The Decline of Wage Bargaining, Rising Wage Dispersion, and the Gender Wage Gap in Germany

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PRELIMINARY – PLEASE DO NOT QUOTE!

Abstract: This paper investigates the recent increase in wage inequality, the decline in wage bargaining, and the changes in the gender wage gap in Germany based on the German Structure of Earnings Survey for 2001 and 2006. Coverage by union wage contracts fell between 2001 and 2006 by 16.3 (8.1) percentage points (pp) for male workers and by 19.9 (12.6) pp for female workers in West (East) Germany. Furthermore, the empirical results show that wage dispersion is rising, driven not only by wage increases at the top of the wage distribution, but also by real wage losses below the median of the wage distribution. The gender wage gap remained unchanged between 2001 and 2006. Regarding union coverage, not only the share of employees under an industry-wide collective contract but also the share of individuals covered by a firm-level contract declined. In 2006, the majority of German employees is not covered by a collective bargaining agreement anymore. Moreover, women seem to benefit from being covered by collective bargaining. We also find that the gender wage gap widened for high-skilled women, while it declined for low-skilled women and for those medium-skilled women at the bottom of the wage distribution.

Keywords: Wage Distribution, Gender Wage Gap, Collective Bargaining, Quantile Regression, Decomposition

JEL-Classification: J31, J51, J52, C21

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Contents

1 Introduction

Wage inequality has been rising in Germany during recent years (Fitzenberger, 1999; Dustmann et al., 2007; Kohn, 2006; Gernandt and Pfeiffer, 2006) both at the bottom and the top of the wage distribution. Compared to the strong increases in wage inequality in the US and the UK since the early 1980s, the increase in wage inequality in Germany was restricted to the top of the wage distribution in the 1980s and wage inequality at the bottom of the wage distribution only started to grow in the mid 1990s. It is likely that until the mid 1990s growing wage inequality at the bottom of the wage distribution was prevented by labor market institutions such as unions and implicit minimum wages implied by the welfare state (Fitzenberger, 1999; Dustmann et al., 2007).

This paper investigates as to whether and to what extent the recent increase in wage inequality between 2001 and 2006 can be related to the decline in wage bargaining. In fact, coverage by union wage contracts as reported in the German Structure of Earnings Survey (see section 3 for a description of the data set) fell between 2001 and 2006 by 16.3 (8.1) percentage points (pp) for male workers and by 19.9 (12.6) pp for female workers in West (East) Germany. Since collective bargaining is associated with wage compression (Fitzenberger et al., 2007), this strong and unprecedented decline of the wage bargaining institutions in Germany is likely to have contributed to the increase in wage inequality.

The gender wage gap in Germany has been falling over time (Fitzenberger and Kunze, 2005; Black and Spitz-Oener, 2007) but women still earn less than men. At the same time, female employment rates have been increasing, albeit women work on average lower hours. Even though unions have been demanding greater gender equality in the labor market, there is hardly any empirical evidence regarding the relationship between union wage bargaining and the gender wage gap (one notable exception being Felgueroso et al., 2008). Since unions reduce wage dispersion and women typically earn less then men, one may expect that wage bargaining reduces the gender wage gap and therefore the reduction in coverage may result in an increase in the gender wage gap. However, since union membership of male workers is higher than of female workers (Fitzenberger et al., 2006), one may expect that unions represent more strongly the interests of males compared to females. Therefore, it is empirically an open question how the decline in wage bargaining institutions affects the gender wage gap.

This is the first study to use the latest available cross-section of the German Structure of Earnings Survey for 2006 and to compare it to the cross–section for 2001. As major labor market reforms took place during this time period in Germany, it is of highest interest to see how the wage structure changed between these two periods. For earlier

periods Dustmann et al. (2007), Kohn (2006), and Gernandt and Pfeiffer (2006) find evidence that wage dispersion increased in Germany. At the same time Antonczyk (2007) and Black and Spitz-Oener (2007) analyze the development of the gender wage gap in West Germany until 2004, resp. 2001, and find that after some decades of an increase in relative female wages, the gender wage gap stagnated in recent years. In order to separate composition effects from changes over time, we employ the decomposition techniques proposed by Machado and Mata (2005) and Melly (2006) to decompose the gender wage gaps within each bargaining regime.

Traditionally in Germany, most employment conditions – among them most prominently wages – are negotiated in collective bargaining between unions and employers' associations. Bargaining can take place at the industry level ("Flächentarifvertrag" or sectoral collective contract) or at the firm or plant level ("Firmentarifvertrag" or "Betriebsvereinbarung"). As it is by law forbidden to discriminate against non-union-members, all employees and not only union members benefit from the collective agreements. For this reason coverage rates are much higher than membership rates. In addition, even those agreements which are not reached by general collective bargaining often adapt parts of the general agreement, thereby increasing the scope of collective bargaining even further.

Our results show that wage dispersion is rising, driven not only by wage increases at the top, but also by real wage losses below the median. The gender wage gap remained unchanged between 2001 and 2006 in both, West and East Germany. Regarding union coverage, we find that not only the share of employees under a industry-wide collective contracts but also the share of individuals covered by a firm-level contract declined. As a result, in 2006 the majority of German employees is not covered by a collective bargaining agreement, anymore. Moreover, women seem to benefit from being covered by collective bargaining, as for those women the gender wage gap is smallest compared to the gender wage gap for women not covered at all. We also find that the gender wage gap widened for high-skilled women, while it declined for low-skilled women and for those medium-skilled women at the bottom of the wage distribution.

This paper proceeds as follows: The next section describes our decomposition technique based on quantile regression. In section 3 the data are briefly described before presenting the descriptive results in section 4. Finally, section 5 provides some concluding remarks.

