

## Secondary Publication



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Date of secondary publication: 20.04.2023

Version of Record (Published Version), Bookpart

Persistent identifier: urn:nbn:de:bvb:473-irb-591740

#### Primary publication

Kleinert, Corinna; Leuze, Kathrin; Bächmann, Ann-Christin; Gatermann, Dörthe; Hägglund, Anna Erika; Rompczyk, Kai: Occupational Sex Segregation and its Consequences for the (Re-) Production of Gender Inequalities in the German Labour Market. In: Education, Competence Development and Career Trajectories : Analysing Data of the National Educational Panel Study. Weinert, Sabine [...] (editors). pp 295-317. DOI: 10.1007/978-3-031-27007-9\_13

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# Chapter 13

## Occupational Sex Segregation and its Consequences for the (Re-)Production of Gender Inequalities in the German Labour Market



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**Abstract** In Germany, the structuring principle connecting the educational system and the labour market is occupations. In theory, this occupational principle is gender-neutral, because both women and men are channelled into jobs according to the occupations for which they are trained. In practice, however, it means that patterns of occupational sex segregation in the education system are reproduced in the labour market. As a consequence, occupational sex segregation has important consequences for the subsequent employment biographies and life courses of women and men. In this chapter, we study the relevance of occupational sex segregation for the (re-)production of gender inequalities in the German labour

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market. More specifically, we examine long-term trends in occupational sex segregation, how occupational sex segregation is causally linked to other occupational characteristics, how these occupational characteristics translate into gender inequalities regarding non-monetary labour market outcomes, and how these occupational characteristics affect the gender wage gap.

### 13.1 Introduction

In the German welfare state, occupations are the structuring principle connecting the educational system and the labour market. Because the education system is characterized by not only a pronounced level of standardization and stratification (Allmendinger, 1989) but also an explicit occupational orientation (Kerckhoff, 2003), vocational and academic certificates signal both a specific amount of education and a specific bundle of general and occupation-specific skills (Gangl, 2001; Leuze, 2011). Accordingly, education certificates are necessary prerequisites for finding stable and regular employment in a particular occupation with the associated resources it provides such as prestige and income (Müller et al., 1998). As a result, occupational mobility in Germany is low by international standards, both at labour market entry and during later career development (Gangl, 2001). In sum, the occupational principle is a decisive mechanism of social stratification in the German labour market (Solga & Konietzka, 1999).

In theory, because both women and men are channelled into jobs according to the occupations for which they are trained, the occupational principle is gender-neutral (Solga & Konietzka, 2000). In practice, however, this means that patterns of occupational sex segregation in the education and training system are reproduced in the labour market (Trappe, 2006; Trappe & Rosenfeld, 2001). As a consequence, occupational sex segregation serves to produce and reproduce gender inequalities. Previous research has shown that the uneven distribution of women and men across the occupational structure is particularly important for understanding the gender wage gap (e.g. for Germany, see Aisenbrey & Brückner, 2008; Busch, 2013a; Gartner & Hinz, 2009; Leuze & Strauß, 2009, 2014). Even though a large body of studies has demonstrated that occupations dominated by women pay less, it is far from clear why this is the case—is it the mere share of women, or are the decisive mechanisms other occupational characteristics linked to ‘female-typical’ occupations? In addition, it remains unclear how these characteristics are linked causally over time and contribute to changing gender inequalities.

Even less is known about the impact of occupational sex segregation on aspects of labour market inequality going beyond wages such as occupational or status mobility. The few existing studies on the effects of occupational segregation on individual occupational mobility show that female-dominated occupations generate ‘revolving doors’ (Jacobs, 1989) or cumulative disadvantages over the life course (Bygren, 2004; Chan, 1999). Yet even though many studies assume that the share of women in an occupation impacts directly on individual employment prospects

(e.g. Anker, 1997, p. 315), it is often argued that this relationship is not straightforward and should be approached in a systematic way (Jacobs, 1993). Therefore, the project ‘Occupational sex segregation and its consequences for the (re-)production of gender inequalities in the German labour market’, funded from 2012 until 2018 by the DFG Priority Programme 1646, specified, both theoretically and empirically, the ways in which occupational sex segregation and other occupational characteristics translate into labour market inequalities between women and men in Germany. More specifically, it examined:

- long-term trends in occupational sex segregation
- how occupational sex segregation is causally linked to other occupational characteristics
- how these occupational characteristics translate into gender inequalities regarding non-monetary labour market outcomes
- how these occupational characteristics affect the gender wage gap in Germany.

In the following, we first present the theoretical framework underlying the project; and, second, empirical results on each of these research questions.

## 13.2 Theoretical Framework

Our theoretical concern was to understand how occupational sex segregation and other occupational characteristics might generate labour market inequalities between women and men and how their influence might change over the life course. In the following, we shall therefore discuss how the sex composition of occupations might be causally linked to other occupational characteristics, and how this relationship might affect gender inequality in the labour market.

The most elaborate body of theory addresses the correlation between occupational sex segregation and wages, a correlation that can be observed universally. There are conflicting theories on the macrolevel processes causing this correlation: it may be caused by either a devaluation of female occupations, active choices, or the channeling of women into low-wage occupations. The central idea behind devaluation is that in the culture of western industrialized countries, women are valued less than men, and this leads to a devaluation or stigmatization of all things associated with women—styles of clothing, names, leisure activities as well as fields of study or occupations (Baron & Newman, 1990; Cohen & Huffman, 2003; Ridgeway, 1997). However, in the literature, whether devaluation is caused merely by a higher share of women working in a particular occupation or whether it is (also) due to particular activities performed in these occupations remains an unsolved issue. In the second perspective, it is argued that the gender-typing of occupations can exist independently of their numerical domination by men or women. Cultural gender-role beliefs involve the idea that household, reproductive and care work, which are provided mainly by women in the private sphere on the basis of affection but not for pay, are considered less valuable than paid work (Ridgeway & Correll, 2006). Other work

