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# Gender-Specific Occupational Segregation, Glass Ceiling Effects, and Earnings in Managerial Positions: Results of a Fixed Effects Model

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# ABSTRACT

## Gender-Specific Occupational Segregation, Glass Ceiling Effects, and Earnings in Managerial Positions: Results of a Fixed Effects Model

The study analyses the gender pay gap in private-sector management positions based on the German Socio-Economic Panel Study (SOEP) for the years 2001-2008. It focuses on occupational gender segregation, and on the effects of this inequality on earnings levels and gender wage differentials in management positions. Our paper is, to our knowledge, the first in Germany to use time-constant unobserved heterogeneity and gender-specific promotion probabilities to estimate wages and wage differentials for persons in managerial positions. The results of the fixed-effects model show that working in a more "female" job, as opposed to a more "male" job, affects only women's wages negatively. This result remains stable after controlling for human capital endowments and other effects. Mechanisms of the devaluation of jobs not primarily held by men also negatively affect pay in management positions (*evaluative discrimination*) and are even more severe for women (*allocative discrimination*). However, the effect is non-linear; the wage penalties for women occur only in "integrated" (more equally male/female) jobs as opposed to typically male jobs, and not in typically female jobs. The devaluation of occupations that are not primarily held by men becomes even more evident when promotion probabilities are taken into account. An Oaxaca/Blinder decomposition of the wage differential between men and women in management positions shows that the full model explains 65 percent of the gender pay gap. In other words: Thirty-five percent remain unexplained; this portion reflects, for example, time-varying social and cultural conditions, such as discriminatory policies and practices in the labor market.

JEL Classification: J31, J16, J24

Keywords: gender pay gap, managerial positions, gender segregation, glass-ceiling effects, Oaxaca/Blinder decomposition, fixed effects, selection bias

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# 1 Introduction

Many national and international studies on the gender pay gap show a wage disadvantage for women (Bardasi/Gornick 2008; Kunze 2008; Cohen, Philip N./Huffman 2007; Blau/Kahn 2006; Fitzenberger/Kunze 2005; Blau/Kahn 2003, 2000; Waldfogel 1998; Jacobs/Steinberg 1995a; Kilbourne et al. 1994; Marini 1989). Germany, had a (raw) wage pay gap of 23.2 percent in 2008, one of the highest in the European Union (European Commission 2010). However, few articles to date have examined the gender pay gap in management positions in Germany (see for other countries: Kirchmeyer 2002; Bertrand/Hallock 2001; Lausten 2001; see for academics in Germany: Leuze/Strauß 2009). The present study seeks to fill this lacuna by analyzing the gender pay gap in private-sector management positions in Germany based on data from the German Socio-Economic Panel Study (SOEP) (Wagner et al. 2007).

We focus in particular on gender-specific labor market segregation—the observation that women and men are distributed unequally across occupations and within occupational hierarchies—and the effects of this segregation on earnings and gender wage differentials in management positions. In Germany, gender-specific labor market segregation has remained very stable over time (Trappe/Rosenfeld 2004): most women still work in typical "women's jobs" and most men in typical "men's jobs." Segregation is also found in managerial positions in Germany. On the one hand we see vertical segregation: women tend to work at lower hierarchical levels than men—even within management the upper echelons of which are mainly occupied by men. The higher the hierarchy is the lower the share of women in it (Holst/Wiemer 2010a, b, Holst/Busch 2010). On the other hand, we see horizontal segregation: the majority of men and only a minority of women in management positions work in typically "male" jobs. While women in management are less segregated than other female employees, the opposite is true for men (Holst/Busch 2010). Further, managerial positions show gender-specific occupational differences in the size of the enterprise, the sector of the economy, and the industry (Bischoff 2010; Kleinert et al. 2007): women more often head smaller firms, and they more frequently work in health care, welfare, and in the private services. Women with a university degree more often choose a field of study that is dominated by women, such as humanities (Leuze/Strauß 2009). In addition, female managers are more often employed in public services than in the private sector (Brader/Lewerenz 2006).

Women's occupations are generally characterized by worse employment conditions in terms of wages; many studies analyze the effects of working in a gender-typical or -atypical

occupation on wages and wage differentials between women and men (Busch/Holst 2010, 2009; Cohen, Philip N./Huffman 2007; Hinz/Gartner 2005; Cohen, Philip N/Huffman 2003; Jacobs/Steinberg 1995b; England 1992; England et al. 1988). The question that is not fully answered is why this wage penalty even in management still exists where "the best of the best" are being employed.

To control for unobserved time-constant heterogeneity, we use fixed effects panel models to estimate wages and wage differentials of women and men in management positions. As promotion probabilities are highly gender-biased in Germany (Holst/Busch 2010; Fietze et al. 2009) we take gender-specific promotion probabilities into account by employing a special version of Heckman selection (Heckman 1979). We use these strategies to obtain unbiased estimators of the coefficients for the wage effects of working in a gender-segregated occupation. To our knowledge, this is the first time that the gender pay gap in managerial positions has been analyzed in the German context by taking fixed effects and selection bias into account simultaneously (see for the US: England et al. 1988). Finally, we decompose the gender pay differential to explain the extent to which the gender pay differential is related to gender-specific segregation on the labor market and to other components of our wage equation (Blinder 1973; Oaxaca 1973).

The study is structured as follows. In Section 2, we introduce the key theories explaining the dependency between gender-specific labor market segregation and wages, discuss the current state of research, and formulate our working hypotheses. In section 3, we present the multivariate method for quantitative analysis of the gender-specific wage differential in management positions. In Section 4, we explain our database and variables, and in Section 5 we present the empirical findings. Finally, in Section 6, we summarize the results and draw conclusions.

