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Original Article

A 'potential motherhood' penalty? A longitudinal analysis of the wage gap based on potential fertility in Germany and the United Kingdom

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While labour market penalties related to motherhood are a widely studied topic, less is known about the implications of signalled *potential* fertility. We thus posed the question of whether potential fertility—operationalized as the likelihood that a childless woman will transition to motherhood depending on observed sociodemographic characteristics—is associated with a wage penalty and—if so—what the drivers of this wage gap are. We further tested theory-driven hypotheses about heterogeneity across institutional contexts (i.e. in Germany and the United Kingdom) and socio-economic classes. In so doing, we relied on SOEP, BHPS, and UKHLS panel data to construct a synthetic measure of potential fertility over the period from 1991 to 2017. We first explored the overall association between potential fertility and wages and found a wage gap to the disadvantage of potential mothers in both contexts, albeit with non-negligible heterogeneity across time and socio-economic classes. Subsequently, we selected the top and bottom quartiles of the distribution of potential fertility and performed a 2-fold decomposition of the wage differential between potential mothers and women who are less likely to transition to motherhood. The observed wage gap can mostly be explained by compositional differences in observed characteristics between the two groups of women, thereby leaving little room for explanations based on employer discrimination.

Introduction

Gender disparities in the labour market and the explanatory mechanisms behind these disparities have been the object of extensive empirical research. The present article contributes to the existing knowledge on the topic by bridging two major theoretical frameworks: namely the 'motherhood penalty' (or 'child penalty') and discrimination. On the one hand, there is general agreement about the major role that childbirth plays in widening gender gaps in labour market outcomes. On the other hand, discrimination theories postulate that these outcomes are not solely the result of workers' marginal productivity or the determinants of this productivity, such as childbirth. Indeed, demand-side factors—such as employers' reliance on indirect signals of work productivity—are also likely to be relevant. Taking both perspectives together, it would be possible to theorize that not only *realized* motherhood, but also *potential* motherhood (i.e. a woman's likelihood of having a child) could be used by employers as an indirect signal of future worker productivity. The present paper specifically focuses on the signalled potential fertility of childless female employees and investigates both the presence of a wage differential between potential mothers and women who are less likely to transition to motherhood as well as the determinants of this differential.

This article makes three main contributions: First, by bridging the literature on the motherhood penalty and statistical discrimination theory, we propose a synthetic measure of potential fertility that can be observed by employers. Second, we provide a detailed account of the components of the wage gap that are related to potential fertility by using longitudinal and comparative microdata. Survey data complement knowledge derived from experimental designs by overcoming external validity issues and by extending the timeframe and the number of analysable contexts. This latter feature is particularly relevant in current research as it enables a comparison of the two countries of Germany and the United Kingdom, which differ substantially in terms of their institutional features.

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Finally, heterogeneity among women is theorized and tested by examining differences based on women's socio-economic class.

Theoretical background

Employer discrimination, and motherhood as a signal of worker productivity

Labour market discrimination refers to the different treatment given to some workers or jobseekers based on their personal characteristics, independent of their work productivity. When focussing on discriminatory behaviours perpetrated by recruiters or employers, different forms of discrimination have been theorized and tested. Although empirically disentangling these forms of discrimination represents a challenge (Bohren, Hull and Imas, 2022), it is useful to make a distinction based on their underlying mechanisms. Employer discrimination is said to be *taste-based* when it is driven by personal preferences against one group, independent of expectations about work productivity (Becker, 1957). When discriminatory behaviours originate from cultural prejudices or from performance expectations related to the social status attached to individuals' attributes or roles, these behaviours are referred to as *status-based* (Ridgeway and Correll, 2004; Correll and Benard, 2006). Finally and most importantly for the topic under investigation in the present paper, *statistical* discrimination arises in contexts characterized by information asymmetry—that is, when employers have insufficient, inaccurate, or ambiguous information about employee productivity. Assuming that employers are profit-maximizing actors, they may find it to be too expensive to access complete information about worker productivity and may thus infer this productivity by using statistical information about the average productivity of the social group(s) to which a worker belongs (Phelps, 1972; Arrow, 1973). The most salient aspects of statistical discrimination are that (i) it emerges in contexts of limited information, (ii) employers are assumed to be rational actors whose aim is profit maximization, and (iii) signals of worker productivity assume crucial importance.

Focussing on signalling, a useful distinction is the one between direct and probabilistic signals (Fossati, Wilson and Bonoli, 2020). While direct signals are directly related to skills that are relevant to worker productivity (e.g. education), probabilistic signals only show an indirect association with these skills. Among these probabilistic signals, extensive evidence exists that highlights the crucial role of motherhood as a negative signal of worker productivity.

The literature on the 'motherhood penalty' (or 'child penalty') (Kleven, Landais and Søgaard, 2019) has pointed out that due to work interruptions related to childbirth and subsequent childcare duties, mothers are likely to face a slowdown in human capital accumulation and a depreciation in skills, which is particularly problematic in the case of jobs that require large investments in specific skills (Polavieja, 2012) and thus renders mothers less productive compared with non-mothers and fathers. However, the penalty related to motherhood might be unrelated to actual productivity and could instead be the result of different occupational choices. According to the theory of compensating (wage) differentials (Smith, 1979), job positions that offer more favourable working conditions attract labour at lower wage rates, whereas activities that are characterized by more unfavourable conditions tend to pay wage premiums as a form of 'offsetting compensation' (Rosen, 1986: p. 641). From this perspective, mothers' needs in terms of flexible work schedules and time off for family duties represent incentives for these mothers to choose occupations and positions that are characterized by more favourable non-monetary elements, but at the cost of lower wages. Although these perspectives emphasize different mechanisms, they both suggest that mothers are likely to show less work productivity and career commitment on average than are childless women and fathers. Even when individual mothers deviate from this average picture, following statistical discrimination theory and due to employers' reliance on signals of group belonging, these mothers are equally as likely as other mothers to be discriminated against.

The presence of employer discrimination based on gender and parenthood—and the interaction between both elements—has found support in the empirical literature (Budig and England, 2001; Gangl and Ziefle, 2009) and especially in the experimental literature (for overviews, see Azmat and Petrongolo, 2014; Bertrand and Duflo, 2017).

Potential fertility

Although the *event* of childbirth likely leads to negative consequences for women in the labour market, the *status* of being a mother is not necessarily associated with (the expectation of) lower work productivity or job commitment. After having become mothers, having reached the end of their fertility cycle, and having benefited from reduced childcare duties, there is no reason why women should suffer from statistical discrimination. From the point of view of employers, the investment in women might be perceived as particularly risky especially *before* these women transition to motherhood because childbirth and the related childcare needs would likely decrease the time and effort that these women have to dedicate to their job. To put it differently, the propensity of a woman to give birth (henceforth, *potential fertility*)—if observed by

employers—could represent a negative indirect signal of (future) work productivity.