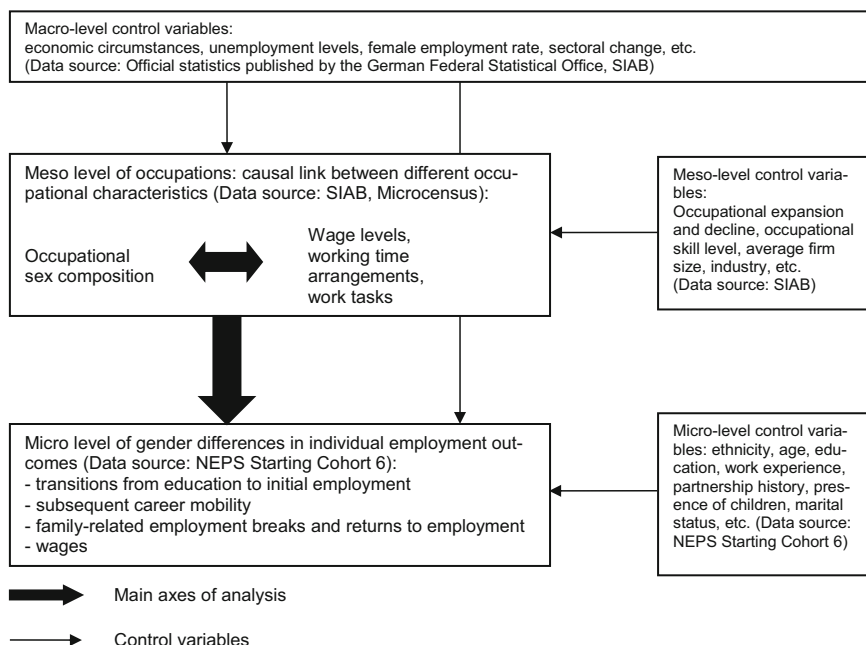
contents are labelled 'female' due to feminization processes in such fields as clerical jobs or sales. Results of empirical research on the effect of 'female-typical' activities on wages are rather mixed. Because both dimensions—female-typed job tasks and the sex composition of occupations—are two important aspects of how devaluation might work, it is necessary to differentiate their influence systematically on the occupational level and to complement them with indicators of female- and male-connoted tasks beyond occupations.

Another perspective on the importance of work tasks for wages is offered by the classical human capital approach (Becker, 1962, 1985). This assumes that wage differentials between women and men result from gender-specific investments in human capital. Following this line of argument, researchers claim that female- and male-dominated occupations may differ in the amount of specialized human capital that is needed to perform occupation-specific work tasks. Employers have to compensate for workers' investments in specialized skills and pay a wage premium for them, particularly when demand for these skills is higher than supply (Becker, 1962). Because the usual indicators for human capital in wage models do not capture specialized skills, this effect might be reflected in the proportion of women within an occupation. Only few studies on this issue have been carried out in Germany, and they have found no or only partial evidence in favour of this hypothesis (Heinze, 2009; Leuze & Strauß, 2009; Ochsensfeld, 2014). More strongly justified assumptions on the returns to specific skills, together with new measurement approaches can be found in the literature on skill-biased technological change and its impact on the wage structure in post-industrial countries (Autor, 2013; Autor & Handel, 2013; Autor et al., 2003). However, the assumptions and skills measures used in this research have hardly been applied to analysing the gender pay gap and to linking it with sex segregation structures and their effects on wages.

A slightly different perspective is offered by the theory of compensating differentials. This also addresses the lower wage returns of female-dominated occupations (Rosen, 1986), but additionally considers working time arrangements with female family commitments. In this view, women choose less demanding and less well-paying occupations because they place a higher priority on family obligations and a lower priority on money than men do. The claim is that women's occupations are more 'mother-friendly' in that they feature more flexible hours while, at the same time, paying less. According to preference theory (Hakim, 2000, 2002), the large majority of women today prefer to combine employment and family work without giving a fixed priority to either. Therefore, women try to reduce their working time once they have children, seeking to devote as much time and effort to their family work as to their jobs.

A last theoretical perspective assumes that declining wage levels or other non-pecuniary characteristics lead to a feminization of occupations based on employer preferences. According to the queuing argument of Reskin and Roos (1990), employers have a general preference to hire men. In this perspective, women are located behind men in the labour queue, and even though they also prefer high wages, they will be employed only in occupations that men do not want because they pay less.

In sum, these basic theories make different assumptions about which causal pathways might exist between occupational sex segregation and other occupational

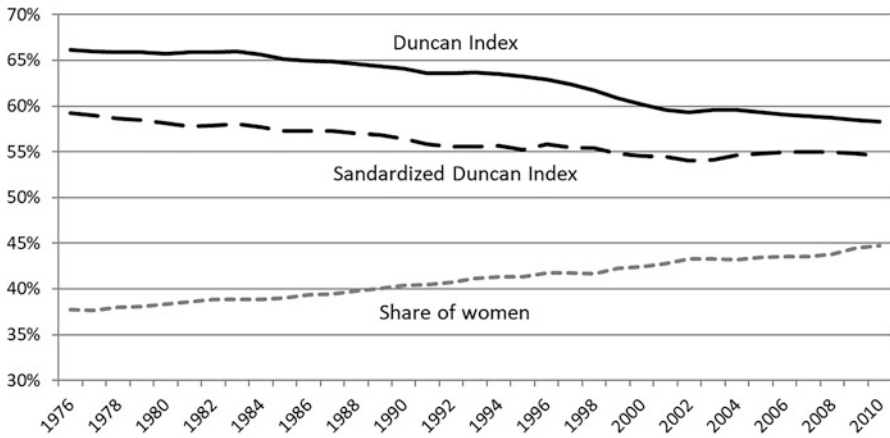


**Fig. 13.1** Model for analysing the relationship between occupational structure and gender inequalities in the German labour market

features such as wage levels or working time arrangements. Thereby, they generate distinct structural patterns for the (re-)production of labour market inequalities between women and men over the life course. In our project, we investigated these relationships for the case of Germany on both the mesolevel and between the meso- and microlevels in order to gain a better understanding of the role occupations play in the system of social stratification. Figure 13.1 displays the main axes of analysis that we pursued and the data sources we used. In order to capture the mesolevel of occupations, we used large-scale data on employees (SIAB) and the economically active population (Microcensus), because these data sources are large enough to observe detailed occupational groups in sufficient detail over time. We used NEPS data (Starting Cohort Adults, SC6) to examine how sex segregation and associated occupational characteristics translate into gender inequalities on the individual level.