# 2 Theoretical background

*Human Capital Approach*

From an economic point of view, the effect of working in a "segregated" (male or female) job on wages can be explained through different investments in human capital. The different human capital investments of men and women are interpreted as being the result of a rational cost-utility calculation (Becker 1993, 1991): an assumption is that women have stronger preferences for family work than men and that these affect their choices of lower-paid

occupations and less successful career paths. Hence, for women, investments in education, work, and on-the-job-training appear less profitable since the accumulated knowledge becomes obsolete during breaks in employment (Blau et al. 2006; Tam 1997; Mincer 1962). As a result, women invest less in education. Human capital theory uses the concept of self-selection to explain the different proportions of women and men in certain occupations and thus the emergence of gender-specific labor market segregation (Polachek 1981). According to this idea, women rationally choose particular jobs that can be combined with family responsibilities—for example, jobs that have lower opportunity costs when working part-time or when employment is interrupted. These are mainly lower-paid jobs. The higher the human capital endowment, and thus the higher the opportunity costs, the lower this effect will be. Becker (1985) assumes that even with the same human capital endowment, it is rational for an employer to pay married women less than men in the same job: "Since housework is more effort intensive than leisure and other household activities, married women spend less energy on each hour of market work than married men working the same number of hours. As a result, married women have lower hourly earnings than married men with the same human capital, and they economize on the energy expended on market work by seeking less demanding jobs" (Becker 1985: 55).

Based on these assumptions, we can formulate the following hypotheses on the dependency between segregation and wages in managerial positions:

*H1: Female occupations pay less than male occupations, even at the management level; this holds for both women and men working in these occupations.*

However, the implicit "given" in the human capital approach of gender-specific preferences was criticized early on in a number of studies (e.g. England 1989; for an overview, see Ferber 1987). In the early 1980s, it was also shown that women who planned to interrupt their careers did not, contrary to the hypothesis of self-selection, choose "female" jobs more frequently than other women (England 1982). In addition, an analysis for West Germany showed that career breaks do indeed have a negative effect on both men's and women's wages, and that this negative effect is particularly strong if the interruption occurred due to family responsibilities (e.g., parental leave) (Beblo/Wolf 2002). Empirical studies show as well that women are "trapped" from the very start of their career, in the sense of experiencing a "lock-in-effect" in occupations with lower pay (Fitzenberger/Kunze 2005).

*Devaluation Approach*

At this point, we turn to the devaluation approaches to explain gender-specific wage differences. Here, it is assumed that the historically dominant "male breadwinner" model, in which women are responsible for the unpaid housework and men for the paid work, lead to corresponding gender-specific values and norms internalized by the individuals—and thus to gender-specific orientations and needs ("preferences") for special jobs, as well as to discriminatory practices on the labor market (Gottschall 2000; Beck 1986; Beck-Gernsheim 1980). The internalization of gender roles in values and norms is (re)produced by a "doing gender" in everyday interaction processes (Ridgeway/Smith-Lovin 1999; Ridgeway 1997; West/Zimmerman 1987): in order to reduce the amount and complexity of information in daily face-to-face interactions, people make gender-specific assumptions about the person with whom they are interacting. These assumptions form the basis for gender stereotypes that are shaped by cultural perceptions about what constitutes "male" and "female." Nelson (1996) argues that individuals tend to think dualistically and to ascribe abilities hierarchically according to gender norms. The characterization "rational" is usually ascribed to men and valued more in the labor market than "emotional" ("emotional work don't 'count'", England 1989: 24) which is usually ascribed as a "female" characteristic developed by providing unpaid family work at home. Accordingly, expectations about potential performance differ by gender—and this may result in wage penalties for women.

As far as pay is concerned the *devaluation hypothesis* postulates a general devaluation of female work (Liebeskind 2004; England 1992; Steinberg 1990; England et al. 1988). This devaluation leads to lower pay for "female" jobs independent of human capital; the higher the percentage of women in a specific job the lower the pay for women as well as for men. This is referred to in the literature as "evaluative discrimination" (Achatz et al. 2005; Peterson/Saporta 2004). In addition, studies have shown that even *within* a specific job (i.e., within a female-dominated, male-dominated, or gender-integrated profession), the work of women is devaluated and paid less than that of men. This is labeled "allocative discrimination" (Achatz et al. 2005; Peterson/Saporta 2004).[1] In line with so-called intergroup conflicts (Blalock 1967), this allocative discrimination may also be due to an increase in perceived threats and perceived competition over scarce resources as more individuals of the

[1] The term "evaluative" indicates that one job is valued less than another solely because it is numerically dominated by one group of persons (men/women), independently of the real tasks and demands of the job (Achatz et al. 2005: 469). "Allocative" discrimination involves wage disadvantages that result from hiring, promotion, and dismissal or firing, which are difficult to document (Peterson/Saporta 2004: 859).

opposite gender enter the workplace. Women as the lower status group on the labor market (Correll/Ridgeway 2006) are disadvantaged in such conflicts because they have less power. As a result, women in men's jobs may be seen by men as a threat, which may have negative consequences especially for their wages.

