auf unterschiedliche Preise, die diese Merkmale am Arbeitsmarkt erzielen, zurückzuführen sind. Vom durchschnittlichen Lohndifferenzial können nur rund 40 % mit unterschiedlichem Humankapital oder anderen, produktivitätsbezogenen Merkmalen erklärt werden. Werden Unterschiede in den Merkmalen von Frauen und Männern berücksichtig, schätzen wir, dass Frauen im Schnitt einen Lohn erhalten, der um rund 11 % des mittleren Lohnes, den Männer erhalten, geringer ist. Der geschlechtsspezifische Lohnunterschied ist am oberen Ende der Lohnverteilung größer als am unteren Ende.

We gratefully acknowledge financial support from the Jubiläumsfonds of Oesterreichische Nationalbank (grant 12975). Björn Fanta and Clemens Kozmich provided excellent research assistance. René Böheim is also affiliated to the Austrian Center for Labor Economics and the Analysis of the Welfare State, Austrian Institute of Economic Research, IZA, Bonn, and CESifo, Munich. Christine Zulehner is also affiliated to the Austrian Institute of Economic Research and the Austrian Center for Labor Economics and the Analysis of the Welfare State.

Electronic supplementary material The online version of this article (doi:10.1007/s12651-012-0113-y) contains supplementary material, which is available to authorized users.

R. Böheim · C. Zulehner (✉)
Johannes Kepler University Linz, Altenberger Strasse 69, 4040 Linz, Austria
e-mail: christine.zulehner@jku.at

R. Böheim
e-mail: rene.boeheim@jku.at

K. Himpele
Statistik Austria, Guglstrasse 6-8, 1100 Vienna, Austria
e-mail: himpele@gmx.de

H. Mahringer
Austrian Institute of Economic Research (WIFO), Arsenal Objekt 20, 1030 Vienna, Austria
e-mail: helmut.mahringer@wifo.ac.at

1 Introduction

Compared to other countries, the gender wage gap in Austria is large. According to the EU gender wage gap indicator, the difference in mean wages was about 25.5 % of men's wages in 2008 (Europian Commission 2011). The EU gender wage gap indicator measures the average difference between men's and women's gross hourly earnings.[1] Of all EU countries, only the Czech Republic fared worse. To reduce this gap, Austrian policy makers required firms to disclose the wages of their workers (Bundeskanzleramt 2010). Currently, only large firms are covered by the new law, but over time also smaller firms will need to disclose their workers' wages. In addition, affirmative action with countries such as Norway and Spain as role models is often debated. Norway, for example, requires a minimum of 40 % of each gender in publicly appointed boards and in all boards of directors in private, shareholder-owned businesses. Spain imposed a similar rule for public sector committees and boards (Bagues and Esteve-Volart 2007).

The EU gender wage gap indicator, however, does not account for differences between men and women in education, labor market experience, or other productivity related variables. To account for these differences, we construct a new data set and decompose the mean wages of men and women. We use methods based on the technique developed by Blinder (1973) and Oaxaca (1973).[2] We construct this new data set from administrative files, where we, for the first time, match Austrian census data with tax records and social security data.

These new data allow us to go beyond the information typically available in survey data. In particular, we investigate how important it is to account for actual experience by contrasting the estimated gender wage gaps using exact personal career information with estimates based on the limited information typically available in survey data. In addition, we identify career interruptions and investigate how much estimates of the gender wage gap differ when we ignore the information on the type of interruptions. Another set of variables that may explain a part of the gender wage gap are firm-specific variables, which are typically not available in survey data. From our matched employer-employee data, we calculate *inter alia* the ratio of female to male workers within the firm or worker turnover in the firm to use as explanatory variables in our estimations.

The public discussion generally focuses on the average gender wage gap. However, this discussion might be misleading if the gender wage gap differs over the wage distribution. A comprehensive study by Arulampalam et al. (2007) uses data from the European Community Household Panel, which provides harmonized data on wages and other individual characteristics from European countries for the years 1995 to 2001. They find that in nearly all of the eleven analyzed countries the estimated wage gaps are larger at the top of the distribution than at the bottom of the distribution. They interpret the larger gap at the top of the wage distribution as evidence for a "glass ceiling", i.e., an invisible barrier that stops women from access to higher paying jobs.

Other studies have also found significant differences in the gender gap at different quantiles of the log wage distribution. Examples are Albrecht et al. (2003) for Sweden, Fitzenberger and Wunderlich (2001) for the UK, Bonjour and Gerfin (2001) for Switzerland, Gupta et al. (2006) for Denmark, Garcia et al. (2001), Gardezable and Ugidos (2005), De la Rica et al. (2008) for Spain, Fitzenberger and Wunderlich (2002), Beblo (2010) for Germany and Albrecht et al. (2009) for the Netherlands.

We also estimate quantile regressions and contrast the evidence from our estimates with those we obtain from the mean regressions and mean decompositions. Here, we follow Machado and Mata (2005) and Melly (2006) and estimate counterfactual distributions, allowing the decomposition of changes in the wage distribution into changes in the regression coefficients and changes in the distribution of covariates.[3]

Our findings demonstrate a remarkable resilience of the estimates. To be sure, the estimates become smaller, the more precise data one has at hands, however, what matters most are good wage information and detailed career information. In our data, the results do hardly change if we account for e.g., the exact number of days on maternity leave—for all practical purposes, an indicator of having been on maternity leave suffices to obtain a reliable estimate of the gender wage gap.

We find that women earn on average about 0.121 log points (11 %) less than men for given characteristics and that about 60 % of the gender wage gap cannot be attributed to observable characteristics.[4] As can be expected, we find evidence that the firm-specific variables are important wage components and, for example, a higher ratio of female to male workers implies lower wages. However, firm-specific

[1] For Austria, the gender wage gap is calculated with earnings data from the Structure of Earnings Survey (SES). In contrast to household surveys such as the European Union Survey on Income and Living Conditions (EU-SILC), the SES samples only employees in enterprises with at least ten employees in the private sector (Geisberger and Till 2009).

[2] There are numerous papers investigating the gender wage gap. For a meta-analysis of studies on the gender wage gap see Weichselbaumer and Winter-Ebmer (2005); for surveys on gender discrimination see Altonji and Black (1999) and Bertrand (2010).

[3] To investigate wage differences over the distribution and over time, Antonczyk et al. (2010) provide a sequential decomposition using quantile regressions.

[4] In an accompanying paper, we examine the change of the gender wage gap in Austria between 2002 and 2007 (Böheim et al. 2012) and find a 17 % decline in the gender wage gap over this period.

information also contributes to an explanation of the gender wage gap. We estimate, for example, the more women work in a firm, the lower is the gender wage gap.

If we extend the set of explanatory variables accounting for human capital (eduction, experience, etc.), occupation, and industry to include the firm-specific variables as well, the unexplained gender wage gap decreases from about 16 % to about 11 %, a difference of about 5 percentage points.