### 13.3 Long-Term Trends in Occupational Sex Segregation

Regarding trends in occupational sex segregation, previous studies on Germany have focused mainly on short-term time intervals since the 1990s (Beblo et al., 2008; Busch, 2013b; Falk, 2002). Thus, the first goal of the project was to analyse long-term trends of occupational sex segregation in the West German labour market from



**Fig. 13.2** Trends in occupational sex segregation in West Germany, 1976–2010. (Source: SIAB weakly anonymized version 7510, authors' estimations)

1976 until 2010 (Hausmann & Kleinert, 2014). We did this by constructing a unique occupational panel containing yearly information about a high number of occupational groups in West Germany based on a large sample of employee social security data (Sample of Integrated Labour Market Biographies, SIAB (vom Berge et al., 2013)<sup>1</sup>). After data preparation and aggregation of similar occupational categories mainly within the manual sector, we generated information for 254 occupational groups over 35 years (Hausmann et al., 2015b).

To describe trends in occupational sex segregation, we estimated different measures of sex segregation such as the Index of Dissimilarity (Duncan & Duncan, 1955), its size-standardized version, or measures of concentration. Results show that the amount of occupational sex segregation in the West German labour market has been high throughout the observation period (Hausmann & Kleinert, 2014). Segregation has declined only marginally (Fig. 13.2), and the larger part of this trend can be attributed to changes in the occupational structure and not to an increasing mix of women and men within the same occupations. Whereas male-dominated occupations are even more segregated than female-dominated occupations, women are concentrated in a smaller range of occupations. However, women have made some advances since the mid-1970s. Their shares have increased mainly in growing sectors such as service occupations and in fields with academic qualifications. Within these occupational fields, however, segregation structures have hardly changed over time.

<sup>1</sup>The SIAB data is available through the Research Data Centre (FDZ) of the Federal Employment Agency in the Institute for Employment Research. For more information on the data and on data access, see <http://fdz.iab.de>.

### 13.4 Causal Links Between Occupational Sex Segregation and Other Occupational Characteristics

The unequal distribution of women and men among different occupations would not pose a problem if working conditions, wages, and promotion and career chances were comparable in male- and female-dominated occupations. However, many studies have found that occupational sex segregation correlates systematically with gender inequalities in the labour market, most pronounced for monetary remunerations. On the occupational level, the relationship between occupational sex composition and wage levels has been analysed mainly for the US labour market (e.g. England et al., 2002; England et al., 2007). However, the results of these studies cannot be transferred directly to the German context, because the institutional conditions of wage negotiations differ strongly, employment chances depend more on vocational certificates, and trends in the occupational structure and wage development vary between both countries.

Thus, in a second step, we looked at the mesolevel of occupations and analysed whether the sex composition of occupations causally affects wage levels in West Germany (Hausmann et al., 2015a). Hence, we tested two competing hypotheses: On the one hand, the devaluation thesis suggests that ‘female’ occupations are valued less in society and are therefore paid less in the labour market. This causal dynamic should also apply to new occupations and occupations with changing sex composition (England, 1992; Ridgeway, 1997), leading to the assumption that a rising proportion of women in an occupation should result in decreasing wage levels. On the other hand, it can be assumed that the gendering of occupations and their wage levels developed jointly during the emergence of the modern occupational structure (Goldin, 2006). The fact that this relationship did not change fundamentally over time might be explained by institutional inertia (England et al., 2007; Krüger, 1995, 2003). According to this assumption, a direct causal relationship should no longer be found today between the share of women and occupational wage levels.

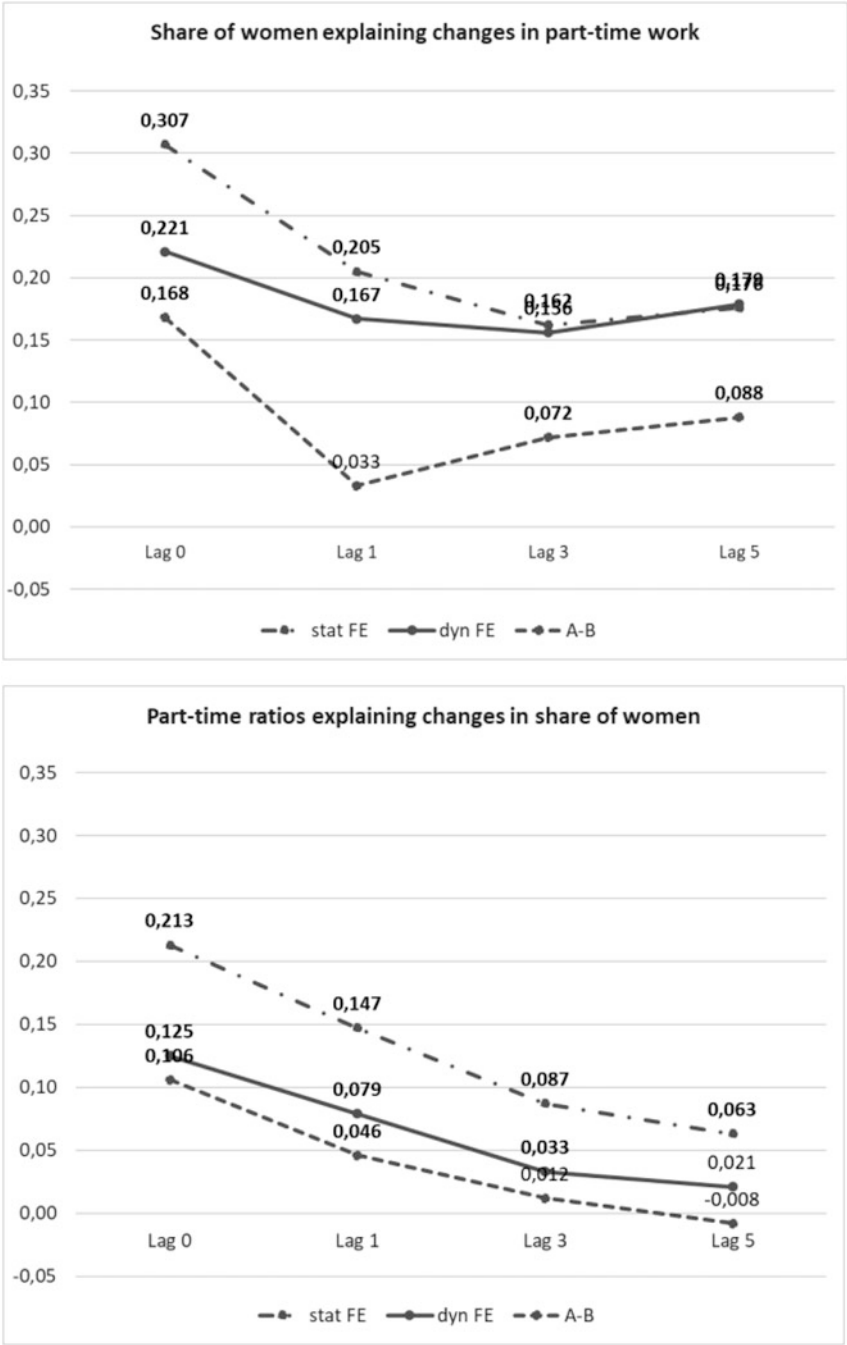
We tested whether a rising share of women per occupation leads to decreasing wages or whether a causal effect can no longer be found using regression models with fixed occupation effects and lagged independent variables. Using these fixed-effects panel models has the advantage that all unobserved time-constant heterogeneity is controlled by design (Brüderl, 2010). We applied stationary and dynamic fixed-effects panel models to the above-mentioned occupational panel. The models considered short- and long-term effects of the proportion of women on the median wage level within occupations. We found a substantive negative long-term effect, net of occupational working time arrangements and qualification requirements. At first sight, this supported the devaluation hypothesis. However, when estimating separate models for women and men, this negative effect disappeared: a rising share of women in an occupation did not affect women’s or men’s wage levels in either the short or the long run. Hence, declining total wages at the occupational level are not the result of a rising share of women per se, but are caused rather by the fact that more women are working in these occupations; and that also within occupations,



