Vocational Training and Gender: Wages and Occupational Mobility among young Workers*

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Abstract: This paper investigates the relationship between the gender wage gap, the choice of training occupation, and occupational mobility. We use longitudinal data for young workers with apprenticeship training in West Germany. Workers make occupational career choices early during their careers and women and men pursue very different occupational careers. We reconsider whether through occupational segregation women are locked in low wage careers (Kunze, 2005) or whether they can move up to higher wage paths through mobility. We furthermore investigate whether patterns have changed across cohorts during the period 1975 and 2001 and whether effects vary across the distribution. The main results are: First, while there exists a persistent gender wage gap over experience, the gap has decreased over time. Second, in the lower part of the wage distribution, the gap is highest and it increases with experience. Third, occupational mobility is lower for women than for men and the wage gains due to occupational mobility are higher for men than for women, especially in the lower part of the wage distribution. We conclude that occupational mobility has helped to reduce the gender wage gap, but lock–in effects are still stronger for women compared to men.

Keywords: gender wage gap, actual experience, occupational mobility, apprenticeship

JEL: C21, J16, J24, J31, J62, J7

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1 Introduction

The German apprenticeship training schemes have often been viewed as a role model of vocational training. A typical feature of these schemes is that workers accumulate a stock of general as well as specific human capital during a 2-3 year period at an early age. Afterwards, no formal training takes place. This kind of system, leading to the smooth integration of the young into the labour market, has often been viewed as a panacea to youth unemployment and low education. An unexplored factor is whether it locks people in particular occupations.

It is a general finding from the empirical literature that a considerable part of the gender wage gap is related to the segregation of men and women in different occupations. This observation, namely that men and women enter very different fields of work, is important for the understanding of the gender wage gap in all European countries (Dolado et al., 2003). It has also been shown for German workers qualified through apprenticeship training that early segregation has persistent effects on the gender wage gap across experience levels (Kunze, 2005). This can be interpreted as a lock-in effect for women in low wage occupations. The question arises whether mobility, given segregation in training occupations, is an important factor which reduces gender differences. Since occupational mobility is likely to be a form of career progression (Fitzenberger and Spitz, 2004), social attitudes regarding gender roles could be an important reason for stronger lock-in effects experienced by women compared to men. Based on international survey data, Fortin (2005) emphasises the importance of social attitudes for differences in labor market outcomes of females.

This paper investigates the relationship between the gender wage gap, the choice of occupation, and occupational mobility. Our empirical analysis uses a West-German sample of young workers with apprenticeship training covering the period 1975-2001. In the following, we refer to those workers with apprenticeship as skilled, excluding unskilled and those with technical college or university degrees. Typically, an apprenticeship is started after 9 or 10 years of schooling. While in training, apprentices have an apprenticeship employment contract. Training takes 2.5-3.5 years depending on the training scheme (occupation). Firms have to follow national training curricula and apprentices attend vocational schools during one to two days a week. The apprenticeship is completed with a certificate after successful completion of a regionally unified oral, written, and practical exam. Exams are taken at the chamber of the industry of the firm, as well as internally (for more details see Münch, 1992). Apprentices receive a relatively low wage which amounts to 20-30 percent of the wage of a skilled worker.

The advantage of analyzing this group of skilled workers is that the systematic occupational segregation through apprenticeship training allows us to disentangle mobility effects during the early career from segregation. Other systems of work based training, where mobility reflects partly accumulation of human capital until full qualification as a skilled worker, make it more difficult to study these effects separately. Regarding the gender wage gap, it has been shown that it may alsol lead to high gender segregation and large gender wage gaps that exist from entry into the first job and remain high throughout the early career (Kunze, 2005). Hence, it looks as if women are locked into occupational careers. These results stem from averages across apprentices during the 1975-1990 period. In this study, we extend this analysis by investigating whether we find the same effects for different training cohorts during the longer period 1978-2001. Instead of focusing on averages, we also take the entire distribution of wages into account. Fitzenberger and Wunderlich (2002) found that the gender wage gap for the group of skilled workers decreased between 1975 and 1995 and the reduction in the gap was strongest in the lower part of the wage distribution. Finally, we extend the study of the gender wage gap and occupational segregation, by taking occupational mobility into account.

The main results are: First, while there exists a persistent gender wage gap over experience, the gap has decreased over time. Second, in the lower part of the wage distribution, the gap is highest and it increases with experience. Third, occupational mobility is lower for women than for men and the wage gains due to occupational mobility are higher for men than for women, especially in the lower part of the wage distribution. We conclude that occupational mobility has helped to reduce the gender wage gap, but lock–in effects are still stronger for women compared to men.

The remainder of the paper is organised as follows: In section 2, we review the economic background. In section 3, we describe the data and summary statistics. In section 4, the results are presented. Section 5 concludes. The appendix discusses methodological aspects of the estimation approach and comprises tables with information on the data and estimation results.

2 Economic Background

In this section, we discuss important arguments on (a) the gender wage gap and the choice of occupation/occupational segregation (b) gender wage gap and occupational mobility. Based on these considerations, we state three hypotheses which guide our empirical analysis.

Economic explanations of the relation between gender wage gap and occupational segregation can be derived from self-selection models (Polachek, 1981) based on human capital theory, where atrophy rates of human capital are occupation specific. The crucial assumption is that women have better options outside of the labour market, and hence, higher reservation wages. This results in women having more interruptions in their labour market careers. Women are also less willing to bear the costs of specific investment into their human capital. From these arguments, it follows that experience profiles in wages should be steeper for males compared to females, but the starting wages of females should be higher right after finishing apprenticeship. The shortcoming of self-selection models is that they are not consistent with empirical findings showing that men earn more from entry into their first employment (Light and Ureta, 1995; Loprest, 1992; Kunze, 2005) and that the uncertainty about the turnover risk from the employers' perspective is the same for both genders with women exhibiting a higher risk of leaving the labor force and males a higher risk of job shopping for better jobs (Light and Ureta, 1992).

A positive gap between male and female starting wages can be rationalized assuming that women are less attached to the labor market and show higher turnover rates. Therefore, men are selected into occupations and jobs with higher specific training and higher wage growth even accounting for job or occupation changes. The job rationing model by Kuhn (1993) argues that firms tailor jobs for specific groups and that labor force attachment of women is public information.

Statistical discrimination arises because women have difficulties in signalling that they do not quit employment and behave like men. Barron et al. (1993) argue that firms pay higher entry wages to male workers to prevent job shopping. Both models imply occupational segregation, a positive gender wage gap at entry, and a widening gap with tenure.

Empirical studies have shown that occupational segregation is related to the gender wage gap (see e.g. Dolado, 2001, 2003, and Miller, 1987). Other studies have shown that differences in schooling content are related to the gender wage gap (see e.g. Brown and Corocoran, 1997, and Paglin and Rufolo, 1990). In recent studies based on data for apprentices in Germany during the time period 1975 to 1990, Kunze (2003, 2005) finds that occupational segregation explains a large and persistent part of the gender wage gap during the early career. Gender wage differences are large from the beginning and virtually constant conditional on occupational segregation. While results are in contrast to predictions from self-selection models, they are consistent with models considering employer induced sorting mechanisms and firm specific training (Kuhn, 1993; Barron et al., 1993). This leads to the question whether women are locked into low wage careers through apprenticeship training schemes.

It has been shown that mobility is a driving factor of wage growth among young male workers in the U.S.. Topel and Ward (1992) find that young male workers experience approximately one third of early career wage growth through moving jobs. In a recent study for Finland, Kangasniemi (2004) finds that occupational mobility is much lower for female workers compared to male workers and that occupational mobility is mostly associated with promotions. Having a different focus, the study does not explicitely estimate the relationship between occupational mobility and the gender wage gap. Related to the results by Kunze (2005), the question arises to what extent mobility counteracts the lock–in effect or, put differently, whether the gender gap in occupational mobility is crucial for the persistence of the gender wage gap. This is what we investigate in the following empirical analysis.

Fitzenberger and Spitz (2004) explicitly analyse the decision to change the occupation of work in a two period model.[1] The model assumes that a change

[1]Occupational mobility in Germany is also analysed by Euwals and Winkelmann (2002),

in occupation between period 1 and 2 takes only place if the random wage increase in the new occupation in the second period outweighs the loss in specific human capital accumulated in the training occupation. Workers differ by their unobserved, innate ability which both affect the return to training and the return to occupational change. Some implications of the model are analysed empirically for male workers in Germany. By comparing movers (workers who have changed their occupation) with stayers (workers who have not changed their occupation) both for the training occupation and the occupation of work, Fitzenberger and Spitz (2004) find that occupational mobility results in a wage increase. Hence, we hypothesise when occupational mobility is mostly associated with moving to better paid occupations and jobs as part of career progression, then lower occupational mobility among females causes a lock-in effect resulting in a persistent gender wage gap. If females exhibited male mobility patterns, the gender wage gap would be reduced.