Differences in returns to characteristics between women and men increase over the wage distribution. This could be attributed to wage bargaining which is predominantly on an individual basis in the high wage segment of the labor marker, in contrast to low wage jobs where collective bargaining contracts are the norm.

2 Data and summary statistics

We combine data from Austrian administrative records to construct a new data set to overcome potential weaknesses in earlier studies. Data are from the Austrian General Income Report for 2007, which itself combines data from tax records and the Austrian micro-censuses of 2007, and from the Austrian social security records.[5] The merged data contain human capital variables, such as education and experience, workplace characteristics, such as the number of women or the fraction of young workers in a particular workplace, and also complete work histories since 1972. The sample size corresponds to the number of observations in the micro-censuses.

The Austrian General Income Report, published every other year, provides statistics on the income of all employees, self-employed persons, and pensioners in Austria. The Report uses data from tax records; wage data are based on approximately 8.4 million pay slips collected by the Austrian tax authorities and provide information on gross yearly income, paid taxes, paid social contributions, and extra compensations. The tax data do not contain information on the number of hours worked and, in addition, taxes are individual data and it is not possible to build household information from the official tax records. For the purposes of the Austrian General Income Report, the tax data are combined with data from the Austrian micro-censuses to generate household level information and to obtain information on e.g., hours worked or formal qualifications. It is therefore an excellent source of information on wage income for employees (Statistik Austria 2008).

The Austrian micro-census is a quarterly panel survey which collects information on private households. It is representative of the Austrian population and contains information on about 80,000 individuals per year. Every quarter a fifth of the sample is renewed. The micro-census provides information on hours worked, education, and detailed information on individual and household characteristics, but it does not contain wage information. Combining the information from the micro-census and the tax records allows us to compute exact hourly gross and net wages.

The Austria social security data contain information on individual work experience, tenure and characteristics of the workplace, such as industry or region. A firm's identifier permits the construction of workplace characteristics such as the share of female workers in a particular workplace. The data also include the reasons for and the length of work interruptions such as unemployment spells or the birth of a child.

Our estimating sample consists of workers who were between 16 and 60 years of age and who worked at least 35 hours per week. To account for possible seasonal fluctuations, we restrict our sample to workers who worked for at least 270 days in 2007. The sample consists of 6,064 women and 11,698 men who worked in private or public sector. We also analyzed private sector employees separately; these additional results are available in the online version of the article. Table 1 provides summary statistics on our estimating sample. The difference in mean wages in 2007 was about €3.3 per hour, and women earned on average some 19.1 % less than men, not accounting for differences in characteristics. This "raw" gap is smaller than in 1997, when it was about 23.3 % (Böheim et al. 2007).

Figure 1 plots the distribution of the log hourly wages of full-time employed men and women in the private and public sector. We observe that women's wage distribution is in shape similar to men's, but to the left of it. Women are also slightly less compressed in their wages than men as the peak in their wage distribution is lower than the corresponding peak in the men's distribution. Such distributions are of course only descriptive and do not indicate that women are (unfairly) discriminated against.

One of the most important determinants of the wage is probably the amount of formal education. Women in our sample have on average more formal education than men. For example, 17.9 % of women and 13.7 % of men have a high school degree; 8.7 % of women and 7.8 % of men have a university degree. However, there are relatively more women who have only compulsory education than men. In particular, 19.1 % of women and 13.8 % of men have compulsory schooling only, whereas 28.0 % of women and 48.7 % of men have completed an apprenticeship.

[5] The Austrian General Income Report is described in Statistic Austria (2009) and in Rechnungshof (2008). The social security records are described in Zweimüller, Josef et al. (2009). An anonymous personal identifier allows the combination of these data, which provides us with data for the analysis of gender wage differences. To ensure the anonymity, the actual merging of the data has been handled by an authorized third party. No data that would allow identification of individual persons has been made available to us.

Table 1 Summary statistics, mean (standard deviation)

	Women	Men
Gross hourly wage (€)	14.008	17.305
	(6.424)	(7.978)
Education		
Compulsory school	0.191	0.138
Apprenticeship	0.280	0.487
Secondary school	0.200	0.081
High school	0.179	0.137
Crafts diploma	0.004	0.059
Technical college	0.058	0.022
University (Bachelor, Master, MBA)	0.076	0.062
University (PhD)	0.011	0.014
Age (in years)	37.364	38.458
	(11.654)	(11.193)
Experience (in years)	15.682	18.814
	(9.572)	(10.172)
Tenure (in years)	9.094	10.121
	(7.710)	(8.683)
Length of interruptions (years)	0.950	0.570
	(1.519)	(1.041)
Length of parental leave (in years)	0.402	0.003
	(0.844)	(0.057)
Time in military (in years)	0.000	0.046
	(0.009)	(0.172)
Time out of labor force (in years)	0.129	0.126
	(0.770)	(0.642)
Time unemployed (in years)	0.377	0.328
	(0.818)	(0.723)
Time sick (in years)	0.042	0.066
	(0.148)	(0.181)
Married	0.512	0.672
Executive position	0.045	0.079
Firmsize		
Firm size: 1–10	0.259	0.172
Firm size: 11–19	0.140	0.125
Firm size: 20–49	0.191	0.191
Firm size: 50–499	0.311	0.373
Firm size: 500+	0.099	0.140
Firm size unknown	0.023	0.027
Log workplace size	4.902	4.772
	(2.407)	(2.055)
Average age of the firm	22.282	23.101
	(12.376)	(12.393)
Average age in the firm	38.890	38.481
	(5.542)	(4.997)
Ratio female to male workers in the firm	0.620	0.299
	(0.249)	(0.233)

Table 1 (*Continued*)

	Women	Men
Ratio female to male wage in the firm	0.810	0.767
	(0.360)	(0.244)
Worker turnover in the firm	24.485	4.605
	(792.386)	(256.846)
Public sector	0.366	0.187
Occupation		
Soldiers, administrative officers	0.034	0.082
Researchers	0.115	0.080
Engineers	0.247	0.196
Office workers	0.235	0.084
Sales	0.209	0.084
Craftspersons	0.028	0.265
Assembly workers	0.025	0.117
Unskilled workers	0.107	0.091
Sector		
Agriculture, fishery, mining	0.010	0.014
Manufacturing	0.146	0.310
Energy, water suppliers, traffic and communication	0.044	0.077
Construction	0.024	0.130
Whole sale and retail	0.182	0.148
Tourism	0.076	0.024
Banks, insurance	0.051	0.040
Real estate	0.073	0.055
Others	0.392	0.203
Citizenship		
Austrian	0.930	0.923
EU 15	0.016	0.016
Others	0.053	0.061
Population density		
High	0.353	0.275
Medium	0.245	0.266
Low	0.402	0.458
Region		
Burgenland	0.086	0.087
Lower Austria	0.127	0.127
Vienna	0.143	0.096
Carinthia	0.105	0.107
Steiermark	0.114	0.117
Upper Austria	0.104	0.134
Salzburg	0.119	0.112
Tirol	0.100	0.106
Vorarlberg	0.101	0.114
Number of observations	6,064	11,698