Empirical testing of the labour market implications of potential fertility is rare and usually indirect. Potential fertility often emerges as a residual explanation in studies that are primarily concerned with the effects of other attributes, such as age and sex (e.g. Petit, 2007). In a correspondence study conducted by Baert (2014) in Belgium that focussed on hiring discrimination based on women's sexual orientation, the penalty for young heterosexual women compared with lesbians was interpreted as being dependent on the higher probability of heterosexual women to have children, which supports the thesis of discrimination against potential mothers. Another interesting empirical investigation was undertaken by Jessen, Jessen and Kluve (2019), who examined a 2006 amendment to German law that enabled large companies to contribute to the statutory health insurance system instead of directly financing their employees' maternity leave. The finding of a significant increase in relative female wages within large companies following the reform was interpreted as evidence of employer statistical discrimination against women before the reform on the basis of their potential fertility.

Among the few existing contributions that have explicitly analysed potential fertility and its labour market implications, a large-scale correspondence study conducted by Becker, Fernandes and Weichselbaumer (2019) found that both women with young children and married childless women (two categories that signal potential fertility) had the lowest hiring probability. In a similar vein, analyses based on German survey data suggest that the probability of becoming a parent significantly reduces female horizontal and (albeit to a lesser extent) upward career mobility (Biewen and Seifert, 2018).

In the present paper, we analyse the implications of women's observable potential fertility on wages and hypothesize that:

> **H1a:** There should be a wage gap among women based on their potential fertility. Specifically, potential mothers should suffer a wage penalty compared with women with a lower propensity to transition to motherhood.

Considering potential fertility as a negative signal of worker productivity for employers, we further hypothesize that:

> **H1b:** Employer discrimination should contribute to the wage gap based on potential fertility.

Glass ceilings or sticky floors?

The occupational structure and the type of skills required at different occupational levels might incentivize employer discrimination in certain occupational groups as compared with in others. Two different metaphors are usually invoked in the literature: while the 'glass ceiling' perspective suggests the presence of a wider wage gap at the top of the occupational hierarchy, the 'sticky floor' scenario argues that there is a more severe gap at the bottom.

According to the glass ceiling hypothesis, 'invisible barriers' prevent women (or other disadvantaged social groups) from attaining leadership positions and high salaries. The wage gap is thus expected to be wider at the top of the occupational and income distribution. Such barriers might be due to more severe employer discrimination in higher-level jobs given the greater degree of preparedness and commitment as well as the long-term, uninterrupted careers that are usually required in these positions (Bjerk, 2008). This phenomenon might also be viewed in light of knowledge derived from the stratification literature, which highlights two crucial dimensions along which work is differentiated: the degree of asset specificity and the extent of monitoring difficulty (Goldthorpe, 2000). While asset specificity refers to the extent to which job-specific skills are required, monitoring difficulties are present when an employer cannot precisely assess worker productivity or exercise control over these workers—that is, the classical 'principal–agent problem' (Breen, 1997). In the case of top-level positions, investment in job-specific skills is needed, and monitoring might be particularly difficult, thereby exacerbating statistical discrimination against categories of workers who have more uncertain productivity. While some researchers have posited that this is a 'distinctively gender' phenomenon (Cotter *et al.*, 2001), others have argued that workers who have more uncertain productivity signals (which are not necessarily defined by gender) are more likely to face barriers at the top (Bjerk, 2008).

As there is no clear definition of what constitutes an obstacle in the advancement of 'disadvantaged groups' and given the mixed existing evidence (e.g. Christofides, Polycarpou and Vrachimis, 2013), testing this perspective and its possible underlying mechanisms is particularly important. Taking employers to be risk-averse actors, they would be particularly likely to discriminate against groups of workers whose productivity is more uncertain, especially in more demanding managerial positions. Applied to the present study, the glass ceiling hypothesis predicts that:

> **H2a:** The wage gap related to potential fertility—and particularly the portion of it that is potentially related to discrimination—should be larger in higher occupational classes compared with in lower classes.

On the other hand, the 'sticky floor scenario' posits that disadvantaged social groups struggle to climb

the career ladder and remain trapped in entry-level or low-grade positions, which are often characterized by inferior pay (e.g. Booth, Francesconi and Frank, 2003). As the skills needed in low-skilled or unskilled occupations are usually learned on the job or are irrelevant, employers tend to reward the 'right attitude' rather than to evaluate workers' actual abilities and are thus more prone to relying on the discrimination heuristic (Pager, Bonikowski and Western, 2009).

In line with this scenario, the 'sticky floor' hypothesis states that:

> **H2b:** The wage gap related to potential fertility—and particularly the portion of it that is potentially due to discrimination—should be larger in lower occupational classes compared with in higher classes.

From micro-level mechanisms to macro-level features: the role of the context

Research on the motherhood penalty and employer discrimination has highlighted the crucial role played by macro-institutional factors, especially labour market regulations and family policies (Gangl and Ziefle, 2009; Mayer, 2009; Kleven *et al.*, 2019; Mari and Cutuli, 2021).

According to Hall and Soskice's (2001) 'Varieties of Capitalism' perspective, the main competencies provided by the educational system influence the type of skills that are most appreciated in a given market economy. Productivity returns to specific training are more uncertain for women given their higher likelihood of taking periods of leave or of quitting their job after childbirth. Thus, product market strategies that rely on company- or industry-specific skills tend to enhance employers' statistical discrimination compared with in more 'gender-neutral' contexts in which general skills are required (Estévez-Abe, 2005; Mandel and Shalev, 2009).

Comparative research has further provided solid insights into how work–family policies and services can influence the economic consequences of motherhood. Long and generous maternity leave likely involves direct and indirect costs for employers, thereby potentially making these employers less prone to hiring or promoting women and also incentivizing them to offer lower female wages. In line with this rationale, mothers who opt for longer leave have lower chances of an upward occupational move (Evertsson and Duvander, 2011; Evertsson, Grunow and Aisenbrey, 2016), and the gender wage gap is wider in contexts with longer parental leave (Cukrowska-Torzewska and Lovasz, 2020). Conversely, public or subsidized childcare services can reduce the duration of work interruptions after childbirth, thereby limiting the potential costs for employers (Gornick and Meyers, 2003).

The present article compares Germany and the United Kingdom—two countries that strongly differ in their institutional and policy packages. Germany is characterized by comparatively high levels of employment protection legislation and labour market rigidity (Barbieri and Gioachin, 2021) and exemplifies the ideal-typical coordinated market economy based on industry-specific skills. For women, both reinstatement in the same job after a period of leave and finding a new job with a different employer are impeded by the high degree of skill specificity, the maintenance and formation of which require occupational continuity and the non-transferability of which encourages long tenures in the same company or industry. This low transferability of skills represents a disadvantage for (potential) mothers, who are comparatively more likely to suffer from employer discrimination.