The devaluation hypothesis has been controversial in the literature. It is generally acknowledged that on average wages in typical women's jobs are lower than in typical men's jobs (Olsen/Walby 2004; Jacobs/Steinberg 1995b). But there is no consensus on the *reasons* for these findings (England et al. 2000; Tam 2000, 1997; Kilbourne et al. 1994; England et al. 1988). However, neither of the aforementioned studies makes a clear distinction between evaluative and allocative discrimination. An explicit analytical distinction between these dimensions of discrimination was made in a German study by Achatz et al. (2005) identifying evaluative as well as allocative discrimination. Wages decreased with an increasing percentage of women in a job cell,[2] and this wage disadvantage was higher for women than for men. Busch/Holst (2010) found a similar result for the increasing percentage of women in an occupation focusing on women and men in management positions in Germany 2006 (Busch/Holst 2010).

Based on these considerations, the following hypotheses can be formulated:

*H2: After accounting for human capital effects, there is still a negative wage effect of working in a women's job, which is due to devaluation (evaluative discrimination).*

*H3: The negative wage effect of working in a women's job is stronger for women than for men. This is due to allocative discrimination.*

The devaluation mechanisms are intensified by stereotyped "gender status beliefs," ideas that one gender is more competent and thus higher in status. The result of such beliefs is that, in general, men are seen as justified in holding higher positions of power and privilege (Ridgeway/Smith-Lovin 1999; Ridgeway 1997). This phenomenon is even more prevalent in top positions. An invisible barrier - known as the "glass ceiling" – is preventing women from climbing the career ladder beyond a certain level (International Labour Office 2004; Wirth 2001). Men are expected to possess higher work-related skills and abilities and to show higher

[2] Others did not use the percentage of women in the jobs, but the percentage of women in job cells. This was calculated as the percentage of (full-time employed) women in a job *per firm* (Achatz et al. 2005: 474). This was possible because they used firm-level data instead of individual micro-data.

performance and productivity than women (see also Correll/Ridgeway 2006; Ridgeway 2001; Foschi 1996). This results in different career and pay opportunities for men and women since wages reflect the expected productivity of the employee. Employers tend to believe that women fit the management profile less especially the leadership profile; and as a result of these and contrasting assumptions about "male" leadership qualities employers attribute a higher competence in this area to men (Gmür 2006, 2004; Eagly/Karau 2002; Ridgeway 1997). In addition, according to the "homophily principle" which states that people interact primarily with others who are similar in given characteristics and build gender-homogeneous networks (McPherson et al. 2001; Ibarra 1997, 1992; McPherson/Smith-Lovin 1987) when making decisions about promotion individuals prefer others who are similar in given characteristics (like gender). Consequently, the predominantly male decision-makers prefer to promote men to management positions (Ridgeway 1997). If, despite the barriers women obtain a managerial position they are highly visible "tokens" (Kanter 1977) and thus subjected to a more rigorous evaluation of their performance and possible mistakes than men. This increases their probability of being marginalized and demoted from their position.

Altogether, women who succeed in climbing the career ladder are probably a highly selected group of women. This might bias their wages upwards and also might bias the coefficients of the independent variables in the wage equations. In gender-segregated occupations in particular this bias might has substantial effects not only on wages but also on the chances of promotion. There is some evidence of a strong negative effect on promotion probabilities for women working in a female occupation (Maume 1999). Again, this can be explained with mechanisms of devaluation of women's jobs: employers provide fewer training opportunities in such jobs and female occupations therefore offer more limited chances of entering management. In terms of allocative discrimination the effect should be stronger for women than for men due to gender status beliefs and different competence expectations. It is therefore assumed that:

*H4: The wage effect of working in a gender-segregated occupation is even stronger when the gender-specific promotion probability is taken into account.*

# 3 Models and Estimation Methods

We first estimate a wage equation according to Mincer (Mincer 1974) with additional human capital variables, variables related to gender-specific labor market segregation and variables connected to social structure/family circumstances (see Section 4). We are employing a multiple linear *panel regression with fixed effects* separately for women and men that, i.e. we *only* consider within-person changes over time (Allison 2009). One main advantage of this method is that it controls for time-constant unobserved heterogeneity, Therefore, variables that vary *between* but not *within* persons (like ability or personality traits) are excluded from the model.

However, there might also be another kind of selection bias that is not controlled for in the fixed effects model per se: the selection into managerial positions. Women who receive a management position might be highly selected. This may result in an overestimation of their wages and therefore in biased coefficients. To correct for such a selection bias, we use a special version of Heckman's correction (Heckman 1979) which is applicable for fixed effects regression (England et al. 1988; Berk 1983). Here, for each year of the time period in our panel we perform a cross sectional logit regression model that predicts working in a management position for women and men. From these equations we compute an instrumental variable that is the predicted probability of holding a managerial position (versus *not* holding a managerial position) for women and men in each year. This instrumental variable is added to the wage equations to control for sample selectivity bias. A common method is to estimate a probit model and use the inverse Mills ratio as an instrumental variable (Greene 2003). In this paper, the predicted probabilities based on logit models as described above are used. We decided to do this because the results of the variable can be interpreted in a more straightforward manner. However, we estimated also a probit model, the coefficients did not differ between the two strategies.

In a last step, the wage differential between women and men is decomposed using the Oaxaca/Blinder decomposition method (Jann 2008; Blinder 1973; Oaxaca 1973).[3] With this, it is possible to quantify more precisely how much each variable is able to explain the gender pay gap. To this end, the gender-specific wage difference is split into different effects:

[3] We also utilized an Oaxaca-style decomposition (Oaxaca and Ransom, 1994) using the coefficients from a pooled model over both groups as the reference coefficients (Oaxaca/Ransom 1994). For the STATA ado-files, see Jann 2008 (Jann 2008). The result is described in a footnote in chapter 5..