While women are on average one year younger than men, their average labor market experience difference is about 3 years shorter, owing to motherhood and child care responsibilities. Most studies on the gender wage gap can only account for potential experience as the length of and the reasons for work time interruptions is usually not known. Zweimüller and Winter-Ebmer (1994) and Böheim et al. (2007) have demonstrated that it is necessary to account for

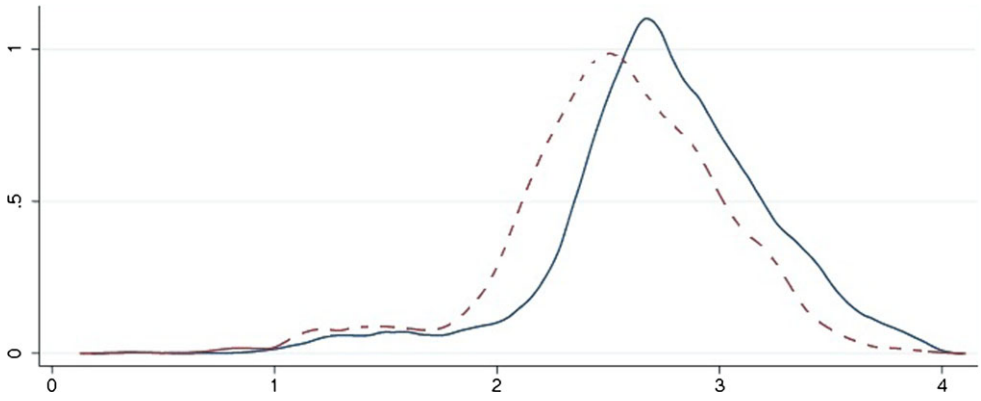

Fig. 1 Kernel density of wages. *Note:* Log wages of 6,064 women (*dashed line*) and 11,698 men (*solid line*) in private and public sector employment. Full-time employees only

differences in actual rather than potential experience to obtain reliable estimates of the wage determinants. The summary statistics also show that fewer women than men are married.

We also observe differences in the kind of labor market interruptions. For example, the main reason why women have less experience is the length of parental leave which is on average 0.402 years for women, but only 0.003 years for men. The time in military is on average (almost) zero for women and equal to 0.046 years for men. On average, women stay out of the labor force 0.129 years, for men this number is equal to 0.126. Unemployment durations were on average 0.377 years for women and 0.328 years for men. Average sickness absences are 0.042 years for women and 0.066 years for men.[6]

However, it should be noted that there are marked differences in the distribution across sectors, for example, the relative majority of women (18 %) works in the retail sector and the relative majority of men (31 %) in manufacturing. We also see that women are concentrated amongst office workers, while men are typically working as craftspersons. Not only do we observe differences in the occupational hierarchy, there is also clear evidence for differences in within-firm hierarchies as merely about 4.5 % of women, in contrast to some 8 % of men, have an executive position.

The differences in wages might also be related to differences in the workplaces in which women and men work. The summary statistics support such an hypothesis since, for example, women work in smaller workplaces and firms than men, and more women than men work in the public sector. The smaller average firm size leads to greater values for similar changes in the average worker turnover for women than for men because of the smaller denominator. Worker turnover is calculated as the sum of all new hires and separations over the year, divided by the average number of employees. The average ratio of female to male workers in a firm is about 0.6 for women and 0.3 for men. While there are little differences between men and women with respect to the average age of the firm or the average age of their coworkers, women work more frequently with other women than men. Whether these differences are the outcome of a selection process or due to discrimination against women is, however, beyond the scope of the current analysis.

[6]These variables are constructed by counting the number of days in the respective labor market status, i.e., military, parental leave, unemployed, out of the labor force, and sick. This information is obtained from the ASSD.

3 Methods

As our main tool of analysis we use decomposition techniques and decompose mean wages as well as the wages across the distribution. To decompose mean wages of women and men, we use methods based the technique developed by Blinder (1973) and Oaxaca (1973). We estimate a wage equation for women (W) and men (M) separately with ordinary least squares,

$$\ln y_i = \beta_i X_i + \epsilon_i, \quad i = M, W, \tag{1}$$

where y_i is the hourly wage, β_i are the coefficients to be estimated, X_i is a vector of characteristics, and ϵ_i is an i.i.d. error. The difference in the mean wages can be re-written as (Oaxaca and Ransom 1995):

$$\overline{\ln y}_M - \overline{\ln y}_W = \hat{\beta}^*(\overline{X}_M - \overline{X}_W) + \left(\hat{\beta}_M - \hat{\beta}^*\right)\overline{X}_M + \left(\hat{\beta}^* - \hat{\beta}_W\right)\overline{X}_W, \tag{2}$$

where $\hat{\beta}^*$ is a weighted average of the coefficient vectors, i.e., $\hat{\beta}^* = \Omega\hat{\beta}_M + (I - \Omega)\hat{\beta}_W$, with a weighting matrix Ω and the identity matrix I. The first term on the right hand side is the difference of the mean characteristics, evaluated at $\hat{\beta}^*$. It is that part of the wage gap that is due to differences in productivity. The sum of the second and third term is the part of the wage gap which cannot be ascribed to differences in productivity. In this way, the difference in mean logarithmic wages is a weighted sum of differences in characteristics and of differences in prices.

The decomposition equations proposed by Blinder (1973) and Oaxaca (1973) represent special cases of generalizations of (2), where Ω is either equal to I or the null-matrix. Neumark (1988) and Oaxaca and Ransom (1995) estimate a pooled model to derive the counterfactual coefficient vector $\hat{\beta}^*$. We follow Reimers (1983) who assumes $\hat{\beta}^* = (1/2)\hat{\beta}_M + (1/2)\hat{\beta}_W$. For a comparison and because the number of females and males in the sample are different, we also apply the approach by Cotton (1988). This approach weights the coefficients by the group sizes, n_M and n_W, i.e., $\hat{\beta}^* = [n_M/(n_M + n_W)]\hat{\beta}_M + [n_W/(n_M + n_W)]\hat{\beta}_F$.

These approaches focus on the mean of the wage distribution and therefore may provide only a limited picture of the differences in wages between women and men. Several authors have found that the mean wage gaps are not representative of the whole distribution. For example, Arulampalam et al. (2007) use data for the years 1995 to 2001 from the European Community Household Panel, which provides harmonized wages and individual characteristics for European countries. They find that in nearly all of the eleven analyzed countries the estimated wage gaps are larger at the top of the distribution than at the bottom of the distribution.