2 Methodology

To analyze the effect of unionization on the *entire wage distribution*, the empirical investigation will focus on using a set of quantile regression estimates. This allows describing wage compression due to collective bargaining and its impact on the difference in the wage distribution by gender.

Specify the function of log hourly wages w conditional on the set of covariates X at the τth quantile as

$$(1) \quad q_w(\tau|X) = X'\beta(\tau) \, .$$

We estimate such quantile regressions separately for each year, for each wage bargaining regime, and for male and female workers.

Quantile regression as introduced by Koenker and Bassett (1978) allows estimation of the coefficients $\beta\,(\tau)$ at the considered quantile τ. Thus, quantile regressions take the entire distribution into account, whereas least squares regressions focus on the wage level (average wage) only. We analyze differences across the conditional wage distribution by means of quantile regressions.

Analogously to the OLS regressions, sampling weights are employed and inference has to account for clustering. Standard errors of the quantile regression coefficients therefore need to be adjusted appropriately.[1] We account for the sampling weights when bootstrapping by resampling in a pairwise bootstrap (design–matrix bootstrap) the weights in addition to the vector of the dependent variable and the covariates. We plan to estimate clustered standard errors by applying a block bootstrap procedure where we resample all observations within an establishment to account for correlation within establishments.

2.1 Decomposition of unconditional quantile functions

We decompose the gender wage gap, defined as the difference of log wages between male and female employees, over the entire wage distribution. Compared to the decomposition technique proposed by Oaxaca (1973) and Blinder (1973) this has the advantage, that the entire distribution is taken into account and not only the mean of log wages.

Ignoring the difference between industry-level and firm-level bargaining for the time being, it is straightforward to decompose the difference of the unconditional sample quantile functions between male and female employees (denoted by $\hat{q}_{male}(\tau)$ and $\hat{q}_{female}(\tau)$) as

[1] Fitzenberger et al. (2007) show how to estimate the covariance matrix $\widehat{VAR}(\hat{\beta}(\tau))$ to account for weights and cluster effects.

follows:

$$\hat{q}_{male}(\tau) - \hat{q}_{female}(\tau) = \left[\hat{q}_{male}(\tau) - \hat{q}_{\beta_f, x_m}(\tau)\right] + \left[\hat{q}_{\beta_f, x_m}(\tau) - \hat{q}_{female}(\tau)\right] \quad (2)$$

$$= [\beta_m(\tau) - \beta_f(\tau)]x_m + \beta_f(\tau)(x_m - x_f) \quad (3)$$

where $\hat{q}_{\beta_f, x_m}(\tau)$ is the estimated counterfactual quantile function, i.e. the quantile function of wages that would be generated for female workers had they male characteristics (x_m: male characteristics) but were still paid according to female coefficients (β_f: female coefficients, i.e. female conditional wage distributions for given characteristics). Analogously, at the same time the counterfactual term $\hat{q}_{\beta_f, x_m}(\tau)$ represents the hypothetical wage distribution of male workers (x_m) were they paid like female employees (β_f). We decide to use this counterfactual as we argue that this is the more policy relevant one (as compared to using the counterfactual with female characteristics and male coefficients). The characteristics of the female population may be influenced over time (e.g. through additional education), while the coefficients, which reflect prices, are more difficult to be influenced in a market economy.

The first term on the right hand side of equation (3) denotes the coefficient effect. The second term captures the effect of the workers' characteristics. This method is an extension of the decomposition of average effects introduced by Blinder (1973) and Oaxaca (1973). For quantile treatment effects the method usually employed is derived by Machado and Mata (2005). In our analysis, we use the alternative approach proposed by Melly (2006) for greater ease in computation. We are planning to bootstrap the Melly estimates.

The quantile functions (1) are estimated separately for male and female workers and for each year. Since the coefficients $\beta^z(\tau)$ differ by the z subsamples with individual coverage, industry-level bargaining, and firm-level bargaining (except for the coefficient of the constant), computations of counterfactual quantile functions and hence quantile treatment effects have to take account of this heterogeneity.[2] We estimate unconditional quantile functions for covered (separately for coverage at the industry and at the firm level) and uncovered employees using their sample counterparts, which leaves the counterfactual distribution to be estimated. Following Melly (2006), we estimate the counterfactual quantile function as

$$\hat{q}_{\beta_f, x_m}(\tau) = \inf\left(q : \frac{1}{N_{male}} \sum_{j:male} \hat{F}_{female}(q|X_j) \geq \tau\right), \quad (4)$$

where N_{male} is the number of male employees in the sample $\{j : male\}$ and $\hat{F}_{female}(q|X_j)$

[2]Variation of the coefficient on the constant is already captured by $\beta^m(\tau)$ and $\beta^f(\tau)$.

is the conditional distribution function of wages in the sample of females evaluated at the characteristics X_j of the male worker j. We obtain an estimate for the counterfactual conditional distribution function $F_s(q|X_j)$ by

$$\hat{F}_{female}(q|X_j) = \sum_{m=1}^{M} (\tau_m - \tau_{m-1}) \mathbb{1}(X_j' \hat{\beta}_{female}(\tau_m) \leq q). \tag{5}$$

where $\mathbb{1}$ is an indicator function and $\hat{\beta}_{female}(\tau_m)$ is the sequence of $m = 1, ..., M$ piece-wise constant quantile regression coefficient estimates. Instead of a computationally intensive iterative procedure, we simply arrange the predicted values for all quantiles and all individuals and seek the corresponding value at the τth sample quantile. As a further simplification, we follow the applications in the literature (Machado and Mata, 2005; Melly, 2006) and estimate 49 evenly spaced quantile regressions starting at the 2%–quantile.[3] We use this technique to decompose the gender wage gap for each of the bargaining regimes and the results are described in detail in section 4.