- *Endowment effect (E)*: This part, which is also called the "explained" effect is the portion of the gender pay gap that can be explained with gender-specific differences in the endowments of the independent variables. This value corresponds to the percentage wage loss that men would experience if they had the same qualifications, working experience, and other characteristics taken into account in the model as women, and if these characteristics were valued the same way for women as for men. Technically, it is the difference in the average variable values between the two groups multiplied by the coefficient calculated for the male group.
- *Residual effect (R)*: This is also called the "unexplained" part and shows the portion of the gender pay gap that cannot be explained by gender-specific differences in endowments of the variables included in the model but by the different monetary values attributed to the characteristics. It shows how much more women would earn if their qualifications, working experience, etc. were rewarded to the same extent as men's. Technically, the differential between the coefficients estimated for men and for women multiplied by the average of each variable for the female group plus the difference in the shift coefficients is taken into account. This residual effect is frequently interpreted as "discrimination." However, caution is required since this component also includes unobserved differences between groups, e.g., career motivation (Chevalier 2007). In addition, some differences in the variables recorded could be due to discrimination, for instance, if it is more difficult for women to enter particular forms of education or employment (Olsen/Walby 2004).

# 4 Data and Determinants of Earnings

The wage estimations are based on data from the German Socio-Economic Panel Study (SOEP) for the years 2001-2008 (Wagner et al. 2007). The sample observed consists of persons in management posotions working *full-time*. Full-time work is defined as working with an agreed weekly work time of 35 hours or more or with an actual weekly work time of 35 hours or more if no work time is agreed.

Persons in managerial positions are defined as being at least 18 years old and having described themselves as white-collar full-time employees in the private sector with

(1) extensive managerial duties (e.g. managing director, manager, head of a large firm or concern) or with

(2) managerial function or highly qualified duties (e.g. scientist, attorney, head of department).

The inclusion of the second group of employees was important because of the small number of women in top management positions in Germany: the case numbers for this group in the SOEP sample would not allow for more in-depth analysis. The limitation to the private sector is due to the differences between the private and public sector in the mechanisms for promotion and payment. In addition, studies have shown that the gender pay gap is particularly high in the upper wage quintile, especially in the private sector (Arulampalam et al. 2006).

Our dependent variable is the *(logarithmic) real gross monthly earnings* of women and men. The earnings are adjusted for inflation while dividing the earnings by the consumer price index. Taking the logarithm of the gross monthly earnings allows us to interpret the regression coefficients as a percentage change of the wage when the particular independent variable increases by one unit. Gross monthly earnings were used instead of the gross hourly earnings because overtime in managerial positions is generally not paid extra. Long working hours are common in management and therefore covered by the monthly income. Hourly earnings do not take this fact into consideration. Nevertheless, we control for the actual weekly working time.

The following independent variables are used for the wage estimations:

**Human Capital**: As important human capital resources for income, we take into account the *duration of education* (in years), the actual *work experience* (full-time plus part-time, in years provided by the SOEP), as well as the *work experience squared* as an indicator of the diminishing marginal utility of the work experience. This variable also indirectly corresponds with age, which we had to drop from our model due to multicollinearity reasons. The human capital factors mentioned do not yet include the accumulation of firm-specific human capital—"on-the-job training"—in the firm which is also an important resource affecting income (Blau et al. 2006; Tam 2000, 1997). Because of this we also include the *length of employment with current employer* (in years) in our model.

**Segregation**: As an important variable concerning horizontal segregation we include the *percentage of women in each job* as a predictor for the wage. This indicator shows, for each year, the percentage of women and men employed in typical female, gender-integrated, and

male jobs. The variable has been computed by taking the mean percentage of women in each job from the job classification of the German Federal Office of Statistics.[4] The values for each year have been taken from a special evaluation of the German Microcensus, conducted by the German Federal Office of Statistics. However, it has to be kept in mind that the occupation-specific values of this variable vary over time. This is a problem in the longitudinal analysis, because these variations cannot be explained by the variables included. They are due to unobserved mechanisms on the labor market that are not controlled for in the models. Thus, we have computed the mean percentage of women in each occupation over the time period 2001-2008, so that each job has a constant value in each year. We have also computed the variance of the percentages of women in each job for the same period. This information serves as a control variable for possible effects of this procedure in all analyses. The coefficients of this control variable are not shown in the tables. In a last step, to show whether and to what extent the effects of the variable may be non-linear the job gender segregation variable has been categorized as follows: male job (percentage of women 0-30 percent), integrated job (percentage of women 31-69 percent) and female job (percentage of women 70-100 percent).

We also consider the *economic sector* and the number of *employees at the place of employment*. The assumption is that the wage options in the manufacturing industry are better than in parts of the service sector. In addition, in larger firms, there are often internal labor markets and better opportunities for promotion meaning that the chances of having a higher income are on average higher here than in small firms (Lengfeld 2010; for a descriptive overview, see Busch/Holst 2008; for the theory of internal labor markets, see Doeringer/Piore 1971). To give a better picture of segregation at different hierarchical levels (vertical segregation), we also include information on whether the person performs *extensive managerial duties* or *managerial functions/highly qualified duties*.

Finally, we include further control dimensions in the multivariate analysis:

- Control dimensions concerning *social structure and family circumstances*: To control for the different limitations women and men face due to family responsibilities, we include *family status* and the *number of children* aged 16 and below in the household as predictors for earnings. In addition, we include information on whether the person lives in *Eastern*

[4] This classification for Germany is more appropriate in this study than the ISCO88-code (International Standard Classification of Occupations) to show the horizontal segregation and related inequalities because it contains many more job categories than the ISCO88.