To not only analyze the effects of gender and other observables on the conditional mean of the logarithmic wage distribution, but also on different quantiles, we estimate quantile regressions.[7] Quantile regression models specify the q-th conditional quantile of the logarithmic wage distribution as a linear function of characteristics:

$$\ln y_{iq} = \beta_{iq} X_i + \epsilon_{iq}, \quad i = M, W, \tag{3}$$

where $q \in (0, 1)$ and $E[\epsilon_{iq}|X_i] = 0$. For each quantile q, we estimate one equation for men, M, and for women, W. While ordinary least square regressions have the property that the mean of the dependent variable and the mean of the explanatory variables are on the regression line, which makes the decomposition of the dependent variable straightforward, the estimators for the quantile regression models do not have this property. We therefore use a different procedure to calculate the gender wage gap at the q—the quantile to differences in returns adjusted for characteristics.

We follow Melly (2006) and estimate counterfactual distributions, allowing the decomposition of the distribution of wages into a change in the distribution of characteristics and a change in the coefficients between men and women. This decomposition is similar to the Machado and Mata (2005) decomposition. Both decompositions are numerically equivalent, when the number of simulations used in the Machado and Mata (2005) decomposition goes to infinity (Melly 2006).

[7]For an introduction and an overview to quantile regression see Koenker and Bassett (1978) and Koenker and Hallock (2001).

The approach developed by Melly (2006) is a two-step regression strategy: In the first step, the conditional wage distribution is estimated by quantile regressions; in the second step, the conditional distribution is integrated over the range of covariates to obtain an estimate of the unconditional distribution. Based on the distribution of women's characteristics and coefficients obtained from regressions using male observations, we obtain the counterfactual distribution that we would observe if women had the same returns than men. For each quantile, the difference between the observed unconditional quantiles is decomposed into a part that is explained by the different distribution of characteristics and a part that is explained by the different coefficients.[8]

4 Estimation results

Table 2 presents the estimated coefficients of two specifications of the gross hourly wage, for men and women who are working full-time.[9] The two specifications differ in the treatment of past labor force statuses, the first specification uses a less detailed measure of past non-employment spells than the second specification. The results do not differ much between specifications, however, the second specification explains slightly more variation in the dependent variable than the first. Thus, we concentrate on the second specification from now on.

The estimated coefficients indicate, for example, that more formal education is associated with higher wages. For example, men with a high school degree earn 42.3 % more than men with only compulsory schooling. For women, the respective number is equal to 37.1 %. Men with a university degree earn 59.5 % more than men with only compulsory schooling and women earn 53.4 % more. The estimated coefficients for lower formal education differ considerably between men and women, while differences in secondary and tertiary education are small.

The lower estimates for women who have completed an apprenticeship may reflect gender-specific training choices in Austria. Typically, young women choose schools or apprenticeships with social or commercial specialization and young men choose some form of technical education. Gender-specific specialization also takes place in tertiary education. Again, the differences may also reflect preferences for particular subjects. Male students typically chose tech-

[8]See Melly (2006) and Chernozhukov et al. (2009) for a detailed description of the estimator and its statistical properties. Fortin et al. (2011) provide a more general discussion of quantile decompositions. We use Melly's (2006) Stata code "rqdeco".

[9]Summary statistics for private sector employees are available in the online version of the article.

Table 2 Estimated wage regressions

	Specification 1		Specification 2	
	Women	Men	Women	Men
Constant	1.781	1.749	1.772	1.724
	(0.05)	(0.03)	(0.05)	(0.03)
Education (reference group: compulsory school)				
Apprenticeship	0.189	0.252	0.187	0.225
	(0.01)	(0.01)	(0.01)	(0.01)
Secondary school	0.263	0.304	0.261	0.278
	(0.01)	(0.01)	(0.01)	(0.01)
High school	0.374	0.451	0.371	0.423
	(0.01)	(0.01)	(0.01)	(0.01)
Craftsmen diploma	0.236	0.303	0.233	0.278
	(0.06)	(0.01)	(0.06)	(0.01)
Technical college	0.429	0.462	0.425	0.445
	(0.02)	(0.02)	(0.02)	(0.02)
University (Bachelor, Master, MBA)	0.539	0.614	0.534	0.595
	(0.02)	(0.02)	(0.02)	(0.02)
University (PhD)	0.638	0.672	0.625	0.649
	(0.04)	(0.03)	(0.04)	(0.03)
Experience	0.047	0.049	0.048	0.056
	(0.00)	(0.00)	(0.00)	(0.00)
Experience squared × 100	−0.092	−0.098	−0.095	−0.111
	(0.01)	(0.00)	(0.01)	(0.00)
Tenure	0.009	0.009	0.008	0.007
	(0.00)	(0.00)	(0.00)	(0.00)
Tenure squared × 100	−0.003	0.008	−0.001	0.012
	(0.01)	(0.00)	(0.01)	(0.00)
Length of interruptions	−0.002	0.007		
	(0.01)	(0.01)		
Length of interruptions × 100	0.046	−0.225		
	(0.09)	(0.09)		
Time unemployed			−0.001	−0.021
			(0.01)	(0.00)
Time out of labor force			0.016	0.010
			(0.00)	(0.00)
Length of maternity leave			−0.009	−0.094
			(0.00)	(0.05)
Time in military			0.369	0.221
			(0.43)	(0.02)
Time sick			−0.043	−0.047
			(0.03)	(0.02)
Married	0.004	0.050	0.007	0.058
	(0.01)	(0.01)	(0.01)	(0.01)
Citizenship (reference group: others)				
Austria	−0.038	−0.026	−0.038	−0.042
	(0.02)	(0.01)	(0.02)	(0.01)
EU15	0.100	0.098	0.103	0.112
	(0.03)	(0.03)	(0.03)	(0.03)

Table 2 (*Continued*)

	Specification 1		Specification 2	
	Women	Men	Women	Men
Population density (reference group: high)				
Medium	−0.023	−0.004	−0.023	−0.006
	(0.01)	(0.01)	(0.01)	(0.01)
Low	−0.035	−0.013	−0.035	−0.016
	(0.01)	(0.01)	(0.01)	(0.01)
Worker status (reference group: white collar)				
Blue collar worker	−0.074	−0.078	−0.074	−0.077
	(0.01)	(0.01)	(0.01)	(0.01)
Civil servants	0.008	−0.009	0.007	−0.015
	(0.02)	(0.01)	(0.02)	(0.01)
Other public sector employees	−0.069	−0.110	−0.068	−0.111
	(0.02)	(0.02)	(0.02)	(0.02)
Executive position	0.090	0.086	0.091	0.086
	(0.02)	(0.01)	(0.02)	(0.01)
Average age in the firm	0.003	0.004	0.004	0.004
	(0.00)	(0.00)	(0.00)	(0.00)
Ratio female to male workers in the firm	−0.165	−0.170	−0.163	−0.160
	(0.02)	(0.02)	(0.02)	(0.02)
Worker turnover in the firm	−0.000	−0.000	−0.000	−0.000
	(0.00)	(0.00)	(0.00)	(0.00)
Number of observations	6,064	11,698	6,064	11,698
Adjusted R-squared	0.64	0.61	0.64	0.61

Note: Ordinary least square regressions. Standard errors in parentheses. 6,064 women and 11,698 men in private and public sector employment. Full-time employees only. Specification 1 includes the length of an individual's interruptions in the labor market and its squared, whereas specification 2 replaces these two variables by time unemployed, time out of labor force, length of parental leave, time in military, and time sick. All regressions include also firm size indicators and region, occupation, and industry indicator variables

nical subjects with a higher probability than female students (Statistic Austria 2010, Table 4.19).