women generally earn less than men. In our view, this result suggests a social devaluation of all activities performed by women, independent of the predominant gender typing of the occupation they work in.

In a next step, we analysed the causal relations of occupational sex segregation with another important dimension of changing occupational characteristics: part-time work (Bächmann et al., 2022). More specifically, we investigated the reciprocal relationship between sex segregation and part-time work over time within occupational groups in West Germany. Therefore, we asked whether part-time work in occupations increases once more women have entered these occupations, or whether occupations that offer more part-time work attract more women. The first direction of influence suggests that particular groups of women, such as mothers, might choose part-time work to reconcile family and working life. The second direction of influence stresses the importance of occupational choices at the beginning of careers. To test these hypotheses, we enriched our occupational panel data set by further occupational characteristics based on German Microcensus data from 1976 to 2010. The German Microcensus is an obligatory yearly survey conducted by the German Federal Statistical Agency containing a 1-per cent sample of the population living in Germany (Federal Statistical Office and GESIS, 2012). Based on the resulting occupational panel data set covering 254 occupations between 1976 and 2010, we applied linear regression models with fixed occupational effects and lagged covariates. Accordingly, our models consider only within-occupational variance over time and thus control for time-constant unobserved heterogeneity on the occupational level by design (Allison, 2009). Because we anticipated potential mechanisms of reverse causality, we had to overcome the problem that our covariates might not be strictly exogenous—a key assumption for unbiased estimates in static fixed-effects models (Wooldridge, 2010). For this reason, we estimated three different model specifications, namely static (stat FE), dynamic (dyn FE), and Arellano–Bond (A–B) panel models. Jointly, these allow us to assess these problems better and to draw inferences from the results. Moreover, to avoid misspecification of our models, we used different time lags of central independent variables. Results indicate that part-time work in occupations increases, once more women start working in these occupations (Fig. 13.3), especially if they are married and/or have children. In contrast, changing working-time arrangements influence women's inflow into occupations to a much lower extent; instead, the sex composition of previous years strongly affects the current share of women. This points towards strong path dependencies of occupational choices in the German labour market.

Overall, both studies conducted on the mesolevel of occupations indicate that occupational sex segregation is linked to occupational wage levels and part-time ratios in rather complex ways. Thus, whether and how the sex composition of occupations and related occupational characteristics shape individual labour market careers of women and men remains an open question.



**Fig. 13.3** Reciprocal relationships between the share of women and part-time work in occupations. Bold coefficients =  $p < 0.05$ . (Sources: RDC of the Federal Statistical Office and Statistical Offices of the Federal States, Microcensus (SUF) and SIAB weakly anonymized version 7510, authors' estimations)

### 13.5 How Occupational Characteristics Structure Gender Inequalities in Non-monetary Labour Market Returns

Therefore, in four further papers, we investigated how occupational sex segregation and related occupational characteristics structure gender inequalities in non-monetary labour market returns. We did this by merging the generated occupation-level data with individual data from the National Education Panel Study (NEPS) Starting Cohort 6 based on occupation and year of NEPS respondents' employment spells. For these analyses, the NEPS data were transformed into several longitudinal datasets covering the respective transitions as well as cumulative measures of employment trajectories. NEPS data are particularly well suited for these individual-level analyses, because they contain rich monthly information on the educational and employment histories of more than 16,000 individuals living in Germany (born between 1944 and 1986) as well as on their partners and children. These histories were collected retrospectively in the first survey wave. In subsequent waves, the respondents' life courses are being updated by means of dependent interviewing. This data structure makes it possible to measure individual human capital far more accurately than in other surveys, and it delivers precise information on the exercised occupation over the whole employment history. Finally, NEPS data allow us to measure the gendered nature of employment experience precisely, because family-related employment interruptions, phases of non-employment and unemployment, as well as spells of part-time employment are collected retrospectively.