*Germany ("new" federal states) or Western Germany ("old" federal states)*: On the one hand, in Eastern Germany, the wages are more compressed than in western Germany. On the other hand, it may be expected that the gender-specific pay differential is lower in the East than in the West due to more egalitarian structures in the new federal states (Trappe 2006). This may also be reflected in a higher percentage of women in managerial positions in Eastern Germany (Brader/Lewerenz 2006).

- Control dimension *actual working time per week*: The actual working time per week takes into account the influence of the actual number of hours worked on earnings.
- Control dimension *imputation of gross monthly earnings*: Respondents normally answer questions on income at a lower rate than to other questions. This can lead to biases in the results because "item non-response" is generally not distributed proportionally across the different groups of the population. Consequently, in our analysis, we use the imputed gross monthly earnings provided in the SOEP (Grabka/Frick 2003). We also include a dummy variable that shows whether the particular income was imputed or not (results not shown in tables.)

**Selection variables**: In the last step of our analysis, to estimate the selection into managerial positions (Heckman's correction) we use a sample consisting of white-collar employees working full-time in the private sector comparing those who are in leadership positions in this group with those who are not, using logistic regressions for each year. We include the same independent variables in the selection equation as in the wage equation,[5] as well as the additional variables *current health* (varying from 1 "very good" to 5 "bad") and information on whether there are *children 6 years or younger in the household.* Further, we control for *high-income subsample G*: the SOEP was enlarged in 2002 to include the high-income subsample G (households with a monthly net income of over 3,835 euros) with the objective of providing a more extensive database for the analysis of life circumstances, income, and asset accumulation of households in the upper-income range (Schupp et al. 2003). Persons living in these households are also included in our analysis. In the logistic regression models of the probability of holding a managerial position we control for whether the person is part of the subsample or not (results not shown in tables).

[5] The variable for whether the person performs extensive managerial duties or highly qualified duties or a managerial function (vertical segregation) is not entered into the selection equation because this information cannot be observed for individuals in non-managerial positions.

The following table gives an overview of the applied predictors on earnings for persons in managerial positions employed full-time in the private sector pooled for the years 2001-2008.

**Table 1: Women and men in full-time management positions in the private sector: Overview of predictors 2001-2008**

| | Men | | | | Women | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Dev. (within) | N | n | Mean | Std. Dev. (within) | N | n |
| **Dependent variable** | | | | | | | | |
| (Real) Gross monthly earnings (euro) | 5150.91 | 1254.63 | 7609 | 2142 | 3522.08 | 554.22 | 1819 | 703 |
| **Human capital** | | | | | | | | |
| Duration of education (in years) | 14.98 | 0.21 | 7533 | 2119 | 15.06 | 0.14 | 1795 | 692 |
| Work experience (in years) | 19.88 | 1.81 | 7494 | 2039 | 17.06 | 1.64 | 1788 | 673 |
| Work experience$^2$ | 498.53 | 79.27 | 7494 | 2039 | 391.35 | 67.63 | 1788 | 673 |
| Length of employment with current employer (in years) | 11.71 | 2.29 | 7609 | 2142 | 9.42 | 1.73 | 1818 | 702 |
| **Family circumstances** | | | | | | | | |
| Married and living with spouse (=1) | 0.75 | 0.15 | 7609 | 2142 | 0.51 | 0.15 | 1819 | 703 |
| Number of children in household aged under 16 | 0.78 | 0.33 | 7609 | 2142 | 0.29 | 0.20 | 1819 | 703 |
| **Organization** | | | | | | | | |
| Economic sector | | | | | | | | |
| Manufacturing industry | 0.51 | 0.17 | 7557 | 2130 | 0.28 | 0.13 | 1800 | 700 |
| Trade, hotels and catering, transport | 0.15 | 0.13 | 7557 | 2130 | 0.21 | 0.11 | 1800 | 700 |
| Other services | 0.34 | 0.15 | 7557 | 2130 | 0.51 | 0.12 | 1800 | 700 |
| Number of employees at place of employment | | | | | | | | |
| Fewer than 20 | 0.13 | 0.12 | 7590 | 2138 | 0.22 | 0.13 | 1812 | 701 |
| 20 – 199 employees | 0.28 | 0.19 | 7590 | 2138 | 0.28 | 0.18 | 1812 | 701 |
| 200 – 1,999 employees | 0.24 | 0.21 | 7590 | 2138 | 0.23 | 0.17 | 1812 | 701 |
| 2,000 employees or more | 0.34 | 0.19 | 7590 | 2138 | 0.27 | 0.15 | 1812 | 701 |
| **Segregation** | | | | | | | | |
| With extensive managerial duties (=1) | 0.17 | 0.18 | 7609 | 2142 | 0.11 | 0.16 | 1819 | 703 |
| Percentage of women in job: Categories | | | | | | | | |
| Male job | 0.69 | 0.19 | 7505 | 2127 | 0.37 | 0.20 | 1800 | 696 |
| Integrated job | 0.27 | 0.19 | 7505 | 2127 | 0.44 | 0.20 | 1800 | 696 |
| Female job | 0.05 | 0.11 | 7505 | 2127 | 0.19 | 0.14 | 1800 | 696 |
| **Promotion probability** | 0.73 | 0.06 | 7224 | 1985 | 0.50 | 0.09 | 1712 | 648 |
| **Controls** | | | | | | | | |
| Actual working time per week (in hours) | 48.41 | 3.61 | 7594 | 2141 | 45.69 | 3.52 | 1812 | 702 |
| Place of residence: New (eastern) federal states (=1) | 0.16 | 0.05 | 7609 | 2142 | 0.29 | 0.03 | 1819 | 703 |
| *For information only: Age in years* | 44.60 | 1.80 | 7609 | 2142 | 41.19 | 1.62 | 1819 | 703 |

Source: SOEP 2001-2008, authors' calculations.