Alongside its labour market features, Germany is characterized by an insurance-based welfare system that provides long and generous job-protected maternity leave (Aisenbrey, Evertsson and Grunow, 2009; Olivetti and Petrongolo, 2017). Beginning in the 2000s, however, shorter work interruptions began to be financially incentivized (Gangl and Ziefle, 2015; Mari and Cutuli, 2021). Concerning the financing source, larger companies used to pay a share of the generous wage replacement that was provided to mothers. Companies' expected costs were therefore dependent on gender, potential fertility, and the previous wages of their employees—a situation that fostered employer discrimination. Beginning in 2006, maternity protection came to be financed by the statutory health insurance system in all companies, thus making costs independent of employees' personal characteristics (Jessen, Jessen and Kluve, 2019).

In contrast to Germany, the United Kingdom represents a liberal market economy and is characterized by a highly flexible labour market. This flexibility encourages employees to invest in general skills, which are transferable across not only employers, but also industries. The combination of at-will employment and the supply of easily replaceable workers (due the predominance of general competencies within the workforce) likely leads to comparatively lower levels of statistical discrimination against women and mothers (Estévez-Abe, 2005).

Concerning its social welfare model, the United Kingdom features a residualistic model in which the state offers a low level of welfare support and in which families tend to rely on services provided by the market (Esping-Andersen, 1990). Notwithstanding the increase in the length and generosity of maternal leave that has been present since the late 1990s (Lewis and Campbell, 2007; Olivetti and Petrongolo, 2017; Daly and Ferragina, 2018), the British approach to

parental leave has remained minimalistic, with comparatively short and ungenerous leave. Although the literature has mainly focussed on the implications of relevant institutional features for labour market penalties related to gender and motherhood, we argue that the theoretical underpinnings of existing perspectives can be generalized to cover differences between potential mothers and women who are less likely to transition to motherhood. Accordingly, we expect that:

> **H3:** The portion of the wage gap due to employer discrimination against potential mothers should be larger in Germany compared with in the United Kingdom.

Both national contexts have gradually reduced occupational costs related to motherhood, though with different strategies: either by increasing incentives for shorter maternal leave and making this leave fully publicly funded (Germany), or by increasing public spending for childcare (United Kingdom). We thus hypothesize that:

> **H4:** In both Germany and the United Kingdom, the portion of the wage gap due to employer discrimination should have decreased over time.

Data and methods

This article relies on German and British longitudinal microdata from the period of 1991 to 2017.[1] Specifically, we analyse the German Socio-Economic Panel (SOEP, v35, doi: 10.5684/soep-core.v35) and the British Household Panel Survey together with the UK Household Longitudinal Study (BHPS and UKHLS: University of Essex, 2020). These data sources provide detailed individual information about sociodemographic attributes, human capital measures, job and contractual characteristics, work histories, and wages. They additionally present further advantages by covering a relatively long timespan and by being largely comparable.

Our analytic strategy consists of two main steps: the first step is dedicated to constructing a synthetic measure of potential fertility. In the second step, we explore the relationship between potential fertility and wages, we calculate the wage gap between potential mothers and women who are less likely to transition to motherhood, and we provide a detailed decomposition of the components of the wage gap. As each analytic step requires a specific sample selection, in the following section, we outline the analytic samples and methods separately for the two steps in detail.

Potential fertility measurement

The existing literature is heterogeneous in both its conceptualization and operationalization of potential fertility as well as in the analytic strategy adopted to investigate it. Among the studies that have explicitly measured and tested potential fertility, Becker, Fernandes and Weichselbaumer (2019) signalled the probability of childbearing in an experimental setting by varying information on marriage and the presence and age of children while holding applicant age and work experience constant. Relying on survey data, Biewen and Seifert (2018) operationalized the hazard of pregnancy as a function of several observables (such as age, education, work experience, religion, and marital status).

We operationalized potential fertility as the propensity for a childless woman to have her first child (i.e. to transition to motherhood) within the subsequent 3 years.[2] In order to measure potential fertility, we relied on a sample of childless women and women with one biological child, both groups of women being aged 25–48, excluding observations with missing cases in any of the covariates of interest. Selecting women enabled us to better isolate the role of potential fertility by excluding any gender-related inequalities.[3] The age selection was useful for minimizing variability in fertility due to biological constraints and thus enabled us to obtain more conservative estimates. The age of 48 was chosen as the upper limit in order to also enable potential fertility to be calculated based on the subsequent 3 years for women aged 45 as these women were the oldest in the final analytic sample. This measure aimed at capturing general (statistical) knowledge about which women were likely to transition to motherhood; thus, no further selection was performed in this step. Table S1 provides more details about sample selection steps.

For each country and year, we performed a linear probability model (with clustered individual-level standard errors) that predicted the likelihood of transitioning to motherhood. The dependent variable was a dichotomous measure that assumed a value of 0 when no childbirth was observed in any of the following 3 years and a value of 1 otherwise.[4] In order to capture what was likely to be observed by employers, the model was deliberately kept simple. Unlike in previous studies, we excluded personal characteristics that were less likely to be observed by the employer (e.g. religion) as well as variables that were plausibly endogenous to potential fertility itself (e.g. work experience). As formalized in Equation 1, the final model includes age and marital status—both interacted with birth cohort—and region of residence:

$$P = \beta 0 + \beta 1 age + \beta 2 marital\ status + \beta 3 cohort + \beta 4 (age * cohort) + \beta 5 (marital\ status * cohort) + \beta 6 region + u \quad (1)$$

where P is the probability that the dependent variable—namely transition to motherhood—equals 1. In order to obtain predicted probabilities in the range of 0–1, they were estimated through a linear discriminant model (Haggstrom, 1983; Allison, Williams

and Hippel, 2020). Results of this step represent the core synthetic measure of potential fertility, which is therefore composed of a combination of signals that are all probabilistic in nature. Descriptive statistics about covariates and regression results are presented in Section A of the Supplementary Material (Tables S2–S4).

The resulting synthetic measure of potential fertility greatly varies across values of the included covariates, thereby supporting their relevance for capturing the concept of interest. Concerning the role of age, potential fertility reaches its peak when women are aged 27 in Germany and 29 in the United Kingdom. Then, it steeply decreases and stabilizes around the 0 level around age 38 (Figure S1).

Wage gap decomposition

In the second analytic step, we compared the extremes of the distribution of potential fertility. In each year, we selected the first and fourth quartiles of the distribution, which referred to women with a low propensity to transition to motherhood and to potential mothers, respectively. We further limited the sample to childless women aged 25–45 who were in dependent employment. Analysing women without children ensured that the results were not influenced by the presence of children and by the related motherhood penalties. Given the interest in employer–employee relationships, we excluded the self-employed. After sample selection and the exclusion of missing cases, the final analytic sample consisted of 7,895 observations (2,598 individuals) in Germany and 7,391 observations (2,806 individuals) in the United Kingdom (see Table S1 for detailed sample selection steps).

Descriptive statistics about potential mothers and women who were less likely to transition to motherhood are presented in Tables S2 and S3 and in Figure S2. Beyond age, another crucial sociodemographic characteristic was marital status. Women who were less likely to transition to motherhood were more likely to be single (55 per cent in Germany; 58 per cent in the United Kingdom). Potential mothers were instead more often married or cohabiting (57 per cent in Germany; 84 per cent in the United Kingdom) (see Tables S2 and S3).