The first study on the individual level focused on the relevance of occupational characteristics for mothers' family-related employment interruptions (Bächmann & Gatermann, 2017). Leave periods—and particularly longer ones—are well known to have negative consequences for further employment careers, because they contribute to a loss or devaluation of human capital (Aisenbrey et al., 2009). Whereas the determinants and consequences of family-related employment interruptions have been examined in detail, the effects of characteristics related to the occupation held prior to the interruption have been neglected almost completely so far. Hence, this study asked how occupational sex segregation and related occupational characteristics affect the duration of family-related employment interruptions. In particular, we analysed the role of occupational working time arrangements and wage levels and tested two competing hypotheses. First, since female-dominated occupations are associated with a higher share of part-time work, we expected mothers who were employed in such occupations prior to giving birth to have shorter spells of employment interruptions due to a better reconciliation of work and family. Second, because lower wages indicate lower opportunity costs while not working, we anticipated that occupations dominated by women might be accompanied by longer employment interruptions due to their lower wage levels. In addition, we analysed whether the proportion of women in a given occupation per se influences the duration of employment breaks. To test our hypotheses, we concentrated on the duration of employment interruptions of mothers who gave birth to their first child between

1992 and 2010. We employed discrete-time event history models (Allison, 1982) to analyse the impact of occupational sex segregation and associated occupational characteristics on the duration of mothers' employment interruptions. Using event history models enables us to estimate the probability of mothers resuming employment by not only taking into account the time that has already passed since childbirth but also adequately considering right-censored observations—in our case, mothers who had not returned to employment by the end of the observation period. The findings of our models hint towards the second hypothesis: whereas higher occupational wage levels lead to shorter employment breaks, part-time rates and the share of women in an occupation per se have no significant effect on the duration of employment interruptions after childbirth.

We further analysed whether and how sex segregation affects other types of involuntary employment breaks of women and men: namely, unemployment (Hägglund & Bächmann, 2017). For this purpose, we explored transitions from unemployment back to employment from 1993 to 2010, and asked whether gender differences in unemployment trajectories can be explained by the fact that women and men worked in different occupations prior to unemployment. Theoretically, we considered three potential mechanisms that might mediate the influence of occupational sex segregation on re-employment: First, female-dominated occupations might be overcrowded—that is, individuals in these occupations might suffer from increased competition due to an oversupply of labour. Second, they might be characterized by a lower degree of occupational closure indicating that female-dominated occupations are less protected by occupational credentials. Third, shifts in the occupational structure, particularly the decrease in routine manual work, could result in lower re-employment opportunities among incumbents of male-dominated occupations. We also tested this framework by estimating event history models for the same reasons stated above. This time, we used Cox proportional hazards regression models (Blossfeld et al., 2007). To test whether occupational sex segregation and the associated occupational characteristics structure the transitions of women and men back to employment differently, we estimated separate models by gender. Results revealed that working in a male-dominated occupation prior to unemployment influences the transition rate into employment positively—yet, only for men. Moreover, men showed higher transition rates if they worked in occupations with less unemployment in general, higher social closure, and less industrial work. These further occupational characteristics, however, could not explain the effect of occupational sex segregation. Interestingly, none of the occupational characteristics considered affected women's re-employment chances significantly, whereas individual and sectoral aspects were decisive.

In a related study, we explored how sex segregation and associated occupational characteristics influence women's and men's risks of becoming unemployed (Bächmann, 2022). Whereas women in Germany previously faced higher unemployment risks than men, in recent years, the risks facing men have outpaced those facing women. Therefore, we analysed whether this reversal might be due (at least partly) to women and men often working in different occupations. Theoretically, we discussed changes in the labour supply and demand of male- and female-dominated

occupations caused by mechanisms of crowding, and technological and sectoral change. We analysed transitions from employment to unemployment in three decades: the 1980s, 1990s, and 2000s. Using discrete-time event history models (Singer & Willett, 2003), we analysed gender-specific transition patterns from employment into unemployment while controlling for employment experience. Moreover, to analyse whether occupational sex segregation and associated occupational characteristics mediate potential gender differences, we employed the Karlson–Holm–Breen (KHB) decomposition to compare coefficients of nested logit models (Karlson et al., 2012). Our findings show that women faced higher unemployment risks than men in the 1980s, whereas their risk of becoming unemployed was significantly lower than that of men in the 2000s. Additional analyses on occupational closure revealed that women's lower unemployment risk in the 2000s was mediated positively by higher levels of licencing in female-dominated occupations. In contrast, the higher unemployment risks faced by women in the 1980s cannot be traced back to differences in male- and female-dominated occupations. Currently, however, women can benefit from working in occupations with higher occupational closure and thus, ultimately, from occupational sex segregation, at least with respect to employment security.

Finally, we analysed how occupational sex segregation and working-time characteristics affect the transition to part-time work of women and men (Althaber & Leuze, 2020). In Germany, part-time work is considered to be important for reconciling wage work and family responsibilities. Most explanations of part-time work focus on women and discuss factors on the individual, household, and institutional levels, whereas hardly any attention has been paid to men as well as structural factors of the labour market related to occupations. Therefore, in this article, we examined the relevance of occupational characteristics for the transitions from full-time to part-time employment for women and men in Germany between 1992 and 2015. Our theoretical considerations were based on Krüger's institutional approach to gendered life courses (Krüger, 1995, 2003) in combination with Acker's approach to gendered organizations (Acker, 1990). Based on Krüger's approach (1995, 2003) we assumed that transitions to part-time work should be higher in women-dominated occupations, particularly for women. In contrast, the perspective of gendered organizations (Acker, 1990) suggests that transitions to part-time work should be lower in occupations representing strong ideal worker norms such as high shares of fulltime work, overtime, or presence at the workplace, particularly for men. The results of the Cox proportional hazards models (see above) indicate that occupational working-time arrangements rather than sex segregation affect part-time transitions, yet in a differentiated way for women and men. Whereas norms of full-time work and overtime in occupations prevent transitions to part-time work for men, women change more often to part-time under these conditions.

### 13.6 Occupational Sex Segregation and the Gender Wage Gap

In order to analyse the relevance of occupational sex segregation for the gender wage gap in Germany, we modelled the gender wage gap cross-sectionally and longitudinally. We proceeded in three steps: (a) we analysed the occupational task profiles relevant for understanding the gender wage gap of female- and male-dominated occupations descriptively; (b) we examined the influence of occupational task characteristics on the gender wage gap cross-sectionally by merging occupation-level with individual-level data taken mainly from NEPS SC6; and (c) we analysed the changing influence of occupational characteristics on the gender wage gap longitudinally by merging occupation-level data with data from NEPS-SC6 linked to IAB register data (NEPS-SC6-ADIAB (LifBi et al., 2022)).