3 Data

For our analysis we use the German Structure of Earnings Survey (GSES; "Gehalt- und Lohnstrukturerhebung") from 2001 and 2006 which is a large mandatory repeated cross sectional linked employer–employee data set. This study is the first to use the cross-section from 2006. Thanks to the linkage of employer-specific with employee data and to its large size, this data allows for detailed analysis of the wage structure. Moreover, even though the sampling design asks firms to provide data only on a fraction of their workforce, many firms in 2006 prefer to supply data on all employees, thereby increasing the data quality. The data is based on a random sample of all German firms with at least ten employees in all sectors of the economy but focusing on the private sector. Sampling weights are provided to be able to make the sample representative for all employees in the covered industries.

Thus, the advantages of using the GSES data are its size and reliability. Moreover, it provides precise information on whether the employee is covered by a bargaining regime, and if so, under which type (general or firm-specific collective bargaining agreement). It is also of great advantage that in contrast to the IAB linked employer-employee data set (LIAB), wages are neither truncated nor censored so that the entire wage distribution can

[3]Instead of treating τ as a uniformly distributed random variable on $[0, 1]$, τ is treated as uniformly distributed on the 49 even percentiles. This way, we avoid estimation for all M possible cases, where M can be very large in applications like ours.

be considered (Kohn and Lembcke, 2007). Finally, contrary to the LIAB, information is provided on the individual and not on the firm–level. Due to these advantages this data set has also been used by Stephan and Gerlach (2005); Gerlach and Stephan (2005b,a) and Fitzenberger and Reize (2002) to analyze the German wage structure and more specifically by Heinbach and Spindler (2007) and Fitzenberger et al. (2007) who focus on the union wage premium.

As we focus in this study on the prime aged work force, we drop employees who are currently in the dual training system or do an internship as well as all employees younger than 25 or older than 55 years of age.[4] In addition, we limit the sample to full-time workers, i.e. those who get paid at least 30 hours including overtime in October 2001 or 2006. Finally, we are forced to drop the educational and health sector in 2006, as they were not included in the 2001 cross–section. This leaves us with 585,000 employees in some 22,000 firms in 2001 and 1,000,000 employees in 28,600 establishments in 2006. We consider four groups in our analysis: full-time working males and females in West and East Germany.

Our wage is defined as October earnings including overtime pay, but excluding bonuses for Sunday or shift work, divided by hours worked in October including overtime hours. For plausibility, we limit the hourly wage to values between 4 and 70 Euro per hour (both correspond to less than 1% of the wage distribution).[5] We deflate the 2006 wages to the price level in 2001 by using the CPI of the federal statistical office in order to consider only real wages. As outcome variable we use the logarithmized gross real hourly wage.

4 Empirical results

4.1 Wages

Wages are highest for male employees in West Germany, followed by females in the same region, while the East German wage level is still considerably lower – even 16 years after reunification. From 2001 to 2006 there have been some notable changes (cf. table 1): At the median and below, for all four groups real hourly wages stayed the same or dropped, whereas wages increased for the quantiles above the median. Wages thus rose for the upper half of the wage distribution, while they declined for the lower half, leading to an overall increase in wage dispersion. Considering the interquartile range of log-wages as a measure for wage dispersion, males in West Germany experienced an increase in

[4]Note that the participation rate is high among this group, we thus arguably avoid at least some of the problems stemming from self–selection effects.

[5]Cases with 4 Euro are very rare after excluding apprentices.

Table 1: Real log wage distribution

	2001				2006			
	Male		Female		Male		Female	
	West	East	West	East	West	East	West	East
10	2.44	2.07	2.19	1.82	2.35	2.00	2.12	1.81
25	2.61	2.22	2.40	2.05	2.56	2.19	2.36	2.02
50	2.82	2.44	2.62	2.36	2.82	2.43	2.61	2.35
75	3.08	2.73	2.86	2.63	3.11	2.74	2.88	2.66
90	3.35	3.02	3.09	2.87	3.38	3.07	3.13	2.91

Table 2: Real log wage differences: 2006-2001

	Male		Female	
	West	East	West	East
10	-0.09	-0.07	-0.07	-0.01
25	-0.05	-0.03	-0.04	-0.03
50	0.00	-0.01	-0.01	-0.01
75	0.03	0.01	0.02	0.03
90	0.03	0.05	0.04	0.04

wage dispersion of 8 percentage points (pp), while wage dispersion rose for males in East Germany by 4 pp. Female employees experienced an increase in wage dispersion of 6 pp in both, West and East Germany. Considering the 90-10 difference in log-wages as a measure for wage dispersion, the increase between the two considered periods gets even larger (12pp for males in both West and East Germany, 11 and 5 pp for women in West and East Germany, respectively). As can also be seen from table 2, the increases in wage dispersion are driven mainly by real wage losses in the lower part of the wage distribution and to a lesser extent by wage increases in the upper part.

4.2 Gender Wage Gap

Considering the (unconditional) gender wage gap, it remained almost constant over time at about 25% at the upper and lower end of the distribution for West Germany and 20% at the median (cf. table 3). We thus observe an overall U–shape pattern. The gender wage gap is overall notably lower in East Germany, albeit it also reaches 25% at the lower end in 2001 (measured as the difference at the lowest decile), but only amounts to 8% at the median and to about 15% at the top of the wage distribution in that region. However, in 2006 the gender wage gap at the 10th percentile in East Germany decreased from 25% to 19% while remaining constant at 17% at the lower quartile and the rest of the distribution. Otherwise, only minor changes can be detected.