Our empirical analysis investigates the issues discussed above by, first, analysing to what extent gender segregation in occupation explains the gender wage gap. This is similar to Kunze (2005) but is undertaken using a longer data set, covering also the 1990s. In extension, we also consider differences across training cohorts and the wage distribution. Second, we extend previous research by taking occupational mobility into account and by investigating potential lock–in effects in the training occupation or in a low wage career.

3 Data and Summary Statistics

We extract a sample of skilled workers from the newly released IAB employment subsample (IABS)[2] for the period 1975 to 2001. The IABS is a 1 percent random sample drawn from the event history data file of the social security insurance scheme, the employment statistics, collected by the German Federal Bureau of Labour. It contains all dependent employees in the private sector, i.e. about 80 percent of total employment in Germany. Not included are: civil servants, self-employed, unpaid family workers and people who are not eligible for benefits from

Fahr (2004), and Werwatz (2002). These studies do not look at gender differences.

[2]IABS in abbreviation for the **I**nstitut für **A**rbeitsmarkt und **B**erufsforschung **S**ample.

the social security system.[3] The IABS contains approximately 200 000 individuals in every cross-section.

The large longitudinal sample and the long observation window allow us to measure education and employment histories for each worker from the same point in the career that is from age 15. Hence, we observe complete education and work histories up to the current employment spell. Particularly, we observe skill accumulation while in apprenticeship giving us information about the training occupation, duration of training and other initial conditions. Furthermore, we can measure wage and work histories from entry into first employment onwards. Work histories are precisely measured by use of information on whether the employee is working or not, as reported in the data.[4]

The main variables for our analysis are the wage variable, work experience, the training occupation (apprenticeship) as well as the occupation of work. The wage variable we use in the empirical analysis is the wage in an employment spell after training and is defined as the logarithm of daily gross wages deflated by a standard CPI index for Germany. The reference year is 1995. We focus on full-time workers and, hence, exclude observations with hours of work lower than 35. Although hours of work generally are an important explanatory factor of gender wage gap, focusing on full time workers eliminates differences in average hours, as Kunze (2005) has found for a similar sample of young skilled workers from the

[3] For more details based on an earlier release of the data set, see Bender et al. (2000).

[4] We identify skilled workers through our constructed variable measuring the duration of training with a firm, as well as the qualification status reported in the IABS after training. The original sample includes all workers who have only one consecutive period of training longer than 450 days. Hence, those who take more than one apprenticeship are excluded and therefore we do not need to deal with selection into further training. We also exclude workers who have earned a degree after or before training, such as in technical college or university. Workers must be employed as a skilled worker at least once after training. Furthermore, to capture the main group of skilled workers who have gone through typical training, we drop workers who are reported with training duration longer than 6 years, and who have started their career after training relatively late, that is later than age 25. The average age at entry is approximately 20.5, see Kunze (2005). Finally, we restrict the sample to those who do not delay entrance into first employment by more than 2 years. 2 years is the maximum gap that would appear if national service applies. In Germany, national service is only compulsory for men and its length varies throughout the period between 12 and 18 months.

GSOEP 1984-1997. Hence, we do not need to control for hours of work. Work experience is precisely estimated from the rich information in the event history data set.[5] Work experience is calculated by accumulating days of full time work for each individual. We transform it into years of work experience. Since we follow workers through vocational training and work, we can observe the training occupation that we measure in the last spell of training, and the occupation of work afterwards. The latter may change across time for an individual reflecting career changes or promotion. Both occupational variables are measured by the same 2-digit codes.[6] We measure (occupational) mobility by the first transition out of the occupation corresponding to the 2-digit training occupation.

< Table 1 about here >

In order to compare results across training cohorts, we construct an indicator variable defined as the year of completing apprenticeship training.[7] We construct three cohorts capturing the developments around the apprenticeship system from the late 1980s to the mid 1990s. We select the following three: 1978-1980, 1984-86, and 1990-93. Pooling some of them ensures a sufficiently large sample size to undertake detailed analysis within occupation groups. The final apprenticeship cohort we use stops training in 1993. This ensures that we follow almost all of them for at least 5 years of their work history after training.

In table 2 we list the number of observations in our final analysis sample split by sex and years of work experience (integer values). We cut off records after 10 years of work experience for the two earlier cohorts and after 5 years for the latest cohort. This is to ensure sufficient numbers of observations to do

[5]Individual records in the IABS are organised in spells with the calendar date of start and end which are not longer than one year. A spell is reported for every change related to the employment and non-employment status. From the calendar dates and information on employment status, we generate the variable actual experience.

[6]The orginal occupation variable *occorg* (variable 'BERUF') with 130 different outcomes in the IABS is translated into a two-digit, *occ2d* (with 66 different outcomes), occupation variable, see table 1. The original variable *occorg* is a consolidated version of 3–digit occupation codes due to data protection reasons. Because of this limited information, we had to consolidate a number of categories when constructing our 2–digit variable which is coarser than the usual 2–digit classification.

[7]Technically, it is the last year when the worker is reported to be in training.

a statistical analysis within occupation groups. Furthermore, this is sufficient to observe mobility following apprenticeship training during the early career.

< Table 2 about here >

In tables 3 and 4, we list summary statistics measured at the first job for our final sample. The main route is to enter apprenticeship after 9 to 10 years of schooling. Noteworthy, the level of schooling prior to apprenticeship training increased slightly across cohorts and, within the cohort completing training in 1990-1993, 9 percent of men and 5 percent of women have the *Abitur* degree, that takes usually 13 years. The duration of training increased over time from 2.51 years for the cohort in the late 1970s to 2.7 years for the cohort in the mid 1990s. Accordingly, the age at entry into the first job increased as well. This development may capture an increase in quality of training and increase in pre-apprenticeship education. As a final summary statistic, we present the fraction of those who stay in the same occupation after apprenticeship. This we measure by comparison of the training occupation and the occupation of work in the first job. For both we use the original occupation code *occorg* as reported in the data source. Both for men and women the probability to stay was extremely high, 76-77 percent. While across cohorts this probability stayed almost constant for women, it decreased for men by 10 percentage points (ppoints). In the following, we denote the probability to move as mobility and we investigate differences between men and women.

< Tables 3 and 4 about here >

The Gender Wage Gap

To describe the gender wage gap, we present means conditioning on experience. Since our sample of apprentices can be followed from the beginning of their working careers we can observe the entry wage and follow them over time without gap unless they stop working in a job subject to social security taxation, become self-employed or a civil servant. Experience-wage profiles are presented by sex and cohort group in Figure 1. Consistent with human capital theory, both for men and women, we find concavely shaped profiles that first increase more steeply and then increase at a decreasing rate. In line with previous findings, the figure shows already at entry a large gender wage gap which persists throughout the early career. This becomes even more clear from plotting the wage gap at the different levels of work experience.