With a mean real gross monthly income of 3,522 euros women earn 68 percent of the male mean income. Hence, the gender pay gap is 32 percent. As far as education is concerned, the human capital accumulation is balanced: both women and men have on average almost 15 years of education. However, women have only 17 years of work experience compared to nearly 20 years for men. This difference is essentially age-related: as can be see in the table women employed full-time in managerial positions in our sample are on average around three

years younger than their male counterparts. Furthermore, men work longer on average for the same employer (11.7 years versus 9.4 years for women).

Much stronger gender-specific differences can be observed in occupations: 69 percent of men work in male jobs. Interestingly, women in management do not work mainly in female jobs; only a minority of them works in these occupations (19 percent). This may be due to the fact that women's occupations provide limited chances of promotion. The majority of women work in gender-integrated occupations. In addition, only 11 percent of the women but 17 percent of the men work in top positions with extensive managerial duties. These results indicate a kind of glass ceiling effect that reduces women's chances of being promoted. Furthermore, fewer women than men in managerial positions work in the manufacturing industry or in large companies with 2,000 or more employees. Women are, conversely, more often employed in "other services" (e.g., banking and insurance, real estate, legal, and other service professions).

Marked differences can also be seen in the variables concerning social structure and family circumstances: compared to men, fewer women in managerial positions are married and they have a lower mean number of children in the household.

Women's lower chances of promotion can be seen in the mean value of the instrumental variable that is included later in the models to control for selection bias: women have, on average, a net promotion probability of 50 percent; men's promotion probability is much higher at 73 percent. To what extent this may affect the results of the multivariate analysis will be shown in the next chapter.

# 5 Results of the Multivariate Analysis

Table 2 shows the results of the fixed effects regression for men and women and states whether the differences in the coefficients are significant. It also shows the results of the Oaxaca/Blinder decomposition. The analysis was computed in a first step without controlling for selection into a managerial position, and then in a second step with controlling for it.

Without taking the chances of promotion into account, it can be seen that for women, moving from a male job to an integrated job significantly decreases wages. The difference in this effect between men and women is significant. This is despite the fact that human capital indicators have been controlled for. Therefore, this effect cannot be explained by different human capital accumulations or self-selection of women into more "female" occupations that

require less human capital accumulation. It can, however, be explained by an evaluative devaluation of occupations with a higher share of women. Also, there is evidence of allocative discrimination, because the wage penalty is significantly stronger for women. Therefore, hypothesis H1, H2 and H3 are *partly* confirmed.

There are two findings that prevent *full* confirmation of these three hypotheses: first, moving from a male to a female job has negative effects only for men. However, the difference between women and men is not significant here. Second, the effects of working in a segregated occupation are not linear for women; if women move from a male to a female job there is no significant wage penalty. These results change after accounting for promotion effects. The significant effect for men moving to a female job diminishes and the effect for women moving to an integrated job increases in magnitude. Therefore, not accounting for selection into management biases the coefficients of the segregation variables: they are overestimated for men and underestimated for women. This confirms the assumption that selection into management—which is even stronger for women due to the glass ceiling effect—biases the effects of segregation on wages if the promotion probability is not taken into consideration.

As research has shown, in addition to the general glass ceiling effect women's chances of being promoted are low especially for women in female jobs. If women in such jobs reach a management position despite all the barriers they may be especially highly selected and the wages of women in these jobs may therefore be overestimated. This may obscure a negative wage effect of working in a more female job if selection bias is not controlled for.

The opposite is true for men: men's probability of being promoted in women's jobs is not be as low as women's meaning that the wages of men in such jobs are underestimated. Thus, Hypothesis H4 is confirmed.[6]

But still, the question arises why the wage effect of working in male jobs, integrated jobs, or female jobs is not linear for women. This result contradicts other studies that do not focus on managerial positions and also contradicts previous results that focus on management positions but do not estimate fixed effects (Busch/Holst 2009). This non-linear effect might be due to the observation that relatively few women and especially few men in leadership positions work in women's jobs.

[6] In the appendix we present as an example the results on what extent having a male, female, or integrated job affect someone's chances of holding a managerial position for a single year (2008). The model gives clear evidence that working in a segregated job significantly affects promotion probabilities. This is to a lstronger extent due to women.

## Table 2: Men and women in full-time management positions in the private sector: Determinants of gross monthly income (real) 2001-2008 (fixed effects model)