Table 3: Distribution of real log Gender Wage Gap

	Male-Female			
	2001		2006	
	West	East	West	East
10	0.25	0.25	0.23	0.19
25	0.21	0.17	0.20	0.17
50	0.20	0.08	0.21	0.08
75	0.22	0.10	0.23	0.08
90	0.26	0.15	0.25	0.16

4.2.1 Gender Wage Gap by education

The gender wage gap is lowest for employees with low education, with 17% at the median, and 20% at the lower quartile and 18% at the upper quartile. For medium skilled employees we observe a gender wage gap of roughly 18% at these quantiles, for high-skilled it is 25% for the two lower quartiles and 22% for the 75%-quantile. As the gender wage gap is falling over the wage distribution within the group of the high-skilled we do not observe the phenomenon of a glass-ceiling. Over time, the gender wage gap fell most strongly for low-skilled women, whereas the trend for medium-skilled women is less clear. In contrast, the high-skilled women lose over the observed time period at all observed quantiles relative to their male counterparts.

4.3 Coverage

In line with well-known international trends (Card et al., 2003), collective bargaining coverage fell in Germany between 2001 and 2006. Distinguishing between industry-wide and firm- or plant-specific collective bargaining the decreases have been larger in the former compared to the latter regime (in absolute as well as in relative terms).[6] While industry-wide collective bargaining covered about 55% of the workforce in 2001, this share plummeted to 39% for males and 35% for females in 2006. At the same time, coverage rates under a firm agreement decreased roughly from 7 to 6 percent. In East Germany, coverage by industry-wide collective bargaining was at a lower level already in 2001 (35% for males and 41% for females) and dropped by 8 and 11 percentage points, respectively (down to 27% for males and 30% for females), accompanied again by a smaller drop in firm-specific coverage. As a result, in 2006 clearly more than half of the workforce is not covered by collective agreements, anymore. However, nothing can be said about the dynamics of the different bargaining regimes, as the data from 2001 and 2006 cannot be joined to form a panel. It is possible that firm-specific bargaining constitutes an

[6] In the following empirical analysis the firm bargaining regime is defined to comprise plant-specific contracts as there are only very few of the latter.

Table 4: Individual coverage rates

	2001				2006			
	Male		Female		Male		Female	
	West	East	West	East	West	East	West	East
No Coll. Barg.	38.0	56.8	38.7	48.7	54.3	64.9	58.6	61.3
Industry–wide Barg.	54.6	35.2	54.3	41.1	39.3	27.4	35.9	29.7
Firm-level Barg.	7.3	8.0	7.0	10.2	6.4	7.7	5.6	9.0

2006-2001	Male		Female	
	West	East	West	East
No Coll. Barg.	16.3	8.1	19.9	12.6
Industry–wide Barg.	-15.3	-7.8	-18.4	-11.4
Firm–level Barg.	-0.9	-0.3	-1.4	-1.2

intermediate step for some employers, as it allows more flexibility than an industry-wide agreement, but still less than individual contracts. This could imply that in the quest for more flexibility some employers switch from collective to firm-specific bargaining while others switch from firm-specific to no collective bargaining. However, as can be inferred from the numbers this can only be true for a minor part of the employees.

4.4 Wages in the different bargaining regimes

Combining coverage with hourly wages, there are some notable disparities in the different bargaining regimes which also vary for the different demographic groups (cf. table 5). Generally, wage dispersion is highest among employees who are not covered by a collective agreement, while between both types of collective bargaining regimes wage dispersion is roughly similar.

For *West-German males*, highest wages are paid in the upper part of the wage distribution without collective bargaining coverage. However, for the lower three quarters of the wage distribution wages are higher in the firm- or plant-specific bargaining or industry-wide collective bargaining regime. In particular, in the former of these bargaining regimes, employees experience large real wage gains (more than 10 percent at or above the median). At the same time, notable wage losses are detected at the lowest decile for employees under an industry–wide collective agreement, while the remainder of their wage distribution experienced only small changes. Incidentally, the entire real wage distribution of male employees in West Germany who are not covered by collective bargaining has shifted downwards by about 3 to 6%.

In contrast, the real wage distribution for *West German females* without collective bargaining has only shifted downwards by 1 to 2 percent at the top and the bottom of the wage distribution, while remaining constant in between. Similar to the males' distribution for employees under industry-wide collective bargaining, real wage losses are experienced