The main dependent variable of interest in the present paper is individual wage. Specifically, we relied on the logarithmic transformation of individual gross hourly wages adjusted to the 2015 consumer price index. This choice enabled us to obtain an approximately normal distribution of the wage variable and to interpret wage gaps as percentage differences.

The log hourly wage gap between potential mothers and women who were less likely to transition to motherhood was decomposed by means of the 2-fold decomposition specification proposed by Oaxaca and Ransom (1994). Despite increasing complexity and differentiation in the available techniques, decomposition methods generally enable to calculate (i) the portion of the wage gap explained by compositional differences between the two groups—that is, by group differences in the distribution of explanatory variables—and (ii) the portion of the wage gap caused by different wage returns to the same distribution of characteristics. In line with extant research (e.g. Fortin, Lemieux and Firpo, 2011; Haupt and Strauß, 2022), we refer to the former component as the *composition effect* and to the latter component as the *structural effect*. We provide further details about the decomposition specification in Section B of the Supplementary Material. As it captures unexplained differences in wage returns net of the distribution of relevant attributes, the structural component of the gap is often interpreted as possibly being indicative of discrimination (see e.g. Combet and Oesch, 2019). It is important to note that even if the two groups to be compared are known to differ in the distribution of attributes (as in the case of the present paper), the structural component should still be able to capture any differences in wage returns (if present), independent of composition effects.

We implemented the decomposition analysis through the *xtoaxaca* Stata routine (Kröger and Hartmann, 2021) by setting the initial wage regression as a random-effects panel model.[5] With the aim of avoiding identification problems deriving from the use of categorical variables (Jann, 2008), we normalized the coefficients of these variables.

In line with previous research on the topic (e.g. Oesch, Lipp and McDonald, 2017), we selected covariates that could be grouped into three main categories: namely (i) sociodemographic and family-related attributes, (ii) human capital and work experience, and (iii) job characteristics. Age, migration background, and marital status represented relevant sociodemographic and family-related characteristics. Human capital and work experience were measured through educational level, months of tenure in the current company, and the number of years spent in employment. Finally, full-time (or part-time) employment, fixed-term (or permanent) contracts, occupation (ISCO88), company size, the percentage of women in the current occupation, ISEI score,[6] and the number of exits from employment accounted for job characteristics and were useful in testing the theoretical perspective of 'compensating differentials'. Descriptive statistics about decomposition variables are presented in Tables S2 and S3.

The presence and extent of a wage gap due to potential fertility status—as well as the components of this wage gap—might have been expected to vary depending on occupational and workplace characteristics, such as company type or size.[7] With the aim of providing a more general analysis of occupational heterogeneity

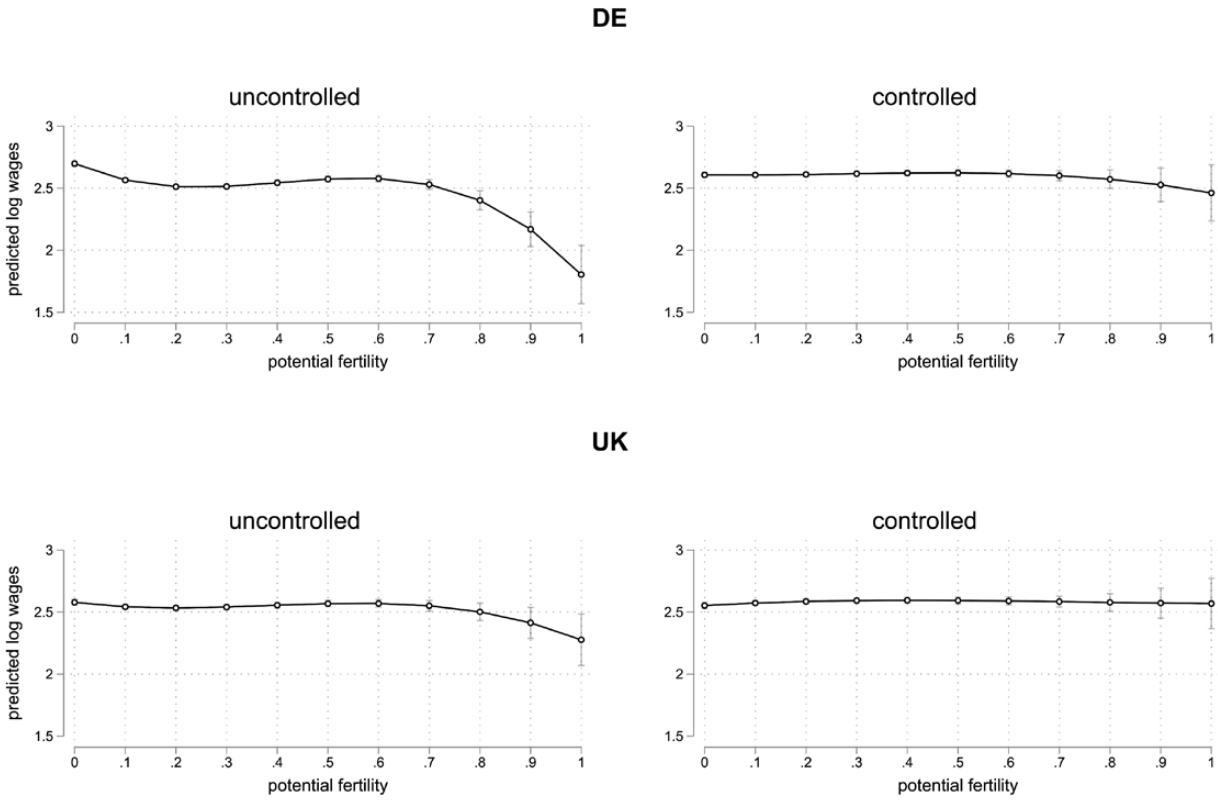

Figure 1 Predicted (log) wages conditional on the continuous measure of potential fertility, uncontrolled and controlled random-effects panel models (N_{DE} = 15,008; N_{UK} = 14,288), 95 per cent CI. Regression results in Table S5. Data source: SOEP, BHPS, and UKHLS. Note: Included controls are age, marital status, educational level, migration background, full- or part-time contract, permanent or fixed-term contract, number of exits from employment, company size, and months of tenure in the company. In order to show possible non-linear relationships, potential fertility is included in cubic form.

and of testing our theory-driven hypotheses, we investigated differences based on a categorical measure of socio-economic class. Class models are based on the idea that the foundation of social stratification lies in the occupational structure and—specifically—in employment relations (Goldthorpe, 2000). Analysing class differences is thus a particularly well-suited choice when the interest lies in employer–employee relationships. We relied on the European Socio-Economic Classification (ESeC) (Rose and Harrison, 2006), which is based on the Erikson-Goldthorpe-Portocarero class schema (Erikson, Goldthorpe and Portocarero, 1979) and was designed to facilitate country comparisons. Following Rose and Harrison's (2006) coding procedures, three main classes are distinguished: the salariat (class 1), the middle class (class 2), and the working class (class 3). The salariat is composed of the higher and lower salariat; the middle class consists of higher white-collar workers, the petit bourgeois, and higher blue-collar workers; and the working class is made up of lower white-collar workers, skilled manual workers, and semi-/unskilled workers.