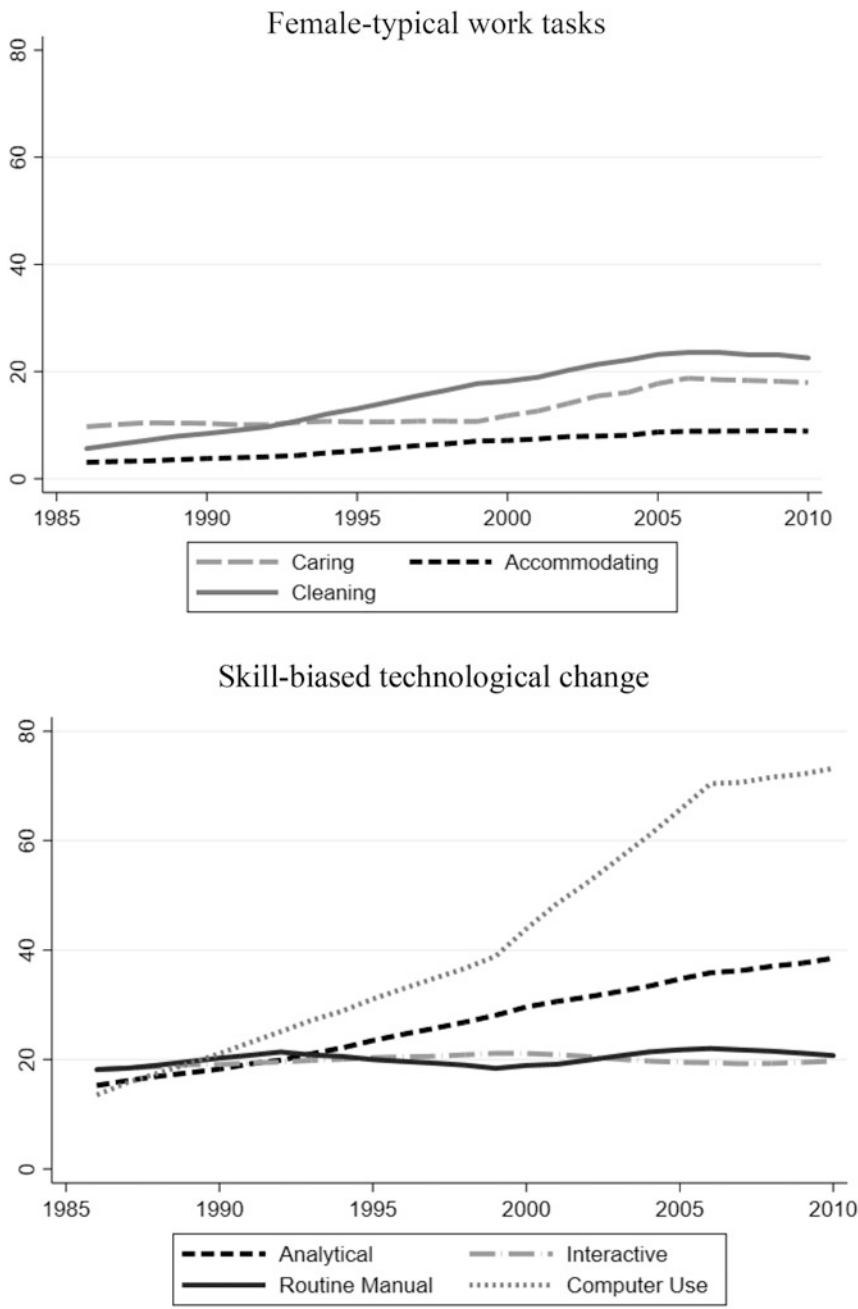
In the first step, we developed measures of occupational tasks in terms of both female- and male-connoted tasks and in terms of specific skills based on the Qualification and Career Surveys of the BIBB<sup>2</sup> (Kleinert et al., 2023). Female-typical tasks were depicted by accounting for caring, cleaning, and accommodating. To measure specific skills, we followed Black and Spitz-Oener (2010) who harmonized the tasks surveyed in the BIBB data sets and computed tasks profiles for different occupations. Transferring the economic tasks literature (Autor et al., 2003) to the German context, we focused on four task dimensions: namely, non-routine analytical tasks, interactive tasks, routine manual tasks, and computer use.

Results of the occupational tasks profiles reveal both continuity and change (Fig. 13.4). Regarding the development of female-typical work tasks, we found rising shares of caring and accommodating tasks, and, to a lower extent, also of cleaning tasks. The usage of female-typical tasks has grown over time with largely similar trends for women and men except for one field: the increase in accommodating tasks has been more pronounced among women. Evidence on skill-biased technological change is less straightforward. There is an increase in non-routine analytical tasks and computer use over time, but hardly any change in interactive and routine manual tasks. Moreover, developments over time are fairly similar for men and women. Thus, consistent with prior studies, our analyses confirm an increase in analytical and interactive tasks profiles over the last decades as well as a rise in female-connoted tasks. Yet, we did not find a decline in routine manual tasks, but rather an increasing complexity in task profiles over time (Rohrbach-Schmidt & Tiemann, 2013).

Our second step was a cross-sectional analysis of how individual task profiles and working-time arrangements contribute to the gender wage gap. A first study on this

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<sup>2</sup>In 1979, 1986, 1992, and 1999 data were surveyed by the Federal Institute for Vocational Education and Training (BIBB) in cooperation with the Institute of Employment Research (IAB), and in the years 2006, and 2012 together with the Federal Institute for Occupational Safety and Health (BAuA). For more information on the data and on data access, see <http://www.bibb.de/de/622.htm>.