Table 5: Wages in the different bargaining regimes

	2001				2006				2006-2001			
	No Collective Bargaining											
	Male		**Female**		**Male**		**Female**		**Male**		**Female**	
	West	**East**	**West**	**East**	**West**	**East**	**West**	**East**	**West**	**East**	**West**	**East**
10	2.34	2.01	2.10	1.76	2.29	1.97	2.09	1.76	-0.05	-0.04	-0.01	0.00
25	2.54	2.16	2.29	1.91	2.50	2.13	2.29	1.94	-0.04	-0.03	0.00	0.03
50	2.80	2.32	2.54	2.15	2.77	2.33	2.54	2.18	-0.03	0.01	0.00	0.03
75	3.20	2.60	2.85	2.44	3.14	2.64	2.85	2.50	-0.06	0.04	0.00	0.06
90	3.51	3.01	3.18	2.75	3.47	3.07	3.16	2.84	-0.04	0.06	-0.02	0.09
	Sectoral Bargaining											
	Male		**Female**		**Male**		**Female**		**Male**		**Female**	
	West	**East**	**West**	**East**	**West**	**East**	**West**	**East**	**West**	**East**	**West**	**East**
10	2.50	2.20	2.28	1.99	2.43	2.04	2.23	1.92	-0.07	-0.16	-0.05	-0.07
25	2.65	2.38	2.45	2.27	2.63	2.33	2.46	2.29	-0.02	-0.05	0.01	0.02
50	2.83	2.58	2.65	2.49	2.85	2.59	2.68	2.56	0.02	0.01	0.03	0.07
75	3.03	2.82	2.87	2.72	3.06	2.84	2.90	2.78	0.03	0.02	0.03	0.06
90	3.23	3.04	3.04	2.92	3.26	3.06	3.08	2.97	0.03	0.02	0.04	0.05
	Firm Bargaining											
	Male		**Female**		**Male**		**Female**		**Male**		**Female**	
	West	**East**	**West**	**East**	**West**	**East**	**West**	**East**	**West**	**East**	**West**	**East**
10	2.51	2.20	2.30	2.09	2.50	2.27	2.11	2.09	-0.01	0.07	-0.19	0.00
25	2.65	2.36	2.49	2.34	2.70	2.46	2.37	2.34	0.05	0.10	-0.12	0.00
50	2.85	2.58	2.65	2.59	2.99	2.63	2.70	2.61	0.14	0.05	0.05	0.02
75	3.09	2.78	2.87	2.73	3.23	2.85	2.99	2.79	0.14	0.07	0.12	0.06
90	3.32	3.00	3.10	2.91	3.44	3.09	3.23	2.95	0.12	0.09	0.13	0.04

by female employees at the bottom of the wage distribution with small increases in the rest of the wage distribution. Strikingly, there have been large losses at the lower end of the wage distribution for women under firm-specific contracts in West Germany (-19% at the first decile and -12% at the lower quartile), which are however accompanied by wage increases on the order of 12% at the upper end and still of 5% at the median. However, as firm-specific bargaining only applies to about 6% of West German females in 2006, the contribution of this development to the overall increase in wage dispersion is small. In addition, for females in West Germany the wage distribution without a collective agreement is always dominated (first order stochastic dominance) by at least one of the two collective regimes.

As for *East German male employees*, an increase in wage dispersion is found for the two largest bargaining groups, namely individual bargaining (which applies to 65% of employees in 2006) and collective agreements (27% coverage in 2006). In the former regime wage changes from 2001 to 2006 vary between -4% at the lower decile to +6% at the upper decile. For employees covered by industry-wide collective agreements, the lowest decile of real wages plummeted by 16% with only minor improvements at the

median and above. The picture is less clear for East German employees covered by a firm- or plant-specific wage contract where real wage increases vary between 1% and 9%.

Turning to *female employees in East Germany*, this group faces the lowest wages in comparison to the other three groups, with the wage distribution under firm-specific bargaining being the most advantageous. For the development over time of this group of employees, the picture is mixed. The wage distribution of East German female employees under individual bargaining experienced the higher increases, the higher is the position in the wage distribution (0 at the lowest decile up to 9% at the highest decile). However, for both types of collective agreements, the pattern is less clear, ranging between -7% at the lowest decile and +7% at the median of the wage distribution under industry–wide bargaining and 0% change at the lower end to 6% at the upper quartile under firm-specific bargaining.

Overall it can be said that large differences persist within and between the different bargaining regimes as well as between different groups of employees (female/ male, East/ West). The main feature which all of these groups share is the move towards more flexible wage arrangements which contributes to the increase in wage dispersion in most groups of employees.

4.5 Gender Wage Gap in the different bargaining regimes

We have seen that the unconditional gender wage gap remained almost constant between 2001 and 2006. However, this is partly due to a composition effect with respect to the different bargaining regimes. Therefore we will now consider the gender wage gap in the different regimes in West Germany.[7] In 2001 the gender wage gap was highest for employees who were not paid under an industry-wide or a firm-specific agreement (cf. table 6). The gender wage gap decreased between 2001 and 2006 in the two larger bargaining regimes, individual contract and sectoral agreement but increased dramatically in the lower half of the wage distribution of employees under firm-specific agreement. Due to those particular changes, in 2006 the largest gender wage gap can be observed in the part below the 70% quantile in the firm contracts and in the upper part of the distribution for the individual contracts. Note that all these are purely descriptive results and we do not claim causality, as we do not control for selection into bargaining regimes.[8] Next we look in more detail at the gender wage gap distribution for individuals in different bargaining regimes and its decomposition into a part explained by characteristics and a

[7]Due to limited computing capacity, the results for East Germany are still being estimated.

[8]Nor do we control for occupational choice. The selection into bargaining regimes is a difficult issue, we leave this point open for further research.

part explained by coefficients (usually called "unexplained part"; cf. figures 1-6 in the appendix). First of all, it is striking that a large part of the gender wage gap is explained by characteristics implying that women earn lower wages due to lower education, lower tenure, etc..

For individuals not covered by a collective agreement the gender wage gap is increasing over the wage distribution, supporting the well-known glass ceiling hypothesis (e.g. de la Rica et al., 2005). However, from 2001 to 2006 there is some decrease in the gender wage gap. Recalling the large dynamics of firms and individuals moving from industry-wide to individual coverage could imply that this decrease of the gender wage gap could be partly due to firms which move between the regimes, but continue to stick to non-discrimination as implied (formerly) by industry-wide bargaining agreements. The better relative positions of women are explained by an improvement in characteristics over the entire wage distribution, at the top of the wage distribution an improvement in coefficients also plays a role. Put differently, at the bottom the coefficient effect was as strong in 2006 as it had been in 2001, whereas it declined at the top.