Figure 1: Wage profiles, by sex and apprenticeship graduation cohort

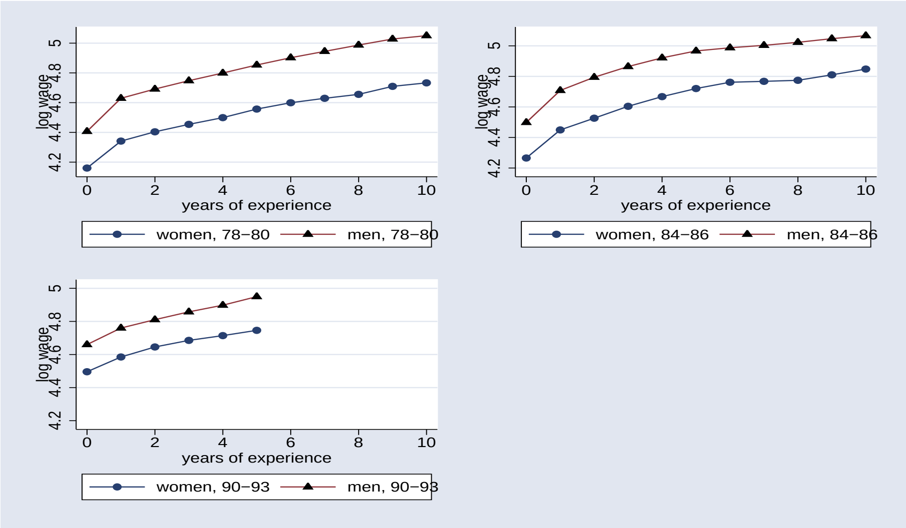
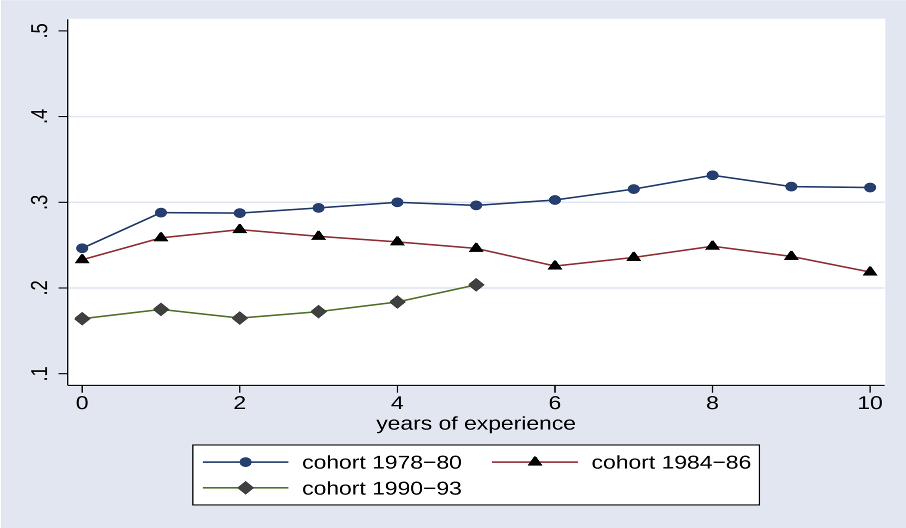


Figure 2 shows the mean gender wage gap for each cohort group separately which reveals interesting developments. First, the gender wage gap declined considerably over time from approximately 25 percent at entry wages to approximately 17 percent. Most of the drop occurs between the mid 1980s cohort group and the mid 1990s cohort group. It is difficult to say what the reason is. From our descriptives, it is not obvious that the improvement in the quality of training can explain this. In the following, we investigate further whether changes in occupational segregation and mobility can explain these patterns.[8] Both for the cohort in the late 1970s and the mid 1990s, the gender wage gap increases by around 5 ppoints within 5 years of work, and for the earlier cohort by 10 ppoints within 10 years of experience. In contrast, the cohort entering the labour market between 1986-88 experienced a slight decline in the gender wage gap comparing the gap at zero and 10 years of experience.

[8]Other hypotheses could be that huge demand shocks around unification have had an impact, or that social attitudes have changed as pointed out by Fortin (2005) in this issue. We will not explore these two hypotheses further in the following.

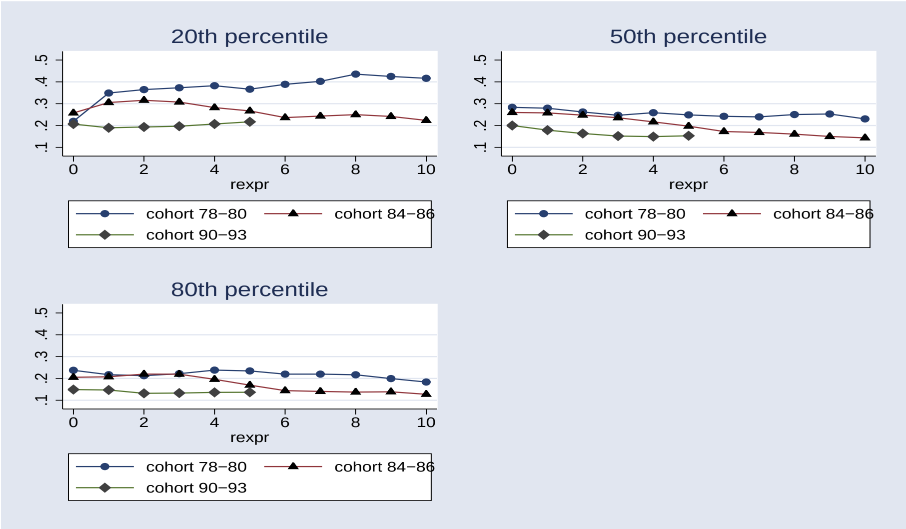
Figure 2: Mean wage gap, by apprenticeship graduation cohort



Second, looking in more detail at the gender wage gap across the entire distribution it appears that most action has taken place at the lower part of the distribution. This is shown in figure 3, where we present wage gaps at the 20th percentile, the median and the 80th percentile of the wage distribution. Most striking is that the gender wage gap is highest in the lower part and lowest in the upper part of the distribution. This holds for all cohorts. Hence, among skilled workers we do not observe that women get promoted only up to a certain level which is why then the gap widens at the upper end of the distribution.[9] For the cohort in the late 1970s, the gap at the 20th percentile shows the largest increase from 20 percent at zero years of experience to 40 percent at 10 years. For the same cohort, the wage gap remained constant in experience looking at the median and 80th percentile. For the other cohorts, we find all throughout the distribution constant or slightly decreasing gender wage gaps in experience. Hence, the descriptive evidence suggests that, if lock-in effects are at work, they tend to work more strongly at the bottom of the distribution. Women at the lower end of the wage distribution may be less mobile or they may gain less from mobility compared to males.

[9]To test for glass ceiling effects, noteworthy, we would have to include women with a university degree in our sample (Albrecht, et al., 2003)

Figure 3: Wage gap at 20th, 50th and 80th percentile, by cohort



4 Empirical Results

The descriptive analysis has shown two main stylized facts on the gender wage gap among skilled workers: First, we have found that the gender gap in entry wages has fallen across cohorts from the mid 1970s to the mid 1990s. Second, the gap is largest at the lower end of the wage distribution. The following econometric analysis investigates the role of occupational segregation and occupational mobility in explaining these facts. We also analyse the gender differences in employment interruptions.

4.1 Occupational segregation and gender wage gap

Skilled men and women are trained and work in quite different occupations. In addition, despite the fact that training schemes are offered in more than 300 occupations, more than 50 percent of both men and women are found in only four most popular training occupations. These are for men mechanical assemblers, technical occupations in electronics, occupations related to construction and woodworking, and sales occupations. For women, the most popular are sales occupations, business, finance and administrative occupations, occupations in the health sector and other service occupations. With the exception of sales assistance in popular occupations among men, fractions of women are very low and vice versa. Considering all occupations, we will as well see that mobility is low and hence occupational segregation is a persistent feature of the skilled labour market. Occupational segregation did not change across the three cohorts considered here.

As it is well known in the literature, the higher the femaleness of an occupation (we define this as the difference between the share among females and among males choosing a specific occupation) the lower the wage in the occupation. Therefore, occupational segregation plays an important role in explaining the gender wage gap. In our sample, the relationship between femaleness and wage level in an occupation has not changed across the three cohorts in a way that this could explain the observed changes in the gender wage gap.

The femaleness of an occupation could also be directly related to the gender wage gap in an occupation. Table 5 provides estimates for the relationship between the femaleness of an occupation and the estimated gender wage gap both for the mean (OLS) and at three conditional quantiles (Quantile regressions for 20%-, 50%-, and 80%-quantile). The table only reports the coefficient on the interaction term between a dummy variable for males and the femaleness of an occupation. At the mean, the gender wage gap is significantly lower in occupations with a higher share of females. This effect is even stronger in the lower part of the distribution and disappears in the upper part of the distribution. After five years of work experience, the gender wage gap in the upper part of the wage distribution has become significantly higher in female dominated occupations. Thus, relative to the overall gender wage gap, women in the lower part of the distribution benefit from being in a female dominated occupation while women in the upper part benefit from being in a male dominated occupation. Again, there is no apparent change in these effects across the three cohorts which could explain the change in the gender wage gap.

< Table 5 about here >

4.2 Employment interruptions

Parts of the literature reviewed in section 2 emphasize the importance of employment interruptions for explaining gender differences. Also, when studying the effect of experience and mobility on the gender wage gap, one might be concerned about potential selection effects. For instance, if females with low wages tended to leave the labor market to a larger extent than males this might cause a spurious reduction of the gender wage gap.