**Fig. 13.4** Development of occupational tasks profiles, 1985–2010. (Sources: NEPS-SC6-ADIAB, BIBB/BAuA employment cross-sections, own estimations)

issue examined the gender wage gap among higher education graduates in Germany (Leuze & Strauß, 2016). It examined two mechanisms that might explain why occupations dominated by women pay less: the wage effects of ‘gender-typical’ work tasks and of ‘gender-typical’ working time arrangements on the occupational level. Drawing on devaluation theory (England, 1992), we assumed that occupations with ‘female-typical’ work tasks should pay less, whereas the perspective of gendered organization (Acker, 1990) suggests that occupations with ‘male-typical’ working time arrangements should pay more. Both of these should contribute to the gender wage gap. We applied linear wage regressions and Blinder–Oaxaca decompositions to a representative survey of higher education graduates who received their degree from a German higher education institution in 2001 (*HIS Absolventenpanel 2001*). These individual-level data were merged with occupation-level tasks data from the BIBB/BAuA Employment Survey of the Working Population on Qualification and Working Conditions in Germany 2006 and occupation-level data on working time from the German Microcensus 2005. Results show that the gender label of occupational work tasks had only limited explanatory relevance. On the one hand, ‘male-connoted’ tasks such as computing/IT induce wage premiums. On the other hand, occupations with a high share of ‘female-typical’ tasks (namely teaching/educating) also pay higher wages, which speaks against a general devaluation of ‘female-typical’ work tasks. Occupational working time arrangements were more important than tasks for our understanding of why occupations dominated by women pay less. Because highly qualified women also work more often in occupations with a high share of part-time employment and less often in occupations with a high share of workers reporting overtime, they earn less than their male counterparts, which supports Acker’s (1990) theory of gendered organizations.

A second paper started from these findings and analysed whether differences in demand and supply of men’s and women’s tasks profiles contribute to our understanding of the gender wage gap (Bächmann et al., 2021). Based on the perspectives of skill-biased technological change (Katz & Murphy, 1992) and the task-based approach (Autor, 2013; Autor & Handel, 2013) combined with sociological considerations of gender essentialism and male primacy, we looked at the systematic variation in the demand and remuneration of job tasks performed mainly by women or by men. We assumed that today’s high demand for highly qualified and non-routine activities should lead to a better payment of analytical and interactive activities, whereas physically strenuous and routine activities should pay less. Because women perform more interactive and routine tasks, whereas men perform more analytical and manual tasks (Autor & Handel, 2013), this means that not all job tasks performed primarily by women pay less, but only those that are no longer in high demand. We tested these assumptions using data from a newly developed instrument on tasks performed in respondents’ current jobs available in NEPS-SC6, Wave 4 (Matthes et al., 2014). This measures four different dimensions of general job tasks: namely, nonroutine analytical tasks (reading, writing, mathematical), nonroutine and routine interactive tasks, routine manual tasks, and routine analytical tasks. Using these task profiles enabled us to address pay gaps not only



between different occupations but also between women and men working in the same occupation. Hence, we estimated within-between random effects models and Blinder–Oaxaca decompositions to analyse the contribution of gender-specific task profiles to the gender pay gap. Using these hybrid models (Schunck, 2013) enabled us to compare the between-occupation and within-occupation effect of individual task profiles directly within one model. Results showed that men benefit from performing more nonroutine analytical activities than women. In contrast, women benefit from performing fewer manual activities within as well as between occupations and from working in occupations characterized by a higher extent of nonroutine interactive tasks. In sum, our results show that women perform lower paid job tasks more often than men do, which contributes to the gender wage gap. As a main contribution to prior literature, our results demonstrate that this finding is caused not only by differences in the task profiles of male- and female-dominated occupations, but also by the fact that women perform different and less highly rewarded tasks than men within the same occupational groups.

Because skill-biased technological change would suggest changes in tasks over time that then evoke changes in the wage structure, a final paper examined how changing occupational tasks contributed to the gender pay gap over time (Kleinert et al., 2023). In our theoretical framework, we contrasted devaluation theory and skill-biased technological change, which systematically differ in their assumptions on the link between occupational task profiles and the gender wage gap. Based on considerations of devaluation theory, we hypothesized that female-connoted tasks would have a negative effect on wages that persists over time. In contrast, skill-biased technological change would assume that non-routine analytical and interactive tasks would receive increasingly higher wages (Giesecke & Verwiebe, 2009), and this should result in a decline of the gender wage gap. We tested our hypotheses using a data set that links the NEPS-SC6 data with longitudinal administrative wage data on the same persons—the NEPS-SC6-ADIAB—and we merged longitudinal occupational task profiles to the individual trajectories based on the BIBB/BAuA employment surveys (see above). We employed repeated cross-sectional regression analyses and Oaxaca–Blinder decompositions to analyse West German regular employees aged 20–50 who left the educational system in the period 1986–2010. Our results reveal that the impact of tasks over time is more complex than theoretically assumed. Gender differences in the usage of tasks in general do not contribute much to the explanation of the gender wage gap or its trend over time. Only cleaning tasks, which are performed more often by women than men, are associated with wage penalties. However, without the existing sex differences in the usage of particular tasks, namely accommodating, caring, and manual routine tasks, the gender wage gap would have been even larger, particularly in recent years. Furthermore, preliminary results suggest that most tasks have quite different effects on wages for women than for men. Thus, task profiles might influence the gender wage gap not primarily via their uneven distribution among women and men, but by generating different rewards.

## 13.7 Conclusions

By investigating the relationship between segregation and inequality on the occupational and individual levels, our project produced new theoretical and empirical insights into the extent to which gender inequalities in the German labour market are reproduced systematically by 'contextualized' labour market structures: namely, occupational sex segregation. Our analyses of how occupations affect gender inequalities in the labour market therefore shed further light on the institutional determinants of gender inequalities in Germany. Overall, the empirical findings of our studies conducted in the project point towards five important results.

First, the sex composition within occupations is linked systematically with other characteristics of occupations such as wage levels or working time arrangements. However, these linkages are more complex than theoretically assumed. Even though rising shares of women in an occupation are accompanied by lower wages, this finding is less attributable to the devaluation of female-dominated occupations, but more to the fact that within occupations, women generally earn less than men. With regard to part-time work, we found that rising shares of women in occupations lead to rising shares of part-time work, particularly in the case of mothers and married women, whereas the effect of part-time work on the occupational sex composition is weaker. This points towards the importance of part-time work for reconciling work–family conflicts in the German labour market, whereas supply-side driven processes of part-time provision by employers seem to matter less. Future research will have to establish whether and how further characteristics, such as occupational closure or occupational qualification requirements, are causally linked with the unequal distribution of women and men across occupations.