For individuals covered by industry-wide agreements the gender wage gap is not increasing over the wage distribution, but instead rather flat. There is even a very subtle increase of the gender wage gap at the lower end of the wage distribution which is more pronounced in 2001 than in 2006. However, the part of the wage gap which is explained by female characteristics is still increasing over the distribution. The part of the gender wage gap explained by characteristics is lower in 2006 than in 2001. The flipside of this finding is that the part of the gender wage gap explained by coefficients lies strictly above the curve in 2006 compared to 2001. Taking these two observations together, this might indicate that women caught up during the two observed periods in terms of human capital, occupational choice, etc. or quite to the contrary that differences in the coefficients, i.e. price differences or "discrimination", developed unfavorably for women. Note that during this period, a strong movement of firms and individuals out of industry–wide bargaining took place. This is not to claim causality, but there are obviously strong composition effects at play changing the composition of the groups of covered and uncovered employees and firms.

Looking closer at the composition of the employees who work under a *firm-specific contract* we observe that considerable changes took place between 2001 and 2006 regarding the relative importance of different occupations. The telecommunication sector has lost importance for males, while it stayed at the same relative share for females. One out of four women who work under a firm-specific contract does so in the telecommunication sector, while only 9% of male employees work in this sector. The relative importance of the

Table 6: Gender wage gaps distribution in different bargaining regimes in West Germany

	2001			2006			2006-2001		
	No Coll. Barg.	**Sectoral Barg.**	**Firm Barg.**	**No Coll. Barg.**	**Sectoral Barg.**	**Firm Barg.**	**No Coll. Barg.**	**Sectoral Barg.**	**Firm Barg.**
10	0.24	0.22	0.21	0.20	0.20	0.39	-0.04	-0.02	0.18
25	0.25	0.20	0.16	0.21	0.17	0.33	-0.04	-0.03	0.17
50	0.26	0.18	0.20	0.23	0.17	0.29	-0.03	-0.01	0.09
75	0.35	0.16	0.22	0.29	0.16	0.24	-0.06	0.00	0.02
90	0.33	0.19	0.22	0.31	0.18	0.21	-0.02	-0.01	-0.01

car manufacturing sector rose strongly for males, by 13% to 35% in 2006, while for women this sector is less important with 12% in 2006. Other sectors in which unequal shifts for male and female employees took place include the food industry, the metal producing industry as well as the energy and water supply sector, the retail sector and finally other services. This might help to explain why there have been unequal developments between the male and female wage structure for those covered by firm-specific contracts. We will investigate further these changes in order to better understand what drives the dramatic changes in the wage structure of those employees covered by firm-specific contracts. We also observe in the data that fewer male employees in West Germany are covered by a specific firm contract in 2006 compared to 2001. The size of the firm does not seem to have affected this phenomenon. To the contrary, the shares for women in firm specific contracts have especially diminished for women working in rather large establishments. Empirically it is often observed that larger establishments pay higher (and less dispersed?) wages. If this is the case, the non-uniform drop of firm contracts over the distribution of firm size may be another explanation for the movements that we observe in the wage distribution for individuals covered by these agreements.

5 Conclusions

This paper investigates as to whether and to what extent the recent increase in wage inequality between 2001 and 2006 can be related to the decline in wage bargaining. In particular, we focus on changes in the gender wage gap. This is the first study to use the latest available cross-section of the German Structure of Earnings Survey for 2006 and to compare it to the cross-section for 2001. Coverage by union wage contracts as reported in the German Structure of Earnings Survey fell between 2001 and 2006 by 16.3 (8.1) percentage points (pp) for male workers and by 19.9 (12.6) pp for female workers in West (East) Germany. In order to separate composition effects from changes over time, we employ the decomposition techniques proposed by Machado and Mata (2005) and Melly (2006) to decompose the gender wage gaps within each bargaining regime.

Confirming the expectation we find that wage dispersion is rising, driven not only by wage increases at the top of the wage distribution, but also by real wage losses below the median of the wage distribution. The gender wage gap remained unchanged between 2001 and 2006 in both, West and East Germany. Regarding union coverage, we find that not only the share of employees under an industry-wide collective contract but also the share of individuals covered by a firm-level contract declined. As a result, in 2006 the majority of German employees is not covered by a collective bargaining agreement, anymore. Moreover, women seem to benefit from being covered by collective bargaining, as for those women the gender wage gap is smallest compared to the gender wage gap for women not covered at all. We also find that the gender wage gap widened for high-skilled women, while it declined for low-skilled women and for those medium-skilled women at the bottom of the wage distribution.

Finally, the issues raised here obviously lead to further questions which are highly interesting for future research. Most of all: Is there a causal relationship between collective bargaining coverage and the gender wage gap?

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Figure 1: Gender Wage Gap, West Germany, No collective contracts, 2001