Table 6 provides regression evidence on gender differences in the accumulated non–employment time during the first eight years after the start of the first job following after apprenticeship. The most striking result is that, in our sample of skilled workers, females experience less time in non–employment than males. Without controlling for the training occupation (specification 1), males spent between one fifth of a year (cohort 90-93) and half a year (cohort 78-80) more time in non–employment than females.[10] Similar to the results by Light and Ureta (1992), young female workers after apprenticeship do not exhibit a higher risk of quitting the labor market. Including dummies for training occupations (specification 2) slightly reduces the gender difference. There is little evidence that the gender difference is associated with certain occupations allowing for more career interruptions. The estimated wage effects (specification 3) are quite interesting. The average entry wage in the training occupation as well as the individual position in the first job exert a significant negative effect on time spent in non–employment. The higher the entry wage the less likely it is that outside opportunities dominate work. This is consistent with self selection models as discussed in section 2. The small magnitude of the gender difference also suggests that selection into non-employment is not likely to cause a bias in our results on the gender wage gap by experience and on occupational mobility.

< Table 6 about here >

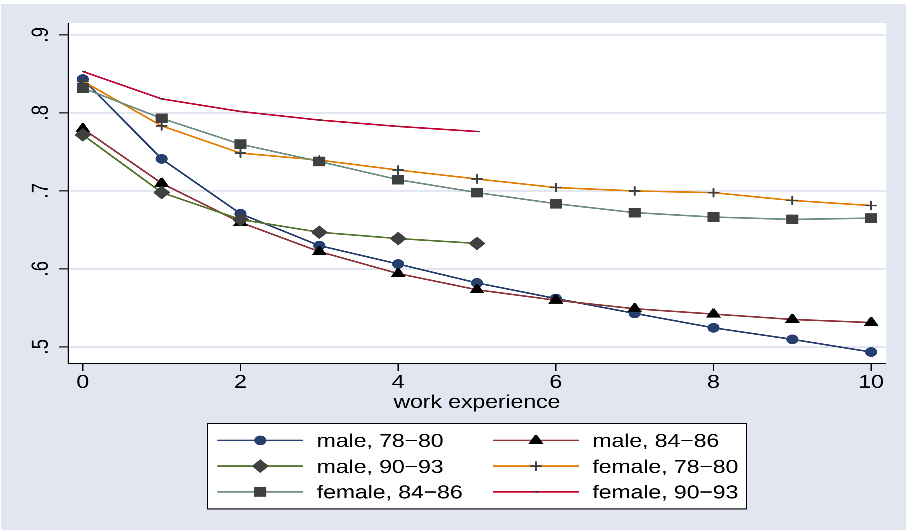
[10]Note that this effect can not be the result of the mandatory military service for males since the first job after apprenticeship typically starts after the service. The effect can also not be related to a gender difference in tertiary education after vocational training, a widespread phenomenon in Germany, since our data set excludes those workers.

4.3 Occupational mobility and gender wage gap

4.3.1 Patterns of occupational mobility

First, we describe to what extent workers are still working in the same occupation they have been trained in. Figure 4 shows the fraction of stayers following workers over the early career. We include all training occupations and measure them at the 2-digit level. Overall mobility seems quite low, and it is lower for women than for men. Both for men and women stability has particularly increased for training cohorts in the 1990s, this is conditional on experience. At entry in all cohorts more than 80 percent of women work in the training occupation and approximately 72 percent of men. For the cohorts in the late 1970s and mid 1980s, after 5 years of work this fraction of stayers has declined to 60 percent of women and 50 percent of men. A further decline to 50 for women and 40 percent for men occurs after 10 years. For the 1990-93 cohort the decline is less pronounced.

Figure 4: Training to work transition – Fraction of stayers in the training occupation measured at the 2 digit level



Following the discussion in section 2, occupational mobility is likely to be a key aspect of career progression since workers change occupation as a transition to a better paying job either with or without a change of the employer. Table 7 provides further evidence on gender differences in occupational mobility at the

2–digit level during the first ten years of work experience. We define dummy variables $DEXP_k$ for (integer) work experience at the beginning of employment spells lying in the intervals $k = 0$, $1-3$, $4-5/4-6$, and $7-9$ years.[11] We report the coefficients on these experience variables interacted with a dummy for male workers and, for specification 3, also for the gender dummy variables interacted with the average entry wage in the training occupation and with the difference between the individual entry wage and the average entry wage in the training occupation.[12]

< Table 7 about here >

The results in table 7 show that the gender gap in occupational mobility increases strongly with experience for the first cohort (specification 1). For the later cohorts, the gender gap is higher at low experience levels but the increase with experience is very small. Comparing males and females in the same training occupations (specification 2), the gender gap in mobility is reduced and the reduction is stronger for the later cohorts. Thus, there is some evidence that women are locked in training occupations with lower occupational mobility and this effect seems to have become more important for the later cohorts. However, one has to be careful not to relate this effect to the level of entry wages by training occupations. We find (specification 3), that the higher the average entry wage level the lower the mobility (except for male workers among the last cohort) and the individual wage position at entry is positively related to mobility. Though mostly significant, the wage variables have no impact on the estimated gender gap in experience since the latter remains at the same level as in specification 1. Apparently, occupational mobility does not overcome the strong segregation in

[11]Here and in the following, we use integer years of experience, i.e. the largest integer which is less than or equal to actual experience in years at the beginning of the employment spell and we restrict the analysis to the first ten years of work experience. $k = 0$ represents those wage observations, for which $0 \leq$ actual experience < 1. Analogously, $k = 7-9$ represents $7 \leq$ actual experience < 10.

[12]Here and in the following, the interaction terms between gender and all other covariates are normalized such that the experience specific gender gap is the estimated average gender difference holding all other covariates constant, see section on methodological aspects in the appendix.

training occupations. For the later cohorts, the gender gap in mobility is mostly related to the training occupations but this is not necessarily related to the entry wages. Given the persistence of segregation in training occupations, this finding by itself does not provide an explanation for the decline in the gender wage gap across cohorts. However, we can conclude that, within training occupations, female and male mobility patterns have converged for the later cohorts.

4.3.2 Gender wage gap and occupational mobility

Now, we investigate to what extent the gender wage gap is associated with the choice of training occupation and gender differences in occupational mobility. Table 8 provides estimates of the gender wage gap by experience intervals ($DEXP_k$ for $k = 0$, $1-3$, $4-5/4-6$, and $7-9$ years) controlling for a number of characteristics at entry. For each training cohort, one set of results also controls for the 2–digit training occupation and gender specific dummy variables for occupational mobility. We add both a dummy variable (pre move) for the fact that an individual later experiences an occupational change during the first ten years of work experience and a dummy variable (move effect) which is one after an occupational change occured. The difference between the move and pre move coefficient provides a conditional difference–in–differences (DID) estimate of the wage effect of mobility. We allow for dynamic effects of these dummy variables by interacting them with dummy variables for the experience level ($DEXPM_k$ for $k = 0$, $1-3$, $4-5/4-6$, and $7-9$ years) when occupational mobility occurred. We obtain both OLS and quantile regression results for the three quantiles 20%, 50%, and 80%.

< Table 8 about here >

For the training cohorts 78-80 and 84-86, the gender wage gap increases strongly between the first and the second year of experience for the mean and the lower part of the distribution. With increasing experience, these gap measures remain fairly constant for the first cohort and decline strongly for the second cohort. In comparison, the gender wage gap is fairly constant at the median and at the 80%-quantile for the first cohort and it decreases with experience for the later cohorts. For the 90-93 cohort, the gender wage gap declines at the mean and at all quantiles with experience. Without controlling for occupational variables the gender wage gap is generally higher in the lower part of the distribution and it becomes smaller for later cohorts. Controlling for occupational variables, the gender wage gap decreases strongly, except for the upper part of the wage distribution. We find almost no reduction for the two earlier cohorts at the 80%–quantile. However, it is not possible to relate the quantile regression results to the previous estimates in the sense of attributing the changes in the gender wage gap to these additional controls.[13] For this purpose, we reestimate the gender wage gap using the simulation approach of Machado and Mata (2005).

Hence, we focus here on the interpretation of the estimated gender gap in the mobility variables. The results show that the wage gains of males from occupational mobility are generally higher than for females, e.g. for the first cohort mobility in the first year results in a 4.1 ppoints (difference $-0.012+0.053$) higher average wage gain for males than for females. This gender gap increases to 11.1 ppoints during years 7 to 9. The gender gap differs strongly across the distribution. Whereas males experience much higher wage gains than females in the lower part of the distribution, the gender gap is close to zero (and even negative for low experience) in the upper part of the wage distribution. This pattern also applies for the second cohort, but generally the gender gap is smaller than for the first cohort. For the last cohort, the gender gap has reversed for low experience with wage gains being higher for females compared to males and gains which are not significantly different from zero for higher experience. Thus, the wage gains associated with mobility changed considerably across the three cohorts and these changes must have contributed to the reduction in the gender wage gap by experience, especially in the lower part of the distribution.