Results

Potential fertility and wages

Figure 1 presents the association between the continuous measure of potential fertility and individual wages. Results derive from random-effects panel models that predict gross hourly wages (in log form) and that include potential fertility in its cubic form (with the aim of better capturing non-linearities) as the main regressor. Predicted wages are presented both gross (left-hand panels) and net of relevant covariates (i.e. the same covariates included in the decomposition analysis) (right-hand panels). Upon examining the uncontrolled models, wages clearly show stability over most of the potential fertility distribution in both Germany and the United Kingdom. However, when potential fertility reaches a high score (i.e. around 0.8), wages decrease by around 7 percentage points in Germany and 3 percentage points in the United Kingdom. Once control variables are included, the negative relationship disappears because predicted wages show great stability over the entire distribution of potential fertility.

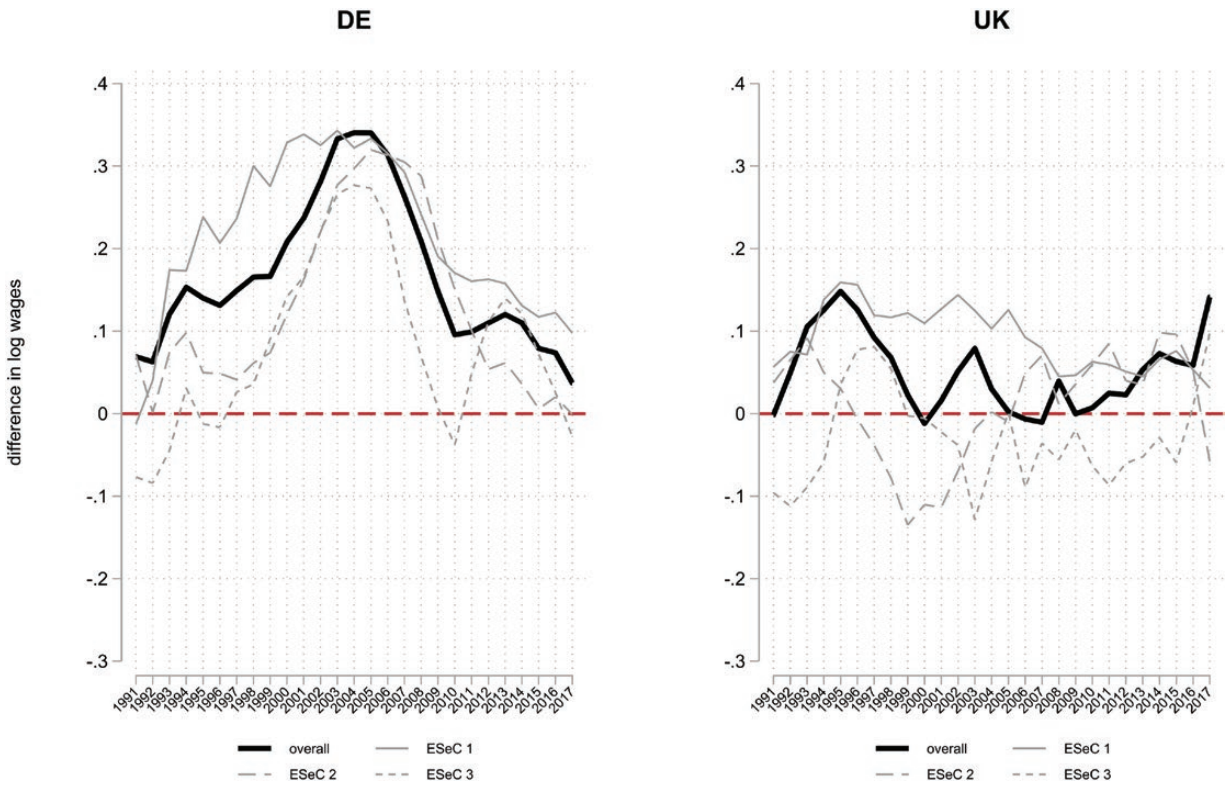

Figure 2 Hourly wage gaps (log scale) between women in the first and fourth quartiles of the potential fertility distribution, by socio-economic class (ESeC, three categories). Results in Tables S6 and S7.

Figure 1 provides preliminary evidence that potential fertility is negatively associated with wages, especially at extreme values. However, Figure 1 also suggests that such a relationship is likely explained by the included control variables. In the following section, we more thoroughly analyse wage differentials between the extremes of the potential fertility distribution: namely the lowest and highest quartiles.

Figure 2 presents the row wage gap (calculated as the difference in log wages) between women who are not likely to have a child (first quartile) and potential mothers (fourth quartile) in the two countries and over time, both overall and by socio-economic class. German potential mothers earn on average 19 per cent less compared with women with a lower propensity to transition to motherhood. The gap shows a reversed U-shaped trajectory, with the positive peak in 2004 and 2005 (i.e. years in which potential mothers earned 34 per cent less). The sharp decrease in the following years appears to be in line with existing evidence that highlights the notion that policy changes in Germany that have led to publicly funded (Jessen, Jessen and Kluve, 2019) and shorter (Mari and Cutuli, 2021) maternity leave have reduced the extent of labour market penalties for potential mothers. Moreover, the trajectory of the gap seems to follow the economic downturn and recovery related to the crisis and possibly points to the relevance of the (female) workforce composition. The relative weight of workforce composition and possible discriminatory dynamics is more thoroughly investigated in the following analytic step. Focussing on differences between socio-economic classes, class-specific wage gaps show similar trajectories to the main one. The gap is the largest in the top class (ESeC 1; 24 per cent on average) and the smallest in the working class (ESeC 3; about 11 per cent)—a finding that appears to be consistent with the glass ceiling hypothesis (H2a).

A different picture emerges for the United Kingdom, where the wage gap is smaller overall (4 per cent on average). This wage gap reaches the highest positive peak in 1995—a year in which potential mothers' average wages were about 14 per cent lower than those of women with a lower propensity to transition to motherhood. The gap then decreases, reaching the null level (indicating the absence of a wage differential) in the year 2000 and wavering over the following years, ending up with another positive peak in 2017. Differences between classes are more accentuated here compared with in Germany, with class-specific wage gaps showing trends and levels that often differ from those of