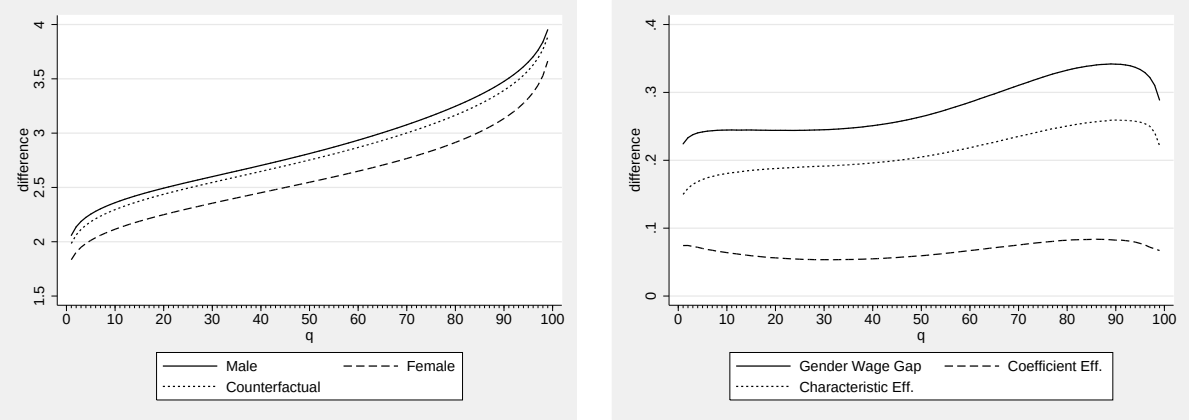

Figure 2: Gender Wage Gap, West Germany, No collective contracts, 2006

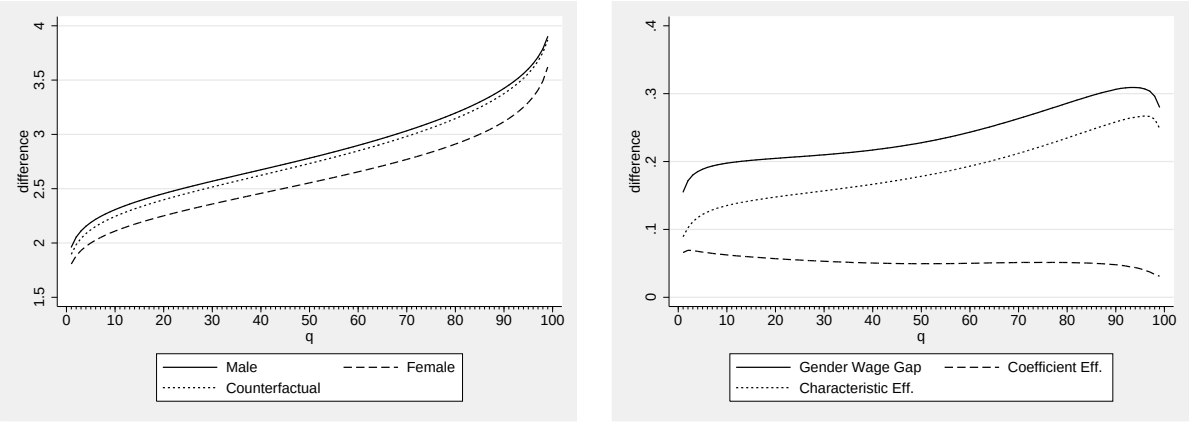

Figure 3: Development of the Gender Wage Gap, West Germany, No collective contracts, 2006-2001