| | Without Promotion Probability | | | With Promotion Probability | | |
|---|---|---|---|---|---|---|
| | Men | Women | $\Delta_{women-men}$ | Men | Women | $\Delta_{women-men}$ |
| **Human Capital** | | | | | | |
| Duration of education (in years) | 0.027*** | 0.008 | | 0.021** | 0.014 | |
| Work experience (in years) | 0.094*** | 0.035 | -* | 0.093*** | 0.034 | -* |
| Work experience$^2$ | -0.001*** | -0.001*** | | -0.001*** | -0.001*** | |
| Length of employment with current employer (in years) | -0.002* | -0.001 | | -0.002* | -0.001 | |
| **Family circumstances** | | | | | | |
| Married and living with spouse (ref.: married but separated/unmarried) | 0.018 | 0.035 | | 0.013 | 0.035 | |
| Number of children in household aged under 16 | 0.004 | 0.015 | | 0.001 | 0.019 | |
| **Segregation** | | | | | | |
| With extensive managerial duties (ref: with highly qualified duties or managerial function) | 0.033*** | 0.091*** | +** | 0.033*** | 0.092*** | +** |
| Economic sector (ref.: manufacturing industry) | | | | | | |
| Trade, hotels and catering, transport | -0.009 | -0.005 | | 0.000 | -0.001 | |
| Other services | -0.026** | -0.092*** | -* | -0.024* | -0.082** | -*** |
| Number of employees at place of employment (ref.: fewer than 20) | | | | | | |
| 20 – 199 employees | 0.033** | 0.010 | | 0.029* | 0.010 | |
| 200 – 1,999 employees | 0.037** | 0.031 | | 0.033* | 0.028 | |
| 2,000 employees or more | 0.050*** | 0.119*** | | 0.045** | 0.113*** | |
| Percentage of women in each job: Categories (ref.: male job) | | | | | | |
| Integrated job | -0.007 | -0.049** | -* | 0.002 | -0.067*** | -*** |
| Female job | -0.044** | -0.004 | | -0.013 | -0.038 | |
| **Promotion probability** | | | | 0.149*** | -0.104 | -*** |
| **Controls** | | | | | | |
| Actual working time per week (in hours) | 0.004*** | 0.004*** | | 0.002*** | 0.005*** | +* |
| Place of residence: new (eastern) federal states (ref.: old (western) federal states) | 0.037 | 0.005 | | 0.042 | -0.010 | |
| Year (ref.: 2001) | | | | | | |
| 2002 | -0.050*** | 0.005 | | -0.053*** | 0.010 | +* |
| 2003 | -0.089*** | 0.010 | | -0.088*** | 0.011 | |
| 2004 | -0.135*** | 0.018 | +* | -0.136*** | 0.022 | +* |
| 2005 | -0.200*** | 0.024 | +* | -0.201*** | 0.029 | +** |
| 2006 | -0.266*** | 0.023 | +** | -0.267*** | 0.033 | +** |
| 2007 | -0.329*** | 0.033 | +** | -0.327*** | 0.044 | +** |
| 2008 | -0.380*** | 0.032 | +** | -0.382*** | 0.046 | +** |
| Constant | 6.433*** | 7.421*** | --- | 6.505*** | 7.340*** | --- |
| N | 7224 | 1712 | 8936 | 7224 | 1712 | 8936 |
| Number of groups | 1985 | 648 | 2633 | 1985 | 648 | 2633 |
| R-squared (within) | 0.082 | 0.125 | 0.0898 | 0.084 | 0.127 | 0.0919 |
| Endowment effect | | | 0.221*** | | | 0.240*** |
| Residual effect | | | 0.150*** | | | 0.131*** |
| **Wage differential** | | | 0.371*** | | | 0.371*** |
| ***% share of explained effect on wage differential*** | | | ***59.57*** | | | ***64.69*** |
| ***% share of unexplained effect on wage differential*** | | | ***40.43*** | | | ***35.31*** |

* Level of significance < 10 percent; ** level of significance < 5 percent; *** level of significance < 1 percent.

Dependent variable: Logarithm of gross real monthly earnings, controlling for imputed earnings and for the variance of the percentage of women in each job for the years 2001-2008.

Source: SOEP 2001-2008, authors' calculations.

If one does not consider the promotion probability in the Oaxaca/Blinder decomposition, the "endowment part" is nearly 60 percent.[7] Therefore, 40 percent of the wage differential remains unexplained. However, after including the promotion probability in the models the explained part is 65 percent and thus increases by 5 percentage points. The promotion probability is higher for men and the coefficient shows that the promotion probability has a positive effect on men's wages. In other words: men's wages are underestimated because they have above-average chances of getting into high positions. This can be further illustrated if we look in greater detail at the results of the decomposition (Table 3): here, the independent variables of the wage equation have been grouped and the endowment effects of the variables have been summed up by group. As can be seen, different human capital endowments explain about half of the overall endowment effect. This is mainly due to different endowments in work experience. The second large part of the total endowment effect comes from the promotion probability; 9.43 percentage points of the wage differential can be explained with different chances of reaching the higher levels of the career ladder. Further, it can be seen that segregation explains 3.23 percentage points of the wage differential.

**Table 3: Men and women in full-time management positions in the private sector: Oaxaca-Blinder Decomposition - Endowment effects (E) of variable groups**

| | E | In % |
|---|---|---|
| Human Capital | 18.40 | 49.60 |
| *Duration of education* | *-0.20* | *-0.54* |
| *Work experience* | *25.10* | *67.65* |
| *Work experience²* | *-6.10* | *-16.44* |
| *Length of employment with current employer* | *-0.40* | *-1.08* |
| Family circumstances | 0.40 | 1.08 |
| Segregation | 1.20 | 3.23 |
| Promotion probability | 3.50 | 9.43 |
| Controls | 0.50 | 1.35 |
| Total endowment effect | 24.00 | 64.69 |
| Residual effect | 13.10 | 35.31 |
| *Wage differential* | *37.10* | *100.00* |

Results of the Oaxaca/Blinder Decomposition, based on the wage equations with fixed effects and promotion probability for women and men (Table 2).

Source: SOEP 2001-2008, authors' calculations.

However, even after including the promotion probability in the models, much of the gender pay gap still remains unexplained. This may be a reflection of time-varying social and cultural conditions such as discriminatory policies and practices in the labor market, among other things.

[7] A decomposition method Oaxaca and Ransom (1994) (see footnote 4) indicates an even lower "explained part" of the wage differential, namely 51 percent (results not shown).