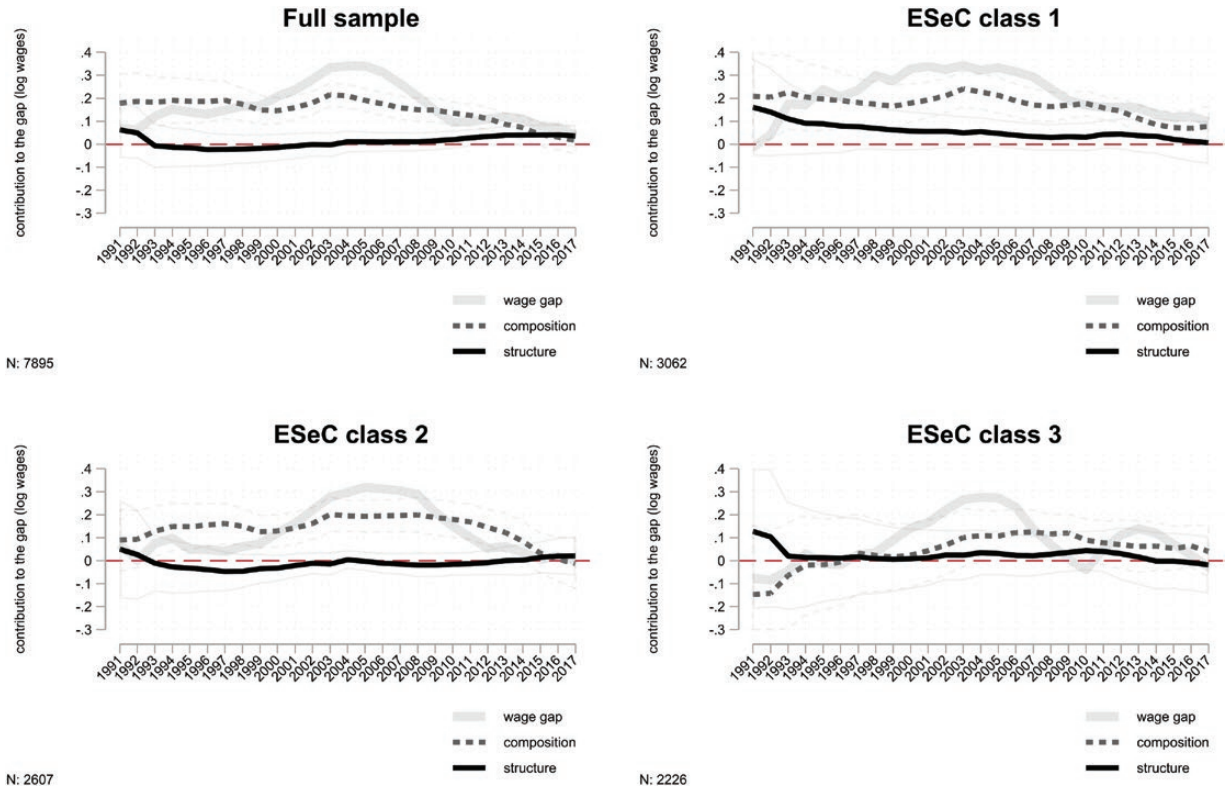

Figure 3 Two-fold decomposition (Oaxaca and Ransom, 1994) of the log hourly wage gap between potential mothers and women with a lower propensity to transition to motherhood, Germany, 95 per cent CI. Decomposition results in Table S6. Data source: SOEP. Note: When larger than the axis range, confidence intervals are capped.

the full sample. The gap for the salariat (ESeC 1) is the largest overall (7.8 per cent), while gaps related to the middle and working classes are small and often reversed (3.4 per cent and −4.2 per cent on average, respectively). Once again, the higher wage differential observed within the top class is consistent with the glass ceiling scenario (H2a).

The presence of a wage differential that disadvantages potential mothers in both countries supports our first hypothesis (H1a). However, decomposition results are needed in order to understand the extent to which the observed wage gaps and the related class heterogeneity are due to compositional differences or to different wage structures (the latter of which could be indicative of employer discrimination).

Disentangling the components of the gap

Figure 3 presents the 2-fold decomposition of the wage gap in Germany. In order to ease the interpretation of the results, each panel also displays the respective wage gap (from Figure 2). As results are provided in the form of log wages, they should be interpreted as the absolute contribution of each component to the gap.

In the overall sample (upper-left graph), the different composition of the two groups appears to be responsible for the greatest portion of the wage differential in Germany as well as for the trajectory of this wage gap. The sharp decrease in the gap following the economic crisis is likely due to the increasing similarity in observable characteristics between potential mothers and women who are less likely to have a child. By contrast, the component that captures different wage structures is mostly null and is in any case smaller than 0.1, which suggests that the role of unobserved factors—including employer discrimination—is negligible. This latter finding does not enable us to support either Hypothesis H1b on the role of employer discrimination or Hypothesis H4 on the decrease of the structural component in the German case over time.

Findings for the different socio-economic classes largely mirror the overall picture. In general, the size of the component that captures group differences in wage structures is small and not statistically different from 0 compared with the component related to compositional differences. Slightly higher positive values for the structural component can only be found in the upper class, which provides some evidence in the