The estimated coefficients further indicate that more experience and more tenure are also associated with higher wages. The marginal effect of experience is of about 0.018 for women and of about 0.014 for men, both evaluated at the respective means. The returns to tenure are rather small with marginal values of about 0.008 for women and 0.009 for men. Unemployment spells, periods of parental leave, and sickness absences are associated with lower wages. In particular, we find that unemployment spells as well as the length of parental leave have a more negative effect for men than for women. In contrast, times out of labor force and the time in the military have a strong positive effect for both women and men, although the latter effect is only significant for men.

In addition, wages clearly differ by the type of workplace and they are typically higher in larger workplaces, and in urban areas. We also find statistical evidence for an association between wages and the gender composition of the workplace. Both men and women are estimated to have a significantly lower wage the more women are employed in the firm. This effect is roughly equal to 16 % for both women and men, i.e., a switch from a firm with only men to a firm with only women decreases ones wages by 16 %.

4.1 Decomposition results

Table 3 presents the results from the decomposition of the gender wage gap for employees in the private and public sector.[10] We report the results from the decomposition by Reimers (1983) and, as a robustness check, the results from a decomposition following Cotton (1988). The results do not change much and we therefore concentrate on the former results. Our sample only contains workers who were working on average at least 35 hours per week on at least 270 days in 2007. We therefore do not consider the effect of unstable employments on the wage difference between men and women.

We calculate the decomposition for three specifications, with the help of which we assess the relative importance of human capital variables, occupational and industry segregation, and the effect of firm characteristics. We start with a simple specification that includes education, experience, tenure, the length of work interruptions, family status, and dummy variables for citizenship, regions, and population

[10] Results for private sector employees do not differ greatly from the results presented here. These results are available in the online version of the article.

Table 3 Decompositions of the wage differences

	(1)	(2)	(3)	(4)
Reimers (1983) decomposition				
Differences in returns, $\Delta\hat{\beta}$ in % of the raw gap (19.0 %)	0.211	0.181	0.169	0.121
		85.8	80.1	57.3
Differences in observed characteristics, ΔX in % of the raw gap (19.0 %)		0.030	0.042	0.109
		14.2	19.9	42.7
Cotton (1988) decomposition				
Differences in returns, $\Delta\beta$ in % of the raw gap (19.0 %)	0.211	0.176	0.158	0.111
		83.4	74.9	52.6
Differences in observed characteristics, ΔX in % of the raw gap (19.0 %)		0.035	0.053	0.100
		16.6	25.1	47.4
Education, experience, interruptions, family status, citizenship, region, density		x	x	x
Worker status, occupation, industry			x	x
Establishment size, firm characteristics, hierarchy				x
Number of observations	17,762	17,762	17,762	17,762

Note: Blinder-Oaxaca decompositions. 6,064 women and 11,698 men in private and public sector employment. Full-time employees only. For the decomposition three specifications based on specification 1 as depicted in Table 2 are used: In column (2), the independent variables are education, experience, experience squared, tenure, tenure squared, interruptions, interruptions squared, family status, citizenship, dummy variables for regions and population density. In column (3), we add dummy variables for worker status, occupation and industry and in column (4), we add dummy variables for establishment size, logarithm of firm size, average age of workers in the firm, ratio female to male workers in the firm, worker turnover in the firm and a dummy variable for a leading position

density. We then add dummy variables for worker status, occupation, and industry. In a last step, we add the logarithm of firm size, the average age of workers in the firm, the ratio female to male workers in the firm, worker turnover in the firm, an indicator variable for an executive position, and dummy variables for establishment size.

Women earn on average 0.211 log points (19.1 %) less than men, without controlling for differences in characteristics. The mean wage difference can be in part explained by differences in human capital endowment, for example, about 14.2 % of the mean difference can be attributed to differences in formal education or experience. If we add information on occupation and industry, we can explain roughly 20 % of the mean wage difference by differences in observable characteristics. If we use all available information in our data, i.e., also controlling for different firm characteristics, we can ascribe almost 43 % of the mean wage difference to differences in observable characteristics.

In particular, we find that firm-specific variables contribute to the explanation of the gender wage gap. For example, the more women work in a firm, the lower is the gender wage gap. Or, if we extend the set of explanatory variables accounting for human capital (eduction, experience, etc.), occupation, and industry to include the firm-specific variables as well, the share of the unexplained gender wage gap decreases from about 80 % to about 57 %. This is a difference of about 27 percentage points. The remainder, the unexplained wage gap, must be ascribed to differential returns to characteristics.

4.2 Wage differences over the distribution of wages

The estimated quantile regressions are tabulated in Tables 4 and 5 for female and male full-time employees in both the private and public sectors.[11] For ease of comparison, the first columns in these tables re-produce the OLS regression results. A graphical representation, Fig. 2, permits a more immediate way of interpreting the results. The wage gap (blue line) is lowest at the first quantiles of the wage distributions. As wages increase, we estimate that the wage gap increases slightly, however, it is fairly similar at the quantiles below the median wages. The wage gap is slightly smaller above the median than below it. For the top quantiles of the wage distributions, we estimate the greatest gender wage gap.

We estimate for lower wages that observed characteristics explain more of the wage gap than at the intermediate levels (red line). The differences in returns (green line) are greater at the top of the distribution than at the bottom, which corresponds to an increase of the unexplained part of the wage gap over the wage distribution. This result can be explained by collective bargaining that imposes minimum pay for employment at the bottom of the distribution. Wages at the top

[11] Results for private sector employees are available in the online version of the article.