# 6 Conclusions

The aim of the paper was it to analyze the gender pay gap of persons in managerial positions in Germany controlling for selection into managerial positions and time-constant unobserved heterogeneity. A special focus was placed on the wage effects of working in a gender-segregated occupation. The results of the fixed effects model show that working in a more female job compared to working in a male job affects wages negatively (*evaluative discrimination*). These mechanisms have even more severe effects on women (*allocative discrimination*). However, the effect is not linear; the wage penalties for women occur only in integrated jobs and not in female jobs. The devaluation of occupations where men are not in the majority is more evident when promotion probabilities are analyzed: here, we find even stronger evidence of evaluative as well as allocative discrimination.

More research is needed to explain why women experience such a severe wage penalty in integrated occupations in particular. Our analysis has shown that one-third of the pay gap still remains unexplained. Future research has to go deeper into the phenomenon in order to better explain the gender pay gap. The analysis suggests also that time-varying effects of social and cultural conditions are influencing wages. These are quantitatively very difficult to measure but might have an impact on the gender pay gap. To capture these effects datasets on employers would be useful to identify the factors that influence the recruitment and promotion of managers which could then be merged with data on employees. Of particular interest would be information on network structures as well as on existing prejudices about the traits and abilities of men and women that play an important role in selection and promotion.

Another finding is that work experience has a large effect on wages. This is mainly due to age differences between women and men in management positions. This makes the catching-up process difficult for women. Also, management positions are usually combined with long working hours that hardly allow reconcile the demands of work and family. This is mainly a problem for women and might also be a reason why the young, well-educated generation of women is moving into these higher and better-paid jobs so slowly.

Our results indicate that policy should focus on measures to reduce gender segregation in the labor market and on enforcing women equal chances of promotion. Initiatives allowing both men and women to better reconcile family and work are still essential also in management positions. All these efforts constitute steps in the right direction, but they are not enough. The

biggest challenge for the future will be to overcome gender stereotypes. While gender stereotypes are often not recognized by either men or women they can substantially reduce women's chances on the labor market and be responsible for an implicit devaluation of women's work and abilities, This leads to lower wages of women—a finding that holds for women in management positions as well. More transparency in decisions on employment, promotion, and pay will be one step in improving women's chances on the labor market. Further measures to improve women's chances could be taken by companies to set concrete and sustainable targets for equal pay and more equal proportions of female managers. To accelerate growth in the number of female managers in Germany and to overcome the obviously strong persistence of existing gender structures in firms gender quotas in executive positions are discussed both in Germany and partly introduced for the supervisory boards of publicly-traded company in other countries of the European Union. On a more basic level, a culture of gender-neutral organization and decision-making in firms would help to pave the way to improve women's chances and achieve equal pay.

# Appendix

As an example we present here the results on what extent having a male, female, or integrated job affect someone's chances of holding a managerial position. Table 4 shows the results of the logistic regression model computed to estimate the wage equation with promotion probability as the instrumental variable for a single year (2008). The model gives clear evidence that working in a segregated job significantly affects promotion probabilities. There is also linearity in the effect: the chances of working in management are lower in integrated jobs than in male jobs. In female jobs, the situation is even worse. This means that an evaluative devaluation of women's jobs is at work in the probability of promotion. Furthermore, the differences here between women and men are significant: the more "female" a job is, the lower chances of promotion women holding such jobs will have. This means that a kind of allocative discrimination is at work in promotion: even if men and women work full-time in the same occupation, women's chances of promotion will be lower than men's.

**Table 4: Full-time white-collar employees in the private sector: Promotion probability 2008 (logit)**

| | Men | Women | $\Delta_{women-men}$ |
|---|---|---|---|
| **Human Capital** | | | |
| Duration of education (in years) | 0.538*** | 0.467*** | |
| Work experience (in years) | 0.078*** | 0.087** | |
| Work experience$^2$ | -0.001 | -0.001 | |
| Length of employment with current employer (in years) | 0.000 | -0.001 | |
| **Family circumstances** | | | |
| Married and living with spouse (reference value: married but separated/unmarried) | 0.197 | -0.438* | -** |
| Number of children in household aged under 16 | 0.245** | 0.547** | |
| **Segregation** | | | |
| Economic sector (reference value: manufacturing industry) | | | |
| Trade, hotels and catering, transport | -0.402** | 0.426 | +** |
| Other services | -0.227 | 0.443* | +** |
| Number of employees at place of employment (reference value: fewer than 20) | | | |
| 20 – 199 employees | 0.053 | -0.168 | |
| 200 – 1,999 employees | 0.330 | 0.367 | |
| 2,000 employees or more | 0.001 | 0.082 | |
| Percentage of women in each job: Categories (ref. : male job) | | | |
| Integrated job | -0.610*** | -1.131*** | -* |
| Female job | -0.822*** | -1.812*** | -*** |
| **Additional selection variables** | | | |
| Children 6 years or younger in HH | 0.083 | 0.020 | |
| Perceived current health | -0.223** | -0.274** | |
| **Controls** | | | |
| Actual working time per week (in hours) | 0.090*** | 0.105*** | |
| Place of residence: new (eastern) federal states (reference value: old (western) federal states) | -0.283 | -0.446* | |
| Constant | -11.819*** | -12.106*** | |
| N | 1481 | 982 | 2463 |
| Pseudo R-squared | 0.3428 | 0.3646 | 0.4074 |

* Level of significance < 10 percent; ** level of significance < 5 percent; *** level of significance < 1 percent.

Dependent variable: Being in a leadership position versus not being in a leadership position, controlling for subsample G, imputed earnings, and the variance in the percentage of women in each job for the years 2001-2008.

Source: SOEP 2001-2008, authors' calculations.

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