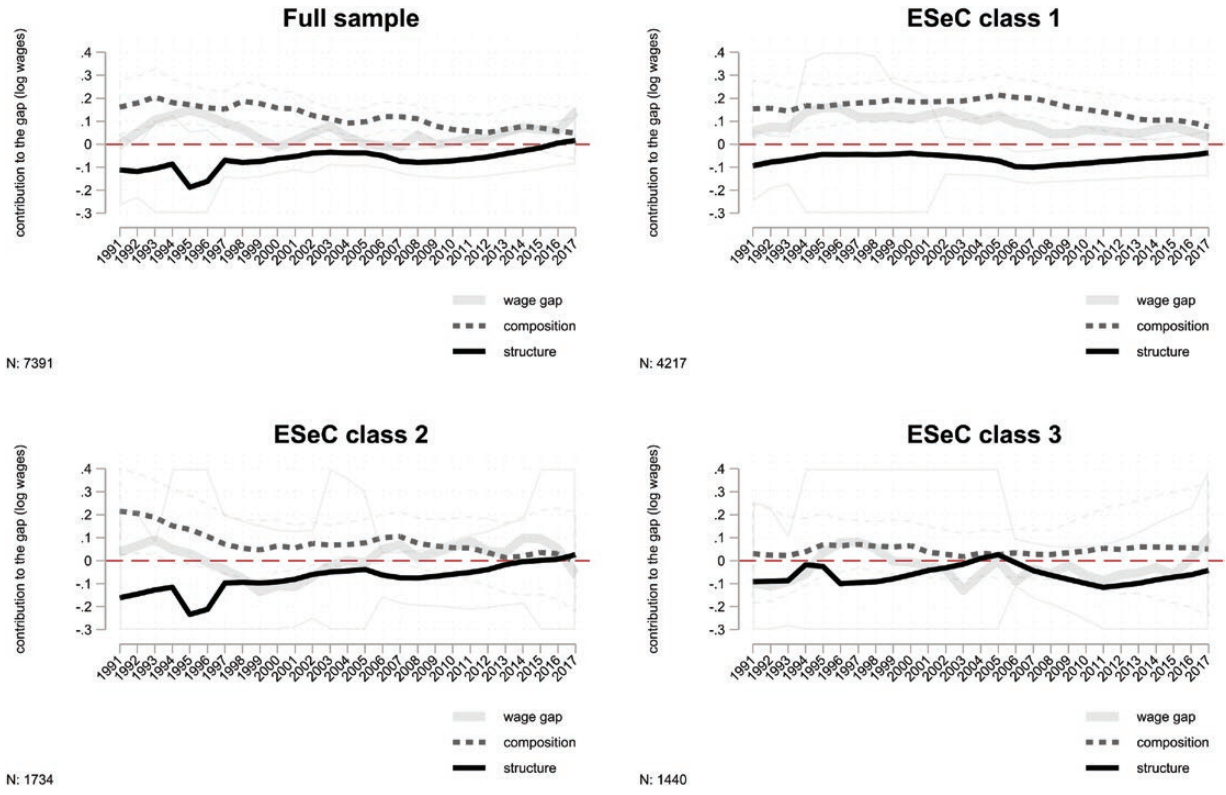

Figure 4 Two-fold decomposition (Oaxaca and Ransom, 1994) of the log hourly wage gap between potential mothers and women with a lower propensity to transition to motherhood, the United Kingdom, 95 per cent CI. Decomposition results in Table S7. Data source: BHPS and UKHLS. Note: When larger than the axis range, confidence intervals are capped.

direction of the glass ceiling scenario (H2a). However, this component also decreased over time, thereby possibly contributing to the overall decline in the potential fertility wage gap.

Decomposition results for the United Kingdom are presented in Figure 4. Upon examining the overall sample, the component that captures compositional differences is found to be positive despite clearly decreasing over time. This finding suggests that potential mothers and women who are less likely to transition to motherhood also became increasingly similar over the analysed years in the UK case. Interestingly, the structural component is mostly negative. Nevertheless, it is seldom statistically significant and reached the null level in the last years observed. In sum, we cannot find empirical support for Hypotheses H1b (employer discrimination) or H4 (reduction in discrimination over time). Concerning the expectation of greater discrimination in Germany than in the United Kingdom (H3), the structural component is null in the former context and mostly negative in the latter context. We therefore cannot argue that the wage penalty observed for potential motherhood is driven by employer discrimination in either of the countries.

Focussing on class heterogeneity, despite great variation in the levels and trajectories of the class-specific wage gaps, decomposition results are overall in line with findings for the full sample. The slightly negative values of the structural component within the top class do not enable us to support the thesis predicted by the glass ceiling scenario (H2a): The obstacles that lead to lower wages for potential mothers in the upper class are not 'invisible barriers' (such as discrimination), but rather observed attributes.

In order to provide a more fine-grained account of the drivers behind the observed wage gaps and their trends, Figure 5 presents detailed decomposition results for the overall potential fertility gap in Germany and the United Kingdom. Considering the greater explanatory power of the composition component of the wage gap in both countries, we disaggregated this component into the relevant groups of the variables of which it is composed (complete decomposition results are presented in Tables S6 and S7).

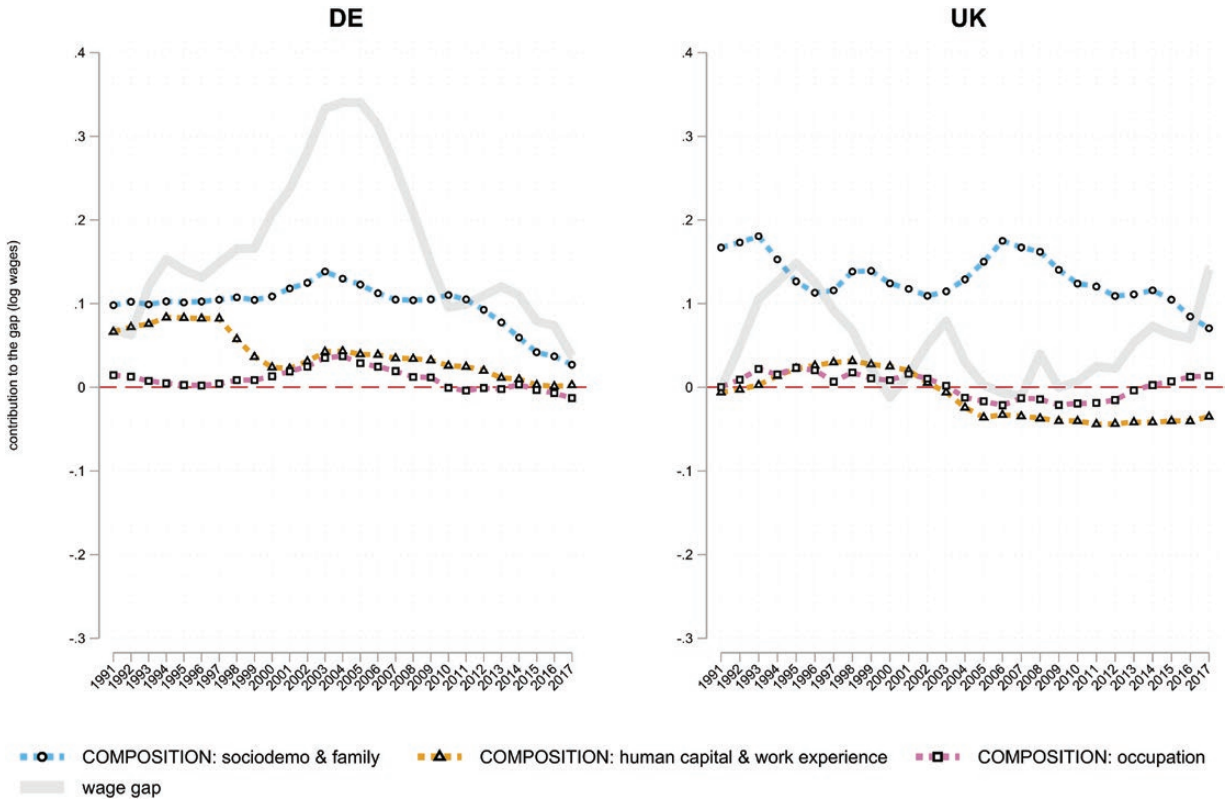

Figure 5 Detailed 2-fold decomposition (Oaxaca and Ransom, 1994) of the log hourly wage gap between potential mothers and women with a lower propensity to transition to motherhood, composition component. Detailed decomposition results in Tables S6 and S7.

In Germany, the most relevant variables that constitute the composition component of the gap are sociodemographic and family attributes, followed by human capital and work experience characteristics. Women who are not likely to transition to motherhood are on average older and more often single compared with potential mothers and additionally have more months of company tenure (see Table S2). These attributes appear to lead to a wage premium for this group of women, thereby fuelling the potential fertility wage gap. Nevertheless, compositional differences have shrunk over time in parallel with a reduction in the overall wage gap.

In the United Kingdom, the most relevant variables in the composition component are also sociodemographic and family characteristics. Women who are less prone to transition to motherhood are older and usually single compared with potential mothers (see Table S3), and although these differences slightly decreased over time, they appear to economically reward women who are less likely to have a child. Interestingly, differences in human capital and work experience do not appear to play a significant role in the British context compared with in the German one.