Table 4 OLS and Quantile regressions, women

	OLS	10 %	25 %	50 %	75 %	90 %
Constant	1.781	1.164	1.462	1.870	2.237	2.498
	(0.05)	(0.09)	(0.05)	(0.05)	(0.05)	(0.06)
Education (reference group: compulsory school)						
Apprenticeship	0.189	0.257	0.213	0.159	0.105	0.080
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Secondary school	0.263	0.298	0.285	0.248	0.199	0.165
	(0.01)	(0.03)	(0.01)	(0.01)	(0.01)	(0.02)
High school	0.374	0.441	0.406	0.350	0.295	0.242
	(0.01)	(0.03)	(0.02)	(0.01)	(0.02)	(0.02)
Craftsmen diploma	0.236	0.161	0.260	0.236	0.249	0.190
	(0.06)	(0.09)	(0.06)	(0.06)	(0.06)	(0.06)
Technical college	0.429	0.509	0.441	0.423	0.346	0.298
	(0.02)	(0.04)	(0.03)	(0.02)	(0.03)	(0.03)
University (Bachelor, Master, MBA)	0.539	0.504	0.535	0.526	0.515	0.492
	(0.02)	(0.04)	(0.02)	(0.02)	(0.02)	(0.03)
University (PhD)	0.638	0.626	0.598	0.577	0.607	0.545
	(0.04)	(0.07)	(0.04)	(0.04)	(0.04)	(0.05)
Experience	0.047	0.059	0.047	0.042	0.040	0.036
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Experience squared × 100	−0.092	−0.123	−0.093	−0.081	−0.075	−0.064
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Tenure	0.009	0.012	0.011	0.007	0.006	0.006
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Tenure squared × 100	−0.003	−0.009	−0.007	0.002	0.006	0.006
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Length of interruptions	−0.002	−0.003	−0.002	−0.006	−0.006	0.004
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Length of interruptions × 100	0.046	0.101	0.062	0.065	0.062	−0.141
	(0.09)	(0.15)	(0.10)	(0.09)	(0.09)	(0.10)
Married	0.004	−0.026	−0.009	0.018	0.011	0.012
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Citizenship (reference group: others)						
Austria	−0.038	−0.037	−0.012	−0.003	−0.047	−0.034
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
EU15	0.100	0.109	0.079	0.090	0.099	0.116
	(0.03)	(0.06)	(0.04)	(0.03)	(0.04)	(0.04)
Population density (reference group: high)						
Medium	−0.023	−0.040	−0.031	−0.007	−0.001	−0.003
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Low	−0.035	−0.039	−0.034	−0.022	−0.023	−0.027
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Worker status (reference group: white collar)						
Blue collar worker	−0.074	−0.051	−0.096	−0.092	−0.098	−0.126
	(0.01)	(0.03)	(0.02)	(0.01)	(0.01)	(0.02)
Civil servants	0.008	0.052	0.022	0.010	0.002	−0.018
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)

Table 4 (*Continued*)

	OLS	10 %	25 %	50 %	75 %	90 %
Other public sector employees	−0.069	−0.034	−0.068	−0.069	−0.083	−0.088
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Executive position	0.090	0.090	0.084	0.106	0.104	0.119
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Average age in the firm	0.003	0.003	0.004	0.003	0.003	0.002
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Ratio female to male workers in the firm	−0.165	−0.170	−0.155	−0.140	−0.166	−0.208
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Worker turnover in the firm	−0.000	0.000	−0.000	−0.000	−0.000	−0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Note: Standard errors in parentheses. 6,064 women in private and public sector employment. Full-time employees only. Explanatory variables as in Specification 1 of Table 2. All regressions include also firm size, region, occupation, and industry indicator variables

of the wage distributions in the private sector are typically the outcome of personal bargaining and thus more flexible. If women have less bargaining power than men, demand lower wages, or are discriminated against, we expect such a distribution of the wage gap.

5 Summary and conclusions

We constructed a new data set from administrative sources and decomposed the wages of men and women in Austria. The new data permit a more adequate analysis of the wage differences between women and men. In particular, we use log hourly wages constructed from tax records, employees' characteristics obtained from micro-censuses, and life-time employment histories from social security records. These data allow us to control for differences in formal education, and also in differences in work experiences along with differences in household, workplace, industry, or firm characteristics. In contrast to previous research, we also obtained exact measures of experience and work interruptions. All these characteristics contribute significantly to the explanation of the gender wage gap.

Our descriptive analyzes confirm earlier results, women earn on average less then men, they are on average better formally educated than men, but have on average less workplace experience, probably due to child bearing (Böheim et al. 2007, 2012; Grünberger and Zulehner 2009; Pointner and Stiglbauer 2010). Taking observed differences between women and men into account, we find that about 40 % of the wage gap is due to observable differences in characteristics, i.e., fair discrimination. However, the remaining part of the wage gap between women and men cannot be explained by such characteristics. Part of this difference might be caused by unobserved characteristics, e.g., attitude and commitment, however, it is likely that (some of) this difference is caused by unfair discrimination against women.

Our estimates confirm that firm-specific characteristics are important wage components and, for example, the more women work in a firm, the lower is the gender wage gap. This result is in line with Bayard et al. (2003) who find that segregation of women into establishments and occupations within establishments (among segregation of women into lower-paying occupations and industries) accounts for a sizable part of the gender wage gap.[12] One explanation for our result is that firms that employ more men may also share rents by paying higher wages (Becker 1957), however, no data on market power or longitudinal information on the firms were available for our analysis.

One of the advantages of our data set is the detailed information on work experience. In our analysis we compared how much estimates of the gender wage gap differ when we ignore the type of interruptions. Although the estimates on the gender wage gap become smaller once we include the types of interruptions, the differences however are rather small. For example, our results do hardly change if we account for the exact number of days on maternity leave. This let us conclude that what matters most are good wage information and detailed career information. The types of interruption do not contribute that much.

Nevertheless, we obtained results that might be of interest in current policy debates. For example, we find that times of parental leave affect men's wages more negatively than women's wages. It seems that men still have to strug-

[12] Interestingly, Heinze and Wolf (2010) find that the ratio of male to female workers has no explanatory power for the gender wage gap in German establishments. The wage bargaining institutions in Germany are, however, different than in Austria. In Germany, wage bargaining agreements at the firm level are common. This is not the case in Austria.

Table 5 OLS and Quantile regressions, men

	OLS	10 %	25 %	50 %	75 %	90 %
Constant	1.749	1.101	1.492	1.870	2.242	2.419
	(0.03)	(0.07)	(0.04)	(0.04)	(0.04)	(0.06)
Education (reference group: compulsory school)						
Apprenticeship	0.252	0.383	0.313	0.215	0.154	0.116
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Secondary school	0.304	0.408	0.364	0.285	0.217	0.143
	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)
High school	0.451	0.595	0.517	0.403	0.331	0.297
	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)
Craftsmen diploma	0.303	0.420	0.360	0.286	0.212	0.160
	(0.01)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Technical college	0.462	0.604	0.516	0.463	0.348	0.264
	(0.02)	(0.04)	(0.03)	(0.03)	(0.03)	(0.04)
University (Bachelor, Master, MBA)	0.614	0.701	0.659	0.594	0.545	0.512
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)
University (PhD)	0.672	0.733	0.732	0.637	0.629	0.576
	(0.03)	(0.05)	(0.03)	(0.03)	(0.03)	(0.05)
Experience	0.049	0.058	0.052	0.045	0.038	0.032
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Experience squared $\times$ 100	−0.098	−0.117	−0.106	−0.091	−0.074	−0.060
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Tenure	0.009	0.013	0.007	0.004	0.004	0.005
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Tenure squared $\times$ 100	0.008	−0.004	0.011	0.018	0.017	0.014
	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)
Length of interruptions	0.007	0.029	0.007	−0.007	−0.016	−0.027
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Length of interruptions $\times$ 100	−0.225	−0.778	−0.211	−0.032	0.034	0.070
	(0.09)	(0.15)	(0.10)	(0.10)	(0.10)	(0.13)
Married	0.050	0.038	0.054	0.039	0.041	0.049
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Citizenship (reference group: others)						
Austria	−0.026	−0.014	−0.021	−0.015	−0.009	0.020
	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)
EU15	0.098	0.037	0.091	0.080	0.064	0.163
	(0.03)	(0.05)	(0.03)	(0.03)	(0.03)	(0.04)
Population density (reference group: high)						
Medium	−0.004	−0.002	0.007	−0.001	−0.010	−0.017
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Low	−0.013	−0.020	−0.015	−0.013	−0.018	−0.010
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Worker status (reference group: white collar)						
Blue collar worker	−0.078	−0.070	−0.080	−0.096	−0.106	−0.145
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Civil servants	−0.009	0.001	−0.025	−0.006	−0.001	−0.048
	(0.01)	(0.03)	(0.02)	(0.01)	(0.02)	(0.02)