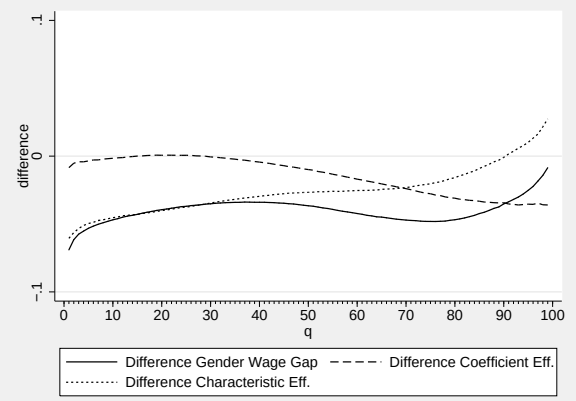

Figure 4: Gender Wage Gap, West Germany, Sectoral Agreements, 2001

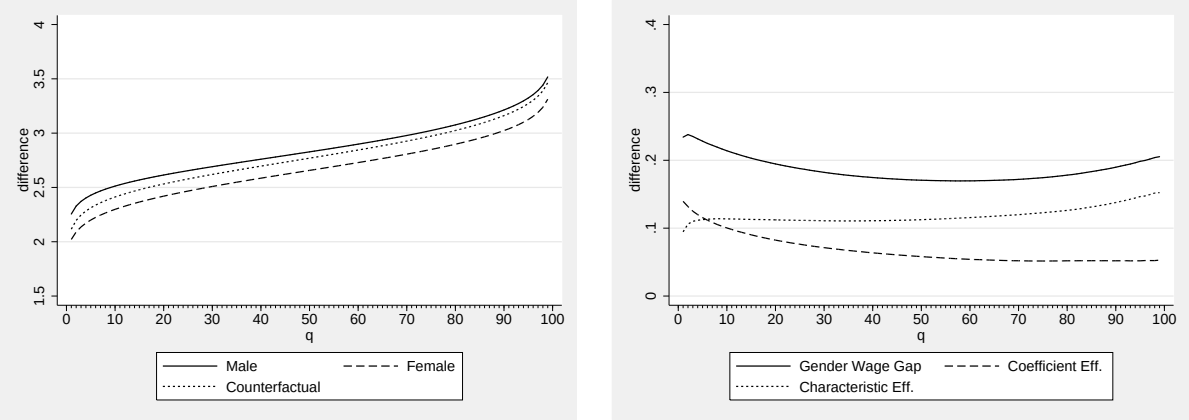

Figure 5: Gender Wage Gap, West Germany, Sectoral Agreements, 2006

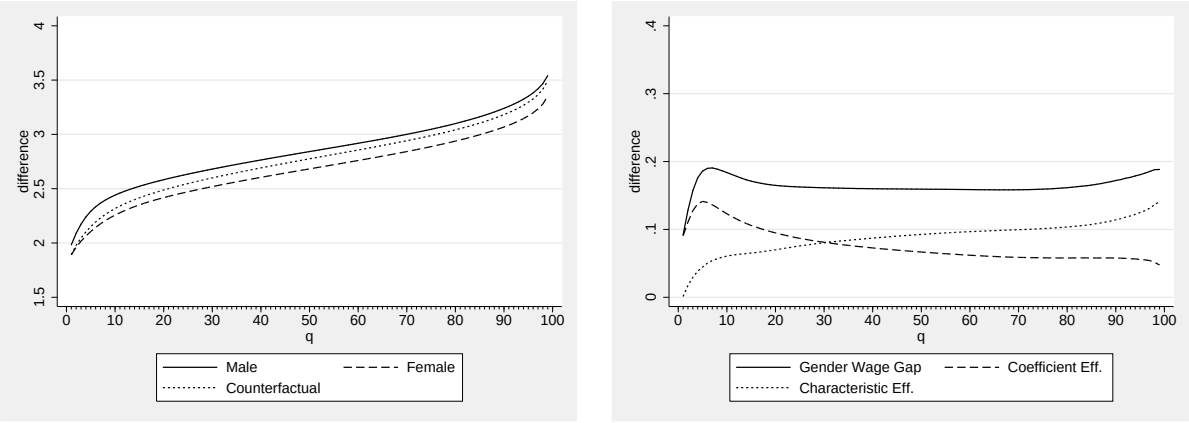

Figure 6: Development of the Gender Wage Gap, West Germany, Sectoral Agreements, 2006-2001

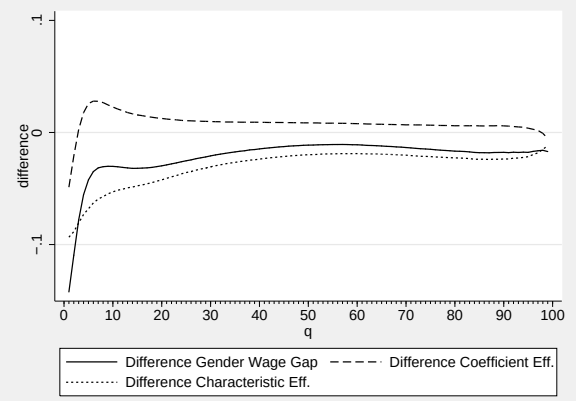

Figure 7: Gender Wage Gap, West Germany, Firm Agreements, 2001

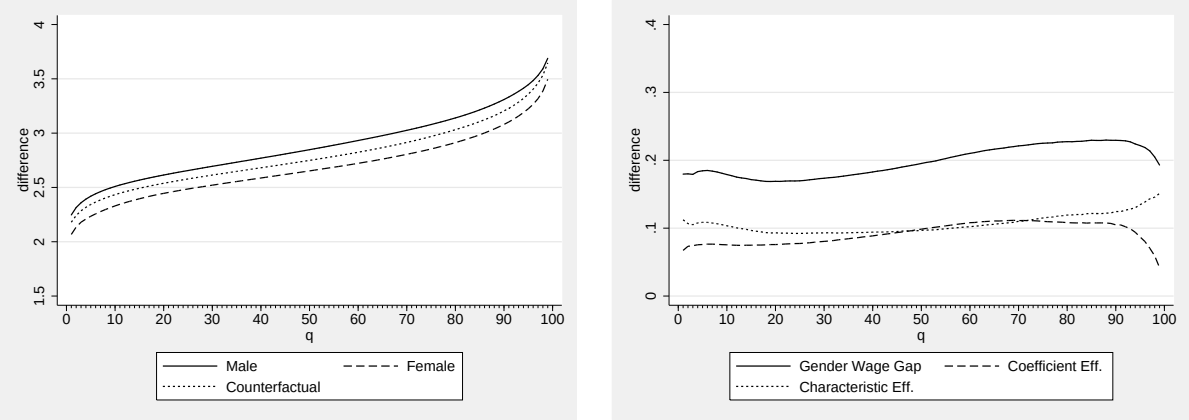

Figure 8: Gender Wage Gap, West Germany, Firm Agreements, 2006

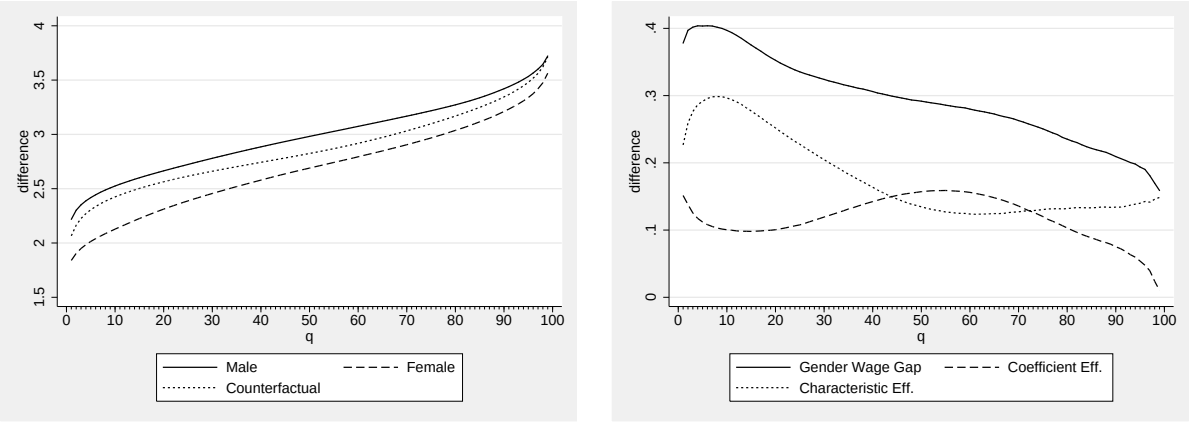

Figure 9: Development of the Gender Wage Gap, West Germany, Firm Agreements, 2006-2001