[13]The problem is that with the change in the set of covariates, it is not possible to relate the quantiles of the different conditional distributions ("Quantiles can not be easily aggregated"). Also, the specification reported in table 8 imposes the same coefficients for both genders except for the experience and mobility variables.

4.3.3 Gender wage gap if women exhibited male training occupations and male mobility patterns

To investigate the extent to which the gender wage gap by experience can be attributed to the gender differences in the choice of training occupations and in the mobility pattern, we estimate quantile regressions for wages based solely on the female sample, i.e. no coefficient is restricted to be the same for both genders, and use the estimates to simulate the wage sample based on male characteristics. For this purpose, we apply a modification of the Machado and Mata (2005) technique, as described in the methodological part of the appendix.

Table 9 provides regression result on the gender wage gap by experience based on the union of the male sample and the simulated, counterfactual sample for females. For all cohorts, the gender wage gap is considerably reduced compared to the first set of results in table 8, except for the lower part of the distribution for the 78-80 cohort. The reduction in the gender wage gap is higher in the upper part of the distribution which corresponds to the findings above on gender differences in wage gains across the distribution and it tends to increase with experience (especially in the upper part of the distribution). The reduction in the gender wage gap increases across cohorts and this effect is also stronger in the upper part of the distribution compared to the lower part of the distribution.

For women in the first cohort who earn low wages, copying male choices of training occupation and male mobility patterns would not have overcome their low wage career. The gender wage gap did persist because women with low wages did not have the same returns on the training occupation and to occupational mobility compared to males in the lower part of the wage distribution. Over time, women would gain more. They would gain more in the upper part of the wage distribution if they became more similar to male workers regarding their choice of training occupation and mobility patterns. Put together, changes in mobility patterns and changes in the wage gains associated with mobility have contributed to the reduction in the gender wage gap. Yet, in the most recent cohort, women could gain even more by copying male training occupations and mobility patterns.

< Table 9 about here >

5 Summary and Conclusions

This paper investigates the relationship between the gender wage gap, the choice of training occupations and occupational mobility. We use longitudinal data on a sample of young workers with apprenticeship training (denoted as skilled workers) in West Germany. Our analysis is also of interest to any country which has implemented or considers implementing a formalized work based training system with the goal to smooth the transition from school to work. Such a system has strong effects on gender differences in labor market careers. Workers make occupational career choices early during their careers and women and men pursue very different occupational careers. We reconsider whether through occupational segregation women are locked in low wage careers (Kunze, 2005) or whether they can raise up to higher wage paths through mobility. Furthermore, our analysis investigates whether patterns have changed across cohorts during the period 1978 and 2001 and whether effects vary across the wage distribution. We consider the labor market experience of three training cohorts defined by the timing of the first job after completion of the apprenticeship. These are the cohorts 1978-80, 1984-84, and 1990-93. We distinguish between the training occupation and the occupation of work reported for the current job based on a 2-digit classification for occupations.

Similar to previous findings, we find a persistent gender wage gap over the first ten years of work experience which is higher in the lower part of the wage distribution. We also find strong differences across the wage distribution. The gender wage gap decreases over time, especially in the lower part of the wage distribution. Occupational segregation by gender, however, persists over time, both regarding training occupation and occupation of work. Females exhibit less occupational mobility than males, which for the two later training cohorts is completely explained by the training occupation. Thus, females are concentrated in training occupations with low occupational mobility rates. The women in our data set experience less time in non–employment than men over the first ten years of labor market experience.

Occupational mobility is associated with positive wage gains and occupational mobility is slightly higher for workers with lower wages in the training occupation.

The gain from mobility is lower for females than for males in the lower part of the wage distribution, while wage gains are similar for both genders in the upper part. Correspondingly, female workers are often locked in low wage careers, since males are more likely to change occupation and benefit from the associated wage gains. Occupational mobility does not overcome occupational segregation and the reduction in the gender wage gap is not caused by a reduction in occupational segregation itself.

Nevertheless, for the later training cohorts, female mobility rates have converged to male rates in the same training occupation and the wage gains due to occupational mobility have increased for females relative to males. Both effects have reduced the gender wage gap. However, if females exhibited the same training occupations and the same mobility patterns as males, the gender wage gap would be reduced considerably further, especially in the upper part of the distribution where the wage gains due to mobility are higher. The evidence suggests that lock-in effects associated with occupational segregation are very important in explaining the gender wage gap among skilled workers in Germany, especially in the upper part of the wage distribution since there women would have gained most from occupational mobility. However, for women with low wages, a substantial wage disadvantage would remain even if they were similar to males regarding training occupations and occupational mobility. Put differently, even with higher occupational mobility, women with low wages tend to be locked in low wage careers. Our study shows that occupational segregation and lower occupational mobility among females explains the gender wage gap to a considerable extent but this differs across the wage distribution.

The observed reduction in the gender wage gap across training cohorts is likely to be related to changes in social attitudes regarding gender roles in the labor market as discussed by Fortin (2005), an issue we could not explore here. In further research, it would be of great interest to quantify the importance of social attitudes for the extent of occupational segregation and the gender differences in occupational mobility.

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Appendix

Methodological Aspects

Normalization of interaction terms to obtain average gender differences

As an illustration, consider the regression of some response variable $y_{i,exp}$ for individual i with experience level exp on covariates indicating dummy variables for (integer years) of experience and mobility dummy variables 'Move' interacted with dummy variables for integer years of experience when mobility took place $ExperM$. Taking just two dummy variables for experience, the regression would be

$$y_{i,exp} = \beta_1 \cdot DEXP_0 + \beta_2 \cdot DEXP_{1-3} + \beta_3 \cdot Move \cdot DEXPM_0 +$$

$$\beta_4 \cdot Move \cdot DEXPM_{1-3} + \gamma_1 \cdot DEXP_0 \cdot Male + \gamma_2 \cdot DEXP_{1-3} \cdot Male$$

$$+\gamma_3 \cdot Move \cdot DEXPM_0 \cdot Male + \gamma_4 \cdot Move \cdot DEXPM_{1-3} \cdot Male \ ,$$

where the error term is omitted. $y_{i,exp}$ represents variable y observed for individual i at experience level exp. $DEXP_k$ is a dummy corresponding to $k = 0$ or $1 - 3$ years of experience, respectively. Move is a dummy for occupational mobility having taken place before. $DEXPM_k$ is a dummy variable indicating the experience level when mobility occurs.

The goal is to normalize the interaction terms such that the gender gap (male minus female) by experience level γ_1 and γ_2 provides the estimated average gender gap (average partial effect of gender) by experience level, e.g. γ_1 should correspond to the average gender difference among workers with 0 years of experience among both movers and stayers. Formally, the estimated average gender gap for workers for 0 years of experience is

$$\frac{1}{N_{m,0}} \sum_{i_m=1}^{N_{m,0}} \hat{y}_{i(i_m)} - \frac{1}{N_{f,0}} \sum_{i_f=1}^{N_{f,0}} \hat{y}_{i(i_f)}$$

where $N_{m,0}$ and $N_{f,0}$ are the number of male and female workers with 0 years of experience, respectively, $i(i_m)$ and $i(i_f)$ correspond to the individual male and female workers, and $\hat{y}_.$ the fitted values. Plugging in the regression estimates, the average gender gap for the example used here is

$$= \frac{1}{N_{m,0}} \sum_{i_m=1}^{N_{m,0}} (\beta_1 + \gamma_1 + \beta_3 Move \cdot DEXPM_0 + \gamma_3 Move \cdot DEXPM_0)$$

$$- \frac{1}{N_{f,0}} \sum_{i_f=1}^{N_{f,0}} (\beta_1 + \beta_3 Move \cdot DEXPM_0))$$

$$= \gamma_1 + \beta_3(\overline{Move \cdot DEXPM_0}_{m,0} - \overline{Move \cdot DEXPM_0}_{f,0}) + \gamma_3 \overline{Move \cdot DEXPM_0}_{m,0},$$

where $\overline{Move \cdot DEXPM_0}_{g,0}$ (g=m,f) are the the gender and experience specific averages of the covariate $Move \cdot DEXPM_0$. Thus, we normalize the interaction terms $DEXPM_k \cdot Move$ (and any other interactions with gender dummies) by subtracting the gender and experience specific averages $\overline{Move \cdot DEXPM_0}_{g,k}$ (g=m,f and k=0,1-3). Then the estimated average gender gap in the response variable (average partial effect of gender) by experience level k corresponds to γ_k.