Table 5 (*Continued*)

	OLS	10 %	25 %	50 %	75 %	90 %
Other public sector employees	−0.110	−0.101	−0.094	−0.090	−0.128	−0.191
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)
Executive position	0.086	0.032	0.054	0.100	0.131	0.144
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)
Average age in the firm	0.004	0.003	0.004	0.005	0.005	0.006
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Ratio female to male workers in the firm	−0.170	−0.145	−0.179	−0.220	−0.199	−0.189
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)
Worker turnover in the firm	−0.000	0.000	−0.000	−0.000	−0.000	−0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Note: Standard errors in parentheses. 11,698 men in private and public sector employment. Full-time employees only. Explanatory variables as in Specification 1 of Table 2. All regressions include also firm size, region, occupation, and industry indicator variables

gle more employer discrimination when going on parental leave. In contrast, time in the military affects both women's and men's wages positively. We suspect that individuals obtain additional skills, e.g., a driver's license, during their time in the military which will result in higher wages.

In order to shed more light on the question whether the gender wage gap varies over the wage distribution, we also analyzed the gender wage gap by the quantiles of the wage distributions. We estimated counterfactual distributions, allowing the decomposition of changes in the wage distribution into changes in the regression coefficients, and changes in the distribution of covariates. Here we find that the wage gap is narrower at the bottom of the distribution than the top, where it is wider. We interpret this widening of the wage gap over the wage distribution as evidence that women fare worse in individual bargaining than men as most low paying jobs are covered by (industry-wide) collective bargaining agreements. In top-paying jobs, individual bargaining is the norm. We can currently only speculate why women fare worse under individual bargaining than men as we lack appropriate data to investigate this question.

However, there are several other hypotheses that are consistent with a wider gap at the top of the wage distribution. The probably most prominent of these hypothesis is that women are unfairly discriminated against. Another explanation is that women, either because of risk-aversion or cultural reasons, bargain for lower wages than men (Riley-Bowles et al. 2005; Croson and Gneezy 2009; Bertrand 2010). Given that the gender wage gap at the top of the wage distribution is wide, it warrants to continue to investigate this question. Discrimination against women could lead to a wider gap at the top of the distribution not only because they receive lower wages than men, but also if it results in limited access to high paying jobs ("glass ceiling"). We find that women are less frequently found in high wage jobs than men and that the share of women in executive positions is about half of men's. This could also be interpreted as evidence for the existence of a glass ceiling.

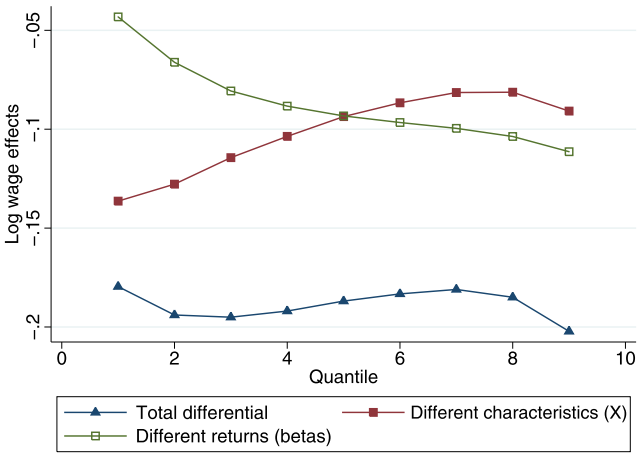

Fig. 2 Quantile decomposition of wages. *Note:* 6,064 women and 11,698 men in private and public sector employment. Full-time employees only

In Austrian, large firms are currently required to disclose the average wages of their workers (Bundeskanzleramt 2010). Because the law was only introduced recently, we cannot perform an analysis of the consequences of this law. We, however, think that it will have two effects. The first effect is a direct effect where the returns to characteristics, in particular, education, will converge. Returns have converged over the last decades (Böheim et al. 2012) and disclosure of such returns will result in more informed wage bargaining. Over time, once educational choices will react to changed (expected) returns to human capital, we believe to observe a convergence of the skill distributions of men and women.

References

Albrecht, J., Van Vuuren, A., Vroman, S.: Counterfactual distributions with sample selection adjustments: econometric theory and an application to the Netherlands. Labour Econ. **16**(4), 383–396 (2009)

Albrecht, J., Bjorklund, A., Vroman, S.: Is there a glass ceiling in Sweden? J. Labor Econ. **21**(1), 145–177 (2003)

Altonji, J.G., Black, R.M.: Race and gender in the labor market. In: Ashenfelter, O., Card, D. (eds.) Handbook of Labor Economics, vol. 3c, pp. 3144–3259 (1999). Chap. 48

Antonczyk, D., Fitzenberger, B., Sommerfeld, K.: Rising wage inequality, the decline of collective bargaining, and the gender wage gap. Labour Econ. **17**(5), 835–847 (2010)

Arulampalam, W., Booth, A.L., Bryan, M.L.: Is there a glass ceiling over Europe? Exploring the gender pay gap across the wage distribution. Ind. Labor Relat. Rev. **60**(2), 163–186 (2007)

Bagues, M.F., Esteve-Volart, B.: Can gender parity break the glass ceiling? Evidence from a repeated randomized experiment. FEDEA Working Paper 2007-15 (2007)

Bayard, K., Hellerstein, J., Neumark, D., Troske, K.: New evidence on sex segregation and sex differences in wages from matched employee-employer data. J Labor Econ. **21**(4) (2003)

Beblo, M.: Beyond the mean gender wage gap: decomposition of differences in wage distributions using quantile regressions. ZEW Discussion Paper, Mannheim **10**(43) (2010)

Becker, G.S.: The Economics of Discrimination. University of Chicago Press, Chicago (1957)