Sensitivity checks

Three main issues may have influenced the reliability and validity of our results. First, selection into employment may have affected labour market participation and consequently also average wages for different groups of women. Selection bias could moreover have differed both between the two countries analysed and over time. Second, as our measure of potential fertility was calculated for the same sample and with similar variables to those used to analyse the wage gap, our findings might have suffered from endogeneity. Finally, the dichotomization of potential fertility might have discarded important information and hidden dynamics that took place at different points in the original continuous distribution.

In order to address selection bias, we replicated the analyses by applying Heckman selection correction (Heckman, 1979) and—specifically—by including the inverse Mill's ratio among decomposition variables. More details about the calculation of the ratio and the results of this sensitivity check can be found in Section C1 of the Supplementary Material (Figures S3 and S4). Findings are very similar to the main ones, which points to the absence of a relevant bias related to (self-) selection into employment among women.

We tested the robustness of our results to the adoption of a different measure of potential fertility based on the aggregate fertility rate provided by Eurostat. This measure is independent from the national datasets, analytic samples, and variables used in the analyses of the present article. Despite the limited timespan available in the Eurostat data, the findings of this sensitivity check are comparable to those presented in the main paper (see Supplementary Material, Section C2, Figures S5 and S6) and thus support the validity of the adopted synthetic measure of potential fertility and the lack of endogeneity issues.

Finally, we implemented the Oaxaca–Blinder decomposition by relying on the entire distribution of the continuous measure of potential fertility (following the specification by Callaway and Huang, 2019). Findings for both countries point to a null structural effect and a significant composition effect, particularly at the top and the bottom of the potential fertility distribution (see Supplementary Material, Section C3, Figures S7 and S8). We interpret these findings as being in support of our choice to compare the first and fourth quartiles of the distribution.

Discussion

The present paper aimed to contribute to the literature on gender disparities in the labour market by investigating the wage penalty associated with potential fertility status. By drawing connections between the literature on both the motherhood penalty and statistical discrimination, we proposed a synthetic measure of potential fertility as potentially observed by employers. Unlike most existing literature on the topic, we explicitly tested the role played by potential fertility on labour market outcomes. We then provided a detailed account of the components of the wage gap that are related to potential fertility by using longitudinal and comparative microdata for Germany and the United Kingdom over the period from 1991 to 2017. Compared with experimental approaches to the study of discrimination, we were able to maximize external validity and to provide more generalizable findings. Finally, we theorized and tested heterogeneity among women pertaining to different socio-economic classes with the aim of contributing to the knowledge about the glass ceiling- and sticky floor scenarios, which point to stronger penalties and discrimination at the top or at the bottom of the occupational hierarchy, respectively, and have seldom been empirically tested.

In line with our first expectation, we found potential mothers to have lower average wages compared with women with a lower propensity to transition to motherhood in both Germany and the United Kingdom. Interestingly, this gap is mostly driven by compositional (observed) differences between potential mothers and women who are less likely to transition to motherhood. The most relevant attributes in both contexts are sociodemographic and family characteristics as well as—in Germany—human capital and work experience. We found the wage gap to be wider in the salariat compared with in the middle and working classes. However, only in Germany were we able to find some evidence in line with the glass ceiling hypothesis, which posited the presence of stronger obstacles (including discrimination) at the top of the occupational hierarchy.

Assuming that potential fertility is recognized by employers as a negative signal of (future) productivity, our findings indicate that this negative signal might not translate to actual discriminatory behaviours—or at least, not in terms of wages. Based on existing evidence, we could speculate that employers rely on signals associated with simpler and broader attributes (e.g. gender) rather than on more articulated proxies of (future) work productivity (e.g. potential fertility). Our results thus call for further research on the nature of attributes that function as signals of work productivity and that incentivize discrimination in the labour market.

In this article, we minimized the risk of overestimating the extent of possible discrimination due to omitted variable bias by leveraging longitudinal microdata that contained a rich set of relevant variables that have been thoroughly discussed in the existing socio-economic literature. The lack of evidence in favour of discrimination seems to support the appropriateness of the used data and additionally points to the lack of employer discrimination against potential mothers. Nevertheless, survey data do not easily allow for disentangling different types of discrimination. Although the main insight underlying the concept and operativization of potential fertility was theoretically informed by statistical discrimination theory, we were unable to disentangle statistical discrimination from other possible forms of discrimination, such as taste-based discrimination (an exercise that would require experimental manipulation—see e.g. Duguet, Loïc, and Petit, 2017). Given the complementarity of knowledge derived from survey and experimental studies, further research could contribute to a better understanding of the role played by potential fertility in shaping labour market inequalities, the different forms of discrimination, and the importance of the macro-institutional context by designing comparative experimental designs.

Notes

1 The choice of this timespan enables a comparison of the same period between Germany and the United Kingdom and allows us to model information for both West and East Germany (the latter having entered the panel in 1990). It should be noted that in order to be consistent with the

results, we refer to the period of 1991–2017 even though original data also include 2018 and—only for the United Kingdom—2019. However, the last yearly observations were lost due to the measurement of potential fertility (we provide more details in the Potential fertility measurement section and in note 4).

2 Pregnancy is associated with physical changes to expecting mothers that are likely to be visible and unambiguous to employers. The timespan of 3 years was chosen as a precaution in order to purge our measurement of potential fertility from possibly observed pregnancy.

3 We nevertheless acknowledge that an interesting extension of the present study would be to compare potential mothers and potential fathers or to compare men and women who are both not likely to have a child.

4 In order to increase validity and consistency in the measurement of potential fertility, the dichotomous dependent variable of the linear probability model was equal to 0 if no increase was observed in the following years *and* if the following time observation was not missing. However, the variable was set to 1 if an increase in any of the following years was observed (which might have been 1, 2, or 3, but not missing). This process inevitably led us to drop both the last time observation for each individual and the last survey year altogether.

5 Fixed-effects panel models have the advantage of purging estimates from time-constant unobserved heterogeneity and are particularly useful when there is substantive interest in *within*-person changes in the variables of interest. In the case of the present paper, we rely on random-effects models, which—although they do not discard variations over time within individuals—more straightforwardly model variation *between* women who signal potential motherhood and those who are less likely to transition to motherhood.

6 International Socio-Economic Index of occupational status (see Ganzeboom, De Graaf and Treiman, 1992).

7 This seems to be a particularly promising topic of research considering the mixed empirical evidence to date (see e.g. Carlsson and Rooth, 2007; Baert *et al.*, 2018).

Supplementary Data

Supplementary data are available at *ESR* online.

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Data Availability

Researchers may apply for data access to the German dataset used in the analyses (SOEP, v35, doi: 10.5684/soep-core.v35) by submitting a user-contract application to the SOEP Research Data Center: https://www.diw.de/en/diw_01.c.678568.en/research_data_center_soep.html.

Access to the British dataset (BHPS and UKHLS, 10.5255/UKDA-SN-6614-18) can be required through the UK Data Service website: https://beta.ukdataservice.ac.uk/datacatalogue/studies/study?id=6614#!/access-data (most recent data collection).

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