Machado and Mata Decomposition Technique

For quantile regression, it is not possible to relate conditional quantiles based on a finer set of covariates to conditional quantiles based on a coarser set of covariates. Machado and Mata (2005) suggest a simulation based method to decompose the effects of differences in covariates and in coefficients on the unconditional gender specific wage distributions to investigate the determinants of the distributional (quantile specific) wage gap.[14] As described in the following, the M&M technique can be readily extended to the decomposition of the gender wage gap by experience levels in a regression context. Using this extension of the M&M technique, we determine to what extent the gender differences by experience reported in table 8 without the occupational covariates reflect gender differences in training occupations and occupational mobility.

The idea of the simulation approach used here is to generate a counterfactual sample of wages where females exhibit male characteristics but are still 'paid like females'. Then, we add the actual male sample to this simulated sample and reestimate the wage regressions without occupational covariates. The resulting gender wage gap by experience is corrected for differences in these occupational covariates (and only these because we still control for experience and characteristics at entry). The counterfactual simulation is based on coefficient estimates based only on the female sample. In contrast, the second set of estimates in table 8 (with occupational variables), estimates the same coefficients for males and females for all covariates except experience and the mobility variables.

Based on the simplication of the M&M techniques suggested in Albrecht et al. (2002), we use the following procedure to simulate the counterfactual sample for females:

1. Using the original female data set, estimate the quantile regression coefficient vector $\beta^f(\theta)$ for each percentile $\theta = .01, .02, \ldots, .99$.

2. Using the male sample, draw independently for each observation i in this sample a corresponding percentile θ_i from the uniform, discrete distribution on all percentiles $\theta = .01, .02, \ldots, .99$.

[14] The decomposition technique by Machado/Mata (2005) is an extension of the well know Blinder/Oaxaca (see Blinder, 1973) decomposition technique for quantile regression.

3. The counterfactual wages for females in the sample with the male characteristics (the initial male sample) are then generated as $\{log(w_i^*) = x_i^m \beta^f(\theta_i)\}$.

Tables and Figures

Table 1: Coding of Consolidated 2-digit Occupation Variable *occ2d*

Consolidated 2-digit code	Comprises the following 2-digit occupations	Comprises the following values of variable 'beruf' (*occorg*) in IABS
1	1–4	1,2
5	5,6	3,4
7	7–9	5
10	10,11	6
12	12,13	7
14	14	8,9
15	15	10
16	16	11
17	17	12
18	18	13
19	19	14
20	20	15
21	21	16
22	22	17–19
23	23	20
24	24	21
25	25,26	22,23
27	27	24–27
28	28	28–30
29	29	31
30	30	32
31	31	33–35
32	32	36–38

Continued on next page

Consolidated 2-digit code	Comprises the following 2-digit occupations	Comprises the following values of variable 'beruf' (*occorg*) in IABS
33	33,34	39
35	35,36	40,41
37	37	42
39	39	43
40	40	44
41	41	45
42	42,43	46
44	44	47,48
45	45	49,50
46	46	51
47	47	52,53
48	48	54
49	49	55
50	50	56
51	51	57,58
52	52	59,60
54	54	62
60	60	63–67
61	61,62	68–73
63	63	74–75
68	68	76–79
69	69	80,81
70	70	82,83
71	71	84–86
72	72	87
73	73	88,89
74	74	90–92

Continued on next page

Consolidated 2-digit code	Comprises the following 2-digit occupations	Comprises the following values of variable 'beruf' (*occorg*) in IABS
75	75	93,94
76	76	95
77	77	96–99
78	78	100–103
79	79–81	104–106
82	82	107
83	83	108
84	84	109
85	85	110–114
86	86	115–117
87	87	118,119
88	88	120
90	90	121
91	91	121–124
92	92	125
93	93	126–129
98	98	61,130

Note: The information for this table is taken from the data description for the IAB employment subsample and the content under the label "Berufe im Spiegel der Statistik" on http://www.pallas.iab.de/bisds/berufsgliederung.asp .

Table 2: **Sample size, by cohort group and sex**

Years of experience	Cohorts 1978-80	Cohorts 1984-86	Cohorts 1990-93
Women			
0	11,482	17,679	22,568
1	7,977	11,232	12,461
2	6,944	10,146	11,033
3	6,180	9,077	9,840
4	5,684	8,219	8,834
5	4,980	7,256	7,766
6	4,406	6,265	0
7	3,839	5,448	0
8	3,319	4,765	0
9	2,858	4,086	0
10	2,428	3,502	0
Men			
0	19,288	25,540	25,827
1	15,596	18,101	14,762
2	12,536	15,772	12,686
3	11,375	14,464	11,349
4	10,664	13,377	10,327
5	10,051	12,426	9,199
6	9,573	11,674	0
7	9,134	11,051	0
8	8,814	10,542	0
9	8,405	9,829	0
10	8,088	9,339	0

Note: West German sample of young skilled workers extracted from the IABS-R01 employment statistic. We collapsed the data into integers of years of work experience. Hence, zero includes entry wages as well as spells with accumulated work experience shorter than 1 year.

Table 3: **Skilled women in first job - means and standard deviations**

cohort	**medium degree**	*Abitur*	**years of training**	**age**	**years of transition**	**1 if stayer**	**number of observations**
1978-80	0.99	0.01	2.51	19.28	0.04	0.77	9168
	(0.09)	(0.09)	(0.51)	(1.06)	(0.17)	(0.42)	
1984-93	0.95	0.05	2.61	20.34	0.04	0.75	11925
	(0.21)	(0.21)	(0.60)	(1.54)	(0.17)	(0.43)	
1990-93	0.91	0.09	2.78	20.85	0.05	0.77	10692
	(0.28)	(0.28)	(0.64)	(1.65)	(0.19)	(0.42)	
Total	0.95	0.05	2.65	20.29	0.04	0.76	
	(0.23)	(0.23)	(0.61)	(1.61)	(0.18)	(0.42)	

Note: West-German sample of young skilled workers extracted from the IABS-R01 employment subsample. Standard errors are reported in parentheses.

Table 4: **Skilled men in first job - means and standard deviations**

cohort	**medium degree**	*Abitur*	**years of training**	**age**	**years of transition**	**1 if stayer**	**number of observations**
1978-80	1.00	0.00	2.69	19.30	0.05	0.76	6214
	(0.06)	(0.06)	(0.51)	(1.02)	(0.20)	(0.42)	
1984-86	0.98	0.02	2.78	20.21	0.06	0.69	9203
	(0.14)	(0.14)	(0.59)	(1.47)	(0.25)	(0.46)	
1990-93	0.95	0.05	2.98	20.91	0.11	0.68	10697
	(0.23)	(0.23)	(0.67)	(1.65)	(0.33)	(0.47)	
Total	0.97	0.03	2.82	20.18	0.07	0.71	
	(0.16)	(0.16)	(0.61)	(1.56)	(0.27)	(0.46)	

Note: West German sample of young skilled workers extracted from the IABS-R01 employment subsample. Standard errors are reported in parentheses.

Table 5: Gender wage gap and occupational segregation – the impact of femaleness in occupation on the gender wage gap

Cohort	1978–80		1984–86		1990–93	
Entry Wage – training occupation 2–digit						
OLS	-0.1029	(0.0858)	-0.4337	(0.0674)	-0.3768	(0.0536)
QR 20%	-0.6169	(0.1480)	-1.1217	(0.1215)	-1.0335	(0.0916)
QR 50%	0.1428	(0.0545)	-0.3431	(0.0445)	-0.3333	(0.0338)
QR 80%	0.4014	(0.1390)	0.0116	(0.1139)	0.0483	(0.0870)
Entry Wage – occupation of work 2–digit						
OLS	-0.3488	(0.0863)	-0.5446	(0.0723)	-0.5467	(0.0552)
QR 20%	-1.3473	(0.1502)	-1.2961	(0.1309)	-1.3387	(0.0942)
QR 50%	-0.0779	(0.0552)	-0.5547	(0.0480)	-0.5447	(0.0348)
QR 80%	0.2090	(0.1405)	-0.2016	(0.1230)	-0.0537	(0.0900)
Wage after 5 years of experience – occupation of work 2–digit						
OLS	-0.0524	(0.0562)	0.0057	(0.0549)	-0.0786	(0.0553)
QR 20%	-0.5052	(0.0962)	-0.4452	(0.0921)	-0.5657	(0.0933)
QR 50%	-0.0324	(0.0357)	0.1203	(0.0348)	0.0765	(0.0351)
QR 80%	0.4390	(0.0923)	0.3982	(0.0908)	0.4053	(0.0914)

All specifications include the following covariates: age at entry, duration of apprenticeship, abitur, prior experience, transition, and linear time trend, femaleness of occupation (≡ difference in occupation shares - female minus male).