Second, our findings on the individual consequences of working in sex-segregated occupations indicate that employment trajectories are structured mainly by occupational characteristics that are structurally linked with sex segregation. Whereas occupational wage levels affect the duration of family-related employment interruptions, occupational closure influences men's re-employment chances and women's unemployment risks. Finally, occupational working time arrangements matter for the transition to part-time work of both women and men. With the exception of unemployment risks and re-employment chances after phases of unemployment, the effect of the sex composition of occupations turns out to be insignificant once further occupational characteristics are considered. This indicates that it is occupational attributes related to occupational sex segregation and not the share of women and men per se that reproduce gender inequalities in the German labour market. As a consequence, future research should more thoroughly establish whether gendered labour market outcomes are indeed attributable to the sex composition of occupations or to related characteristics. Moreover, new theoretical considerations have to be developed that are linked not only to the share of women in occupations but also to the additional attributes these occupations hold.

Third, occupational sex segregation and related occupational characteristics affect employment trajectories of women and men in a gender-differentiated way.

Generally, it seems that these factors are more important for shaping the career trajectories of men by influencing, for example, their employment re-entries after unemployment or their transitions to part-time work. For women, these outcomes are influenced more strongly by individual and household level characteristics such as the presence of children or by sectoral factors such as regional unemployment rates. However, when explicitly investigating changes over time, as Bächmann (2022) does, we can see a growing importance of occupational characteristics for the employment trajectories of women as well. In this regard, working in female-dominated occupations is not always detrimental to women's careers, but also might buffer labour market risks. As a consequence, future research should consider not only gender-differentiated influences of occupational characteristics but also their changing importance for women and men over time.

Fourth, besides other well-researched factors that contribute to the gender pay gap such as differences in experience due to employment interruptions and part-time work or the representation of women in management, what women and men actually do in their jobs also matters. We could show that male-dominated, mixed, and female-dominated occupations show a different mix of task profiles. The trend over time in tasks suggests monetary gains for 'female-typical' tasks such as caring or accommodating, but also for tasks that are usually thought to be more 'male' such as computer use or analytical tasks. Consequently, the link between job task profiles and occupational sex segregation is not as persistent or uniform as often assumed. Furthermore, our findings showed that women and men perform different tasks when working in the same occupations. Both aspects of job tasks have consequences regarding their effects on wages. The different tasks that women and men perform explain part of the gender pay gap—between and within occupations.

Finally, the impact of tasks over time is more complex than theoretically assumed. In particular, devaluation theory, which assumes constant wage penalties for activities associated with females, can explain neither the decreasing size of the gender wage gap nor the fact that without sex segregation (or specialization), the gap would have been even bigger. Our analyses suggest that the devaluation of work performed by women depends not only on gender-typical task profiles but also on three further mechanisms. First, we find gender-specific task specialization within occupations that results in wage losses. Second, similar tasks seem to result in different remuneration for women and men. And third, other aspects of 'female' and 'male' work, such as gender-typical working-time arrangements, also contribute to the gender pay gap. In sum, these findings hint at more subtle differences in the type of everyday work and 'unseen' hierarchies between women and men in the same occupation that we cannot measure with the coarse skills and tasks data available in large-scale survey data. It is up to future research to identify these gender differences and their effects on wages in the Germany.

Taken together, our project contributed to several research areas in sociology. Regarding the sociology of occupations and professions, we contributed both theoretically and empirically to a better understanding of how different aspects of occupations have changed over time in the German labour market, and whether or not these changes are causally linked to each other. In the field of gender studies, our

project shed light on how institutional and structural factors of the labour market affect the (re-)production of gender inequalities over the life course in addition to individual-level explanations. Finally, in the field of life-course research, our project systematically linked changes in the macrolevel institutional structure of the labour market and occupations to the development of individual life-course trajectories. Such an endeavour required not only precise theoretical reasoning on the link between institutions and life courses, but also advanced means of data collection and analysis for linking macro- and microlevel data. By aggregating data from the SIAB and the German Microcensus, which can be matched to the life-course data collected by NEPS Starting Cohort 6, we generated novel datasets that can be used in the future by the whole scientific community for analysing occupational influences on life-course outcomes.

To conclude, our theoretical considerations and empirical findings underline the high relevance of occupational sex segregation for the (re-)production of gender inequalities in the German labour market. Sex segregation affects individual life and employment histories via different mechanisms such as wage levels or different levels of closure in male- and female-dominated occupations. As a consequence, a reduction of occupational sex segregation could be one important way to reduce gender inequalities in the labour market. Our research shows that not only women but also men might benefit from a more integrated occupational structure with regard to, for example, the risk of becoming unemployed. A decrease of segregation would also be desirable from a macrosocial welfare perspective: a reduction of occupational sex segregation could help to meet the demand for skilled workers under conditions of demographic ageing (e.g., in health or STEM occupations). Furthermore, a reduction in occupational sex segregation and associated social norms on the occupational choice of women and men would help to create more individual freedom of occupational choice and support the development of talent.

Nonetheless, our research does not give direct hints on how to attain this aim. One possibility would be to directly address occupational gender stereotypes and choice processes starting in early childhood. Another possibility would be to tackle the uneven conditions between and within different occupations, irrespective of their gender distribution, in order to make ‘typical female’ occupations more attractive for men and ‘typical male’ occupations more attractive for women. This implies a revaluation of female-dominated occupations—a necessity that has just become apparent again in the course of the COVID-19 pandemic; in particular, as regards the wages paid to care and health occupations. Moreover, to increase the share of women in male-dominated fields, conditions for reconciling family and working life could be improved, particularly in relation to working time norms. Finally, our findings imply that a reduction of occupational sex segregation is no panacea. Our research showed that women and men who perform different tasks are also remunerated differently within the same occupations. As a consequence, it is important to focus not only on gender typing, working conditions, and rewards among broad occupational groups, but also to keep an eye on segregation processes within these groups that might gain in dynamics when overall segregation declines.

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