Bertrand, M.: New perspectives on gender. In: Ashenfelter, O., Card, D. (eds.) Handbook of Labor Economics, vol. 4B, pp. 1545–1592. North-Holland, Amsterdam (2010)

Blinder, A.S.: Wage discrimination: reduced form and structural estimates. J. Hum. Resour. **18**(4), 436–455 (1973)

Böheim, R., Hofer, H., Zulehner, C.: Wage differences between Austrian men and women: semper idem? Empirica **34**(3), 213–229 (2007)

Böheim, R., Himpele, K., Mahringer, H., Zulehner, C.: The gender wage gap in Austria: Eppur si muove! Empirica (2012, forthcoming)

Bonjour, D., Gerfin, M.: The unequal distribution of unequal pay—an empirical analysis of the gender wage gap in Switzerland. Empir. Econ. **26**(2), 407–427 (2001)

Bundeskanzleramt: Nationaler Aktionsplan Gleichstellung von Frauen und Männern am Arbeitsmarkt. Bundesministerin für Frauen und Öffentlichen Dienst im Bundeskanzleramt (2010)

Chernozhukov, V., Fernandez-Val, I., Melly, B.: Inference on Counterfactual Distributions. Mimeo (2009)

Cotton, J.: On the composition of wage differentials. Rev. Econ. Stat. **70**(2), 236–243 (1988)

Croson, R., Gneezy, U.: Gender differences in preferences. J. Econ. Lit. **47**(2), 448–474 (2009)

De la Rica, S., Dolado, J.J., Llorens, V.: Ceilings or floors? Gender wage gaps by education in Spain. J. Popul. Econ. **21**(3), 751–776 (2008)

European Commission: Background document on strategy for equality between women and men 2010–2015. Publications Office of the European Union (2011)

Fitzenberger, B., Wunderlich, G.: The changing gender gap across the wage distribution in the U.K. ZEW Discussion Paper, Mannheim **01**(56) (2001)

Fitzenberger, B., Wunderlich, G.: Gender wage differences in West Germany: a cohort analysis. Ger. Econ. Rev. **3**(4), 379–414 (2002)

Fortin, N., Lemieux, T., Firpo, S.: Decomposition methods in economics. In: Ashenfelter, O., Card, D. (eds.) Handbook of Labor Economics, vol. 4, pp. 1–102. Elsevier, Amsterdam (2011)

Garcia, J., Hernandez, P.J., Lopez-Nicolas, A.: How wide is the gap? An investigation of gender wage differences using quantile regressions. Empir. Econ. **26**(1), 149–167 (2001)

Gardezable, J., Ugidos, A.: Gender wage discrimination at quantiles. J. Popul. Econ. **18**(1), 165–179 (2005)

Geisberger, T., Till, M.: Der neue EU-Strukturindikator "gender pay gap" Stat. Nachr. **1**, 64–70 (2009)

Grünberger, K., Zulehner, C.: Geschlechtsspezifische Lohnunterschiede in Österreich. WIFO Monatsber. **82**(2), 139–150 (2009)

Gupta, N.D., Oaxaca, R.L., Smith, N.: Swimming upstream, floating downstream: comparing women's relative wage progress in the United States and Denmark. Ind. Labor Relat. Rev. **59**(2), 243–266 (2006)

Heinze, A., Wolf, E.: The intra-firm gender wage gap: a new view on wage differentials based on linked employer-employee data. J. Popul. Econ. **23**(3), 851–879 (2010)

Koenker, R., Bassett, G.: Regression quantiles. Econometrica **46**(1), 33–50 (1978)

Koenker, R., Hallock, K.: Quantile regression. J. Econ. Perspect. **15**(4), 143–156 (2001)

Machado, J.A.F., Mata, J.: Counterfactual decomposition of changes in wage distributions using quantile regression. J. Appl. Econom. **20**(4), 445–465 (2005)

Melly, B.: Estimation of counterfactual distributions using quantile regression. Mimeo (2006)

Neumark, D.: Employers' discriminatory behavior and the estimation of wage discrimination. J. Hum. Resour. **22**, 279–295 (1988)

Oaxaca, R.L.: Male-female wage differentials in urban labor markets. Int. Econ. Rev. **14**, 693–709 (1973)

Oaxaca, R.L., Ransom, M.R.: On discrimination and decomposition of wage differentials. J. Econom. **61**, 5–21 (1995)

Pointner, W., Stiglbauer, A.: Changes in the Austrian structure of wages, 1996–2002: Evidence from linked employer-employee data. Empirica **37**(2), 105–125 (2010)

Rechnungshof (ed.): Bericht des Rechnungshofes gemäß Art. 1 § 8 Bezügebegrenzungsgesetz, BGBL. I Nr. 64\1997. 2006 und 2007. Der Rechnungshof, Vienna, Austria (2008)

Reimers, C.W.: Labor market discrimination against hispanic and black men. Rev. Econ. Stat. **65**(4), 570–579 (1983)

Riley-Bowles, H., Babcock, L.C., McGinn, K.: Constraints and Triggers: situational mechanics of gender in negotiation. J. Pers. Soc. Psychol. **89**(6), 951–965 (2005)

Statistic Austria: Statistik der Lohnsteuer 2007. Statistik Austria, Vienna (2008)

Statistic Austria: Standard-Dokumentation. Metainformationen. (Definitionen, Erläuterungen, Methoden, Qualität) zum Allgemeinen Einkommensbericht 2008. Bearbeitungsstand: 25.05.2009. Statistik Austria, Vienna (2009)

Statistic Austria: Statistisches Yearbuch, Statistik Austria, Vienna (2010). http://www.statistik.at/web_de/services/stat_jahrbuch/index.html

Weichselbaumer, D., Winter-Ebmer, R.: A meta-analysis of the international gender wage gap. J. Econ. Surv. **19**(3), 479–511 (2005)

Zweimüller, J., Winter-Ebmer, R.: Gender wage differentials in private and public sector jobs. J. Popul. Econ. **7**, 271–285 (1994)

Zweimüller, J., Winter-Ebmer, R., Lalive, R., Kuhn, A., Wuellrich, J.-P., Ruf, O., Büchi, S.: Austrian Social Security Database. Working Paper 0903, NRN: The Austrian Center for Labor Economics and the Analysis of the Welfare State (2009)

René Böheim in an associate professor of economics at the Johannes Kepler University, Linz. His research focuses on labor economics, population economics, and applied microeconomics.

Klemens Himpele studied economics at the University of Cologne and is currently working for the Union for Education and Science, Frank-

furt am Main, after having worked as a researcher in Berlin and with Statistics Austria in Vienna.

Helmut Mahringer is an economist at the Austrian Institute of Economic Research, Vienna, focusing on the evaluation of labour market policy, education policy, and social policy.

Christine Zulehner is professor of economics at the Johannes Kepler University Linz. Her research interests are in industrial organisation, labour economics and applied microeconomics.