Note: The table comprises the regression (OLS and quantile regressions) coefficients for the covariate difference in occupation share among females and males interacted with a dummy for male workers. Observations are weighted by the duration of the respective employment spell. Standard errors are in parentheses.

Table 6: Time spent in non–employment during eight years after the start of the first job after apprenticeship (gender differences and wage effects)

Specification	(1)	(2)	(3)
Covariate	Coeff.	Coeff.	Coeff.
	Cohort 1978-80		
Male	.5094	.4232	.4923
	(.0358)	(.0611)	(.0355)
Average entry wage for males	-	-	-1.0011
			(.0091)
Relative individual entry wage	-	-	-.3029
for males			(.1291)
Average entry wage for females	-	-	-.6133
			(.0544)
Relative individual entry wage	-	-	-1.1496
for females			(.1247)
	Cohort 1984-86		
Male	.4680	.3735	.4627
	(.0259)	(.0395)	(.0257)
Average entry wage for males	-	-	-.9333
			(.0061)
Relative individual entry wage	-	-	-.6969
for males			(.1100)
Average entry wage for females	-	-	-.5571
			(.0468)
Relative individual entry wage	-	-	-1.1945
for females			(.0849)
	Cohort 1990-93		
Male	.2074	.1706	.2059
	(.0204)	(.0305)	(.0204)
Average entry wage for males	-	-	-.7352

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Specification	(1)	(2)	(3)
Covariate	Coeff.	Coeff.	Coeff.
			(.0044)
Relative individual entry wage	-	-	-.1216
for males			(.1093)
Average entry wage for females	-	-	-.2713
			(.0537)
Relative individual entry wage	-	-	-.6907
for females			(.0816)
Dummies for training occupation	NO	YES	NO
All specifications include the following covariates: age at entry, duration of apprenticeship, abitur, prior experience, transition, and linear time trend.			

Note: The table comprises the coefficient estimates for the gender variables in an OLS regression of the years spent not working during the first eight years after the end of the apprenticeship. Heteroscedasticity–consistent standard errors are reported in parentheses. For all interaction terms of wage variables with gender dummies, the wage variable is normalized such that the estimated coefficients for the gender–experience dummy variables reflect the average gender difference for this experience level holding all other covariates constant, see section on methodological aspects in appendix for details.

Table 7: Probability for not working in training occupation during first ten years of work experience – Gender differences by experience and wage effects

Specification	(1)	(2)	(3)
Covariate	Coeff.	Coeff.	Coeff.
Cohort 1978-80			
$Male \times DEXP_0$	.0299	.0065	.0325
	(.0053)	(.0061)	(.0053)
$Male \times DEXP_{1-3}$	.0568	.0311	.0605

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Specification	(1)	(2)	(3)
Covariate	Coeff.	Coeff.	Coeff.
	(.0040)	(.0049)	(.0040)
$Male \times DEXP_{4-6}$	.1135	.0797	.1173
	(.0048)	(.0055)	(.0047)
$Male \times DEXP_{7-9}$	.1530	.1122	.1567
	(.0057)	(.0062)	(.0056)
Average log entry wage for males	-	-	-.0947
in training occupation			(.0090)
Individual log entry wage minus	-	-	.0239
average log entry wage for males			(.0036)
Average log entry wage for females	-	-	-.2702
in training occupation			(.0078)
Individual log entry wage minus	-	-	.0619
average log entry wage for females			(.0051)
Cohort 1984-86			
$Male \times DEXP_0$	.0824	.0047	.0871
	(.0045)	(.0050)	(.0045)
$Male \times DEXP_{1-3}$	.0837	.0011	.0892
	(.0034)	(.0040)	(.0034)
$Male \times DEXP_{4-6}$	.0916	-.0008	.0976
	(.0042)	(.0046)	(.0041)
$Male \times DEXP_{7-9}$	.1027	.0050	.1089
	(.0049)	(.0052)	(.0049)
Average log entry wage for males	-	-	-.1082
in training occupation			(.0084)
Individual log entry wage minus	-	-	.0688
average log entry wage for males			(.0034)
Average log entry wage for females	-	-	-.4091
in training occupation			(.0076)
Individual log entry wage minus	-	-	.0712
average log entry wage for females			(.0053)

Continued on next page

Specification	(1)	(2)	(3)
Covariate	Coeff.	Coeff.	Coeff.
	Cohort 1990-93		
$Male \times DEXP_0$	.1289	.0176	.1297
	(.0041)	(.0047)	(.0041)
$Male \times DEXP_{1-3}$	.1491	.0360	.1501
	(.0035)	(.0042)	(.0035)
$Male \times DEXP_{4-5}$	.1474	.0303	.1485
	(.0050)	(.0054)	(.0050)
Average log entry wage for males	-	-	.0053
in training occupation			(.0120)
Individual log entry wage minus	-	-	-.0449
average log entry wage for males			(.0051)
Average log entry wage for females	-	-	-.3075
in training occupation			(.0103)
Individual log entry wage minus	-	-	-.0261
average log entry wage for females			(.0058)
Dummies for training occupation	NO	YES	NO
All specifications include the following covariates: age at entry, duration of apprenticeship, abitur, prior experience, transition, and linear time trend.			

Note: The table comprises the coefficient estimates for the gender variables in an OLS regression of the dummy of a change of 2–digit occupation (occupation of work differs from training occupation) during the first ten years of work experience after the end of the apprenticeship. Heteroscedasticity–consistent standard errors are reported in parentheses. For the entry wage, we use the wage in the first employment spell after the end of the apprenticeship irrespective of whether the occupation of work is the same as the training occupation. For all interaction terms of wage variables with gender dummies, the wage variable is normalized such that the estimated coefficients for the gender–experience dummy variables reflect the average gender difference for this experience level holding all other covariates constant, see section on methodological aspects in appendix for details.

Table 8: (a) Gender wage gap by work experience controlling for a number of characteristics at entry - training cohort 1978-80

Covariates	OLS		QR 20%		QR 50%		QR 80%	
	Coeff.	(s.e.)	Coeff.	(s.e.)	Coeff.	(s.e.)	Coeff.	(s.e.)
without occupation/mobility dummies								
Experience in years interacted with male								
$DEXP_0$	.2069	(.0039)	.1511	(.0070)	.2343	(.0026)	.1973	(.0065)
$DEXP_{1-3}$	.2793	(.0026)	.3498	(.0045)	.2421	(.0017)	.2041	(.0042)
$DEXP_{4-6}$	.2908	(.0030)	.3544	(.0050)	.2303	(.0018)	.2125	(.0047)
$DEXP_{7-9}$	.3046	(.0034)	.3891	(.0058)	.2249	(.0021)	.1960	(.0054)
with occupation/mobility dummies								
Experience in years interacted with male								
$DEXP_0$	.1382	(.0041)	.0458	(.0071)	.1387	(.0027)	.2038	(.0069)
$DEXP_{1-3}$	.2128	(.0030)	.1919	(.0050)	.1846	(.0019)	.2077	(.0048)
$DEXP_{4-6}$	.2378	(.0033)	.2150	(.0054)	.1804	(.0020)	.2157	(.0052)
$DEXP_{7-9}$	.2557	(.0037)	.2349	(.0059)	.1749	(.0022)	.1988	(.0057)
Mobility effects interacted with male								
Move$\times DEXPM_0$	-.0124	(.0177)	.0624	(.0370)	.0937	(.0138)	-.0764	(.0356)
Move$\times DEXPM_{1-3}$	.0186	(.0090)	.0365	(.0153)	-.0240	(.0057)	-.0381	(.0148)
Move$\times DEXPM_{4-6}$	.0966	(.0120)	.2138	(.0199)	.0616	(.0074)	.0016	(.0192)
Move$\times DEXPM_{7-9}$	.1090	(.0206)	.2173	(.0346)	.1155	(.0129)	-.0085	(.0334)
Pre Move$\times DEXPM_0$	-.0528	(.0176)	-.1058	(.0368)	-.1635	(.0137)	.0056	(.0355)
Pre Move$\times DEXPM_{1-3}$	-.0408	(.0077)	-.0650	(.0133)	-.0164	(.0050)	.0010	(.0128)
Pre Move$\times DEXPM_{4-6}$	.0136	(.0076)	.0128	(.0126)	.0285	(.0047)	.0243	(.0121)
Pre Move$\times DEXPM_{7-9}$	-.0026	(.0082)	-.0097	(.0133)	.0046	(.0050)	.0185	(.0128)

All specifications include the following covariates: dummy variables for experience, age at entry, duration of apprenticeship, abitur, prior experience, transition, and linear time trend.

The specification with occupation variables also includes the mobility variables 'Move' and 'PreMove' interacted with dummy variables for experience when first occupational change occured.

Table 8: (b) Gender wage gap by work experience controlling for a number of characteristics at entry - training cohort 1984-86

Covariates	OLS		QR 20%		QR 50%		QR 80%	
	Coeff.	(s.e.)	Coeff.	(s.e.)	Coeff.	(s.e.)	Coeff.	(s.e.)
	without occupation/mobility dummies							
Experience in years interacted with male								
$DEXP_0$	.2144	(.0033)	.1959	(.0059)	.2390	(.0022)	.2013	(.0056)
$DEXP_{1-3}$	.2669	(.0023)	.3103	(.0039)	.2387	(.0014)	.2248	(.0037)
$DEXP_{4-6}$	.2280	(.0026)	.2518	(.0043)	.1881	(.0016)	.1743	(.0041)
$DEXP_{7-9}$	.2015	(.0030)	.2117	(.0050)	.1480	(.0018)	.1373	(.0047)
	with occupation/mobility dummies							
Experience in years interacted with male								
$DEXP_0$	.1562	(.0034)	.0895	(.0060)	.1666	(.0022)	.1947	(.0058)
$DEXP_{1-3}$	.2145	(.0026)	.1870	(.0042)	.1860	(.0016)	.2163	(.0041)
$DEXP_{4-6}$	.1835	(.0028)	.1480	(.0045)	.1396	(.0017)	.1661	(.0044)
$DEXP_{7-9}$	.1609	(.0031)	.1083	(.0050)	.1036	(.0019)	.1306	(.0049)
Mobility effects interacted with male								
Move$\times DEXPM_0$	-.0079	(.0171)	.0708	(.0365)	.0033	(.0137)	-.0554	(.0354)
Move$\times DEXPM_{1-3}$	.0135	(.0076)	.0421	(.0128)	-.0222	(.0048)	-.0262	(.0124)
Move$\times DEXPM_{4-6}$	.0329	(.0096)	.0184	(.0157)	-.0283	(.0059)	-.0037	(.0152)
Move$\times DEXPM_{7-9}$	.1150	(.0193)	.0356	(.0323)	.0485	(.0121)	.0459	(.0313)
Pre Move$\times DEXPM_0$	-.0413	(.0170)	-.1100	(.0364)	-.0632	(.0136)	.0083	(.0352)
Pre Move$\times DEXPM_{1-3}$	-.0197	(.0065)	-.0481	(.0110)	.0072	(.0041)	.0189	(.0107)
Pre Move$\times DEXPM_{4-6}$	-.0033	(.0063)	-.0117	(.0103)	.0142	(.0039)	.0199	(.0100)
Pre Move$\times DEXPM_{7-9}$	-.0073	(.0080)	.0047	(.0130)	.0152	(.0049)	.0205	(.0126)

All specifications include the following covariates: dummy variables for experience, age at entry, duration of apprenticeship, abitur, prior experience, transition, and linear time trend.

The specification with occupation variables also includes the mobility variables 'Move' and 'PreMove' interacted with dummy variables for experience when first occupational change occured.

Table 8: (c) Gender wage gap by work experience controlling for a number of characteristics at entry - training cohort 1990-93

Covariates	OLS		QR 20%		QR 50%		QR 80%	
	Coeff.	(s.e.)	Coeff.	(s.e.)	Coeff.	(s.e.)	Coeff.	(s.e.)
without occupation/mobility dummies								
Experience in years interacted with male								
$DEXP_0$	.1844	(.0030)	.2089	(.0050)	.2001	(.0019)	.1633	(.0049)
$DEXP_{1-3}$	.1777	(.0022)	.1941	(.0035)	.1648	(.0013)	.1511	(.0034)
$DEXP_{4-5}$	.1779	(.0030)	.1924	(.0047)	.1434	(.0018)	.1450	(.0045)
with occupation/mobility dummies								
Experience in years interacted with male								
$DEXP_0$	.1134	(.0032)	.0882	(.0051)	.1075	(.0020)	.1307	(.0051)
$DEXP_{1-3}$	.1122	(.0025)	.0755	(.0038)	.0914	(.0015)	.1176	(.0038)
$DEXP_{4-5}$	.1185	(.0032)	.0753	(.0047)	.0717	(.0018)	.1089	(.0046)
Mobility effects interacted with male								
Move$\times DEXPM_0$	-.0388	(.0165)	-.0231	(.0337)	-.0523	(.0129)	-.0559	(.0333)
Move$\times DEXPM_{1-3}$	-.0199	(.0087)	-.0398	(.0136)	-.0540	(.0052)	-.0297	(.0135)
Move$\times DEXPM_{4-5}$	.0182	(.0172)	-.0062	(.0266)	.0123	(.0102)	-.0092	(.0263)
Pre Move$\times DEXPM_0$	-.0154	(.0164)	-.0304	(.0335)	.0004	(.0128)	.0110	(.0331)
Pre Move$\times DEXPM_{1-3}$	.0002	(.0067)	-.0015	(.0106)	.0212	(.0041)	.0191	(.0105)
Pre Move$\times DEXPM_{4-5}$	.0057	(.0079)	.0166	(.0120)	.0031	(.0046)	.0190	(.0119)

All specifications include the following covariates: dummy variables for experience, age at entry, duration of apprenticeship, abitur, prior experience, transition, and linear time trend.

The specification with occupation variables also includes the mobility variables 'Move' and 'PreMove' interacted with dummy variables for experience when first occupational change occured.

Note for tables 8(a)-(c): The table comprises the coefficient estimates for interactions of dummy variables for experience and mobility with a dummy for males. These are based on OLS/Quantile regression of log wages on a number of covariates. The set of results with occupation/mobility dummies involves in addition dummy variables for 2–digit training occupations and gender specific dummy variables for occupational mobility (also interacted with integer years of experience $ExperM$ when the first occupational change occured). The 'move effect' dummy is one after the first occupational change has occured. The 'pre mover' dummy is one for all observations for individuals who report an occupational change during the ten years of their work experience. For all interaction terms of mobility variables with a gender dummy variable, the mobility variable is normalized such that the estimated coefficients for the gender–experience dummy variables reflect the average gender difference for this experience level holding all other covariates constant, see section on methodological aspects in appendix for details.

Table 9: Gender wage gap by work experience controlling for a number of characteristics at entry if females had male training occupations and male occupational mobility patterns

Covariates	OLS		QR 20%		QR 50%		QR 80%	
	Coeff.	(s.e.)	Coeff.	(s.e.)	Coeff.	(s.e.)	Coeff.	(s.e.)
Cohort 1978-80 without occupation/mobility dummies								
Experience in years interacted with male								
$DEXP_0$	.1751	(.0037)	.1337	(.0078)	.2063	(.0029)	.1790	(.0074)
$DEXP_{1-3}$	.2454	(.0024)	.3461	(.0049)	.2237	(.0018)	.1593	(.0047)
$DEXP_{4-6}$	.2627	(.0026)	.3643	(.0051)	.2165	(.0019)	.1571	(.0048)
$DEXP_{7-9}$	.2678	(.0027)	.3783	(.0052)	.2104	(.0019)	.1447	(.0050)
Cohort 1984-86 without occupation/mobility dummies								
Experience in years interacted with male								
$DEXP_0$	.1462	(.0033)	.1263	(.0068)	.1554	(.0025)	.1235	(.0064)
$DEXP_{1-3}$	.2027	(.0022)	.2638	(.0043)	.1631	(.0016)	.1295	(.0040)
$DEXP_{4-6}$	.1652	(.0024)	.2313	(.0045)	.1029	(.0016)	.0769	(.0042)
$DEXP_{7-9}$	.1279	(.0025)	.1900	(.0047)	.0620	(.0017)	.0493	(.0044)
Cohort 1990-93 without occupation/mobility dummies								
Experience in years interacted with male								
$DEXP_0$	.0883	(.0030)	.1411	(.0053)	.0789	(.0019)	.0725	(.0050)
$DEXP_{1-3}$	.0772	(.0022)	.1266	(.0035)	.0503	(.0013)	.0498	(.0033)
$DEXP_{4-5}$	.0796	(.0029)	.1236	(.0047)	.0324	(.0017)	.0358	(.0044)

Note: The data for females is simulated based on the technique proposed in Machado and Mata (2005). For this purpose, it is assumed that females have the same characteristics as male but that female coefficients apply. The estimates are obtained analogously to the first set of results for each cohort in table 8.