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TITLE

The feminization of occupations and wage change: a panel analysis of Britain, Germany and Switzerland

Research paper

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A u t h o r s

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A b s t r a c t

In the last four decades, women have made major inroads into occupations previously dominated by men. This paper examines whether occupational feminization is accompanied by a decline in wages: Do workers suffer a wage penalty if they remain in, or move into, feminizing occupations? We analzye this question over the 1990s and 2000s in Britain, Germany and Switzerland, using longitudinal panel data to estimate individual fixed effects for men and women. Moving from an entirely male to an entirely female occupation entails a loss in individual earnings of ten percent in Britain and four percent in Germany, but is not significant in Switzerland. The impact of occupational feminization on wages is not linear, but sets apart occupations holding less than 40 percent from those with more than 60 percent of women. Only moving into the latter incurs a wage penalty. Contrary to the prevailing idea in economics, differences in productivity – human capital, job-specific skill requirements and time investment – do not fully explain the wage gap between male and female occupations. This finding suggests that wage disparities across male and female occupations are in part due to unequal gender norms.

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1. Introduction

Over the last four decades, women's labor market participation has increased continuously in the Western World. Women's expanding employment has thus led to a series of occupations becoming more 'female'. Professions in health care, law and human resources are examples of higher-level occupations in which women have greatly increased their employment share. Postal clerks and bakers represent lower-level occupations that have feminized.

The question raised in this paper is whether occupational feminization is accompanied by a decline in wages. At the aggregate level, the concern is whether increasingly female jobs such as physicians, teachers, or social workers lose ground in the occupational earnings hierarchy. At the individual level, the issue at stake is whether workers who remain in, or move into, feminizing occupations suffer a wage penalty.

In the literature, two views have traditionally challenged each other over this question. The first view is based on neoclassical economics and stresses differential investment into skills and paid work in male- and female-dominated occupations (e.g. Becker, 1985; Tam, 1997; Polavieja, 2008, 2012). The argument expects employers to behave rationally and pay lower wages in female occupations because productivity in these occupations is lower, as workers accumulate less specialized human capital, and adjust their working time to fit with childcare and household arrangements.

A second view, often called "cultural devaluation", believes wages to not only be determined by productivity, but also by social norms and power resources (e.g. Sørensen, 1994; England et al., 2007; Lalive and Stutzer, 2010). The basic idea is that social norms give men pay priority on the labor market. As a result, occupations that feminize are assigned lower wages because women are considered to need – and deserve – lower earnings than men. Linked to this argument of male priority on the labor market is the observation that men are better organized in trade unions and possess more bargaining power than women (Jacobs and Steinberg, 1990; Arulampalam et al., 2007). The aim of our paper is to analyze these competing expectations of the impact of occupational feminization on wages. Our research tries to advance the literature in two ways. First, our focus is on three West European countries - Britain, Germany and Switzerland - rather than on the United States. While the influence of occupational feminization on earnings has been repeatedly studied for the U.S., only a handful of quantitative studies exists for Europe (de Ruijter et al., 2003 for the Netherlands; Grönlund and Magnusson, 2013 for Sweden; Perales, 2013 for Britain;

Polavieja, 2008 for Spain). Our study's comparative design allows us to test whether occupational feminization affects wages similarly across countries –which is uncertain given that the institutional context in which women establish their careers in male-dominated occupations differs greatly across Europe (LeFeuvre, 2010). Labour markets with a more dispersed wage distribution and less institutional interference, such as is found in the US and Britain, may feature higher levels of wage devaluation in female occupations than Germany or Switzerland (Mandel and Semyonov, 2005).

A second innovation is the study's longitudinal design. We use data stemming from three of the world's leading individual-level panel studies: the British Household Panel Survey (BHPS) 1991-2009, the German Socio-Economic Survey (GSOEP) 1991-2010, and the Swiss Household Panel (SHP) 1999-2011. This design contrasts with the European studies quoted above (except Perales, 2010) and several influential American studies (e.g. Sørensen, 1994; Tam, 1997; Tomaskovic-Devey and Scraggs, 2002) that are all based on cross-sectional data. The few existing longitudinal studies for the United States use the National Longitudinal Survey and are thus limited to short time-spans and samples of young people (England et al., 1988; Gerhard and El Cheikh, 1991; MacPherson and Hirsch, 1995). Or alternatively, they are set at the aggregate level of occupations, and thus cannot control for individual-level differences between workers (Catanzarite, 2003; England et al., 2007; Levanon et al., 2009). The crucial advantage that longitudinal studies have over cross-sectional analyses is that they enable the researcher to use fixed-effects estimators that control for unobserved heterogeneity between people. In our case, this allows us to cancel out different ingrained preferences, capabilities and motivations, which affect both a worker's decision to enter male- or female-dominated occupations and his or her earnings potential over the life course.

Our paper is structured as follows. Section II maps out the theoretical arguments as to why workers in female-dominated occupations should earn lower wages than in male-dominated ones and then sketches out our hypotheses. Section III presents our data and estimation method and discusses the advantage of using panel data. Section IV shows descriptive evidence and the results of fixed-effects models. The concluding section V sums up our findings.

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2. Mechanisms linking occupational feminization to wages

Empirical research has consistently found that occupations with a larger share of women pay lower wages. The more robust studies use individual-level panel data with fixed-effects and focus on the American labor market of the 1970s and 1980s. After controlling for differences in human capital, they find that moving from a completely male to a completely female occupation leads to a wage decrease for women of between 4 (Gerhard and El Cheikh, 1991: 69), 8 (England et al., 1988: 554) and 9 percent (MacPherson and Hirsch, 1995: 446). For men, the wage penalty for moving out of a completely male into a completely female occupation is somewhat higher and ranges between 9 (MacPherson and Hirsch, 1995: 446), 10 (England et al., 1988: 554) and 19 percent (Gerhard and El Cheikh, 1991: 69). American panel studies that use *occupation* instead of the individual as the unit of analysis find that earnings in female-dominated occupations are between 3 to 5 (England et al., 2007: 1250) and 6 to 10 percent (Levanon et al., 2009: 885) lower than in mixed-gender occupations, after controlling for skill differences. An American analysis of *changes* in an occupation's gender composition and wages between 1970 and 2007 finds male earnings to decline by 3 to 5 percent with increasing shares of female entrants, higher level occupations being most negatively affected by feminisation (Mandel, 2013: 1200).

The central question is why female-dominated occupations should yield lower wages than male-dominated ones. While the debate has introduced several causal mechanisms, the core issue is simple and divides explanations into two camps. One camp considers wage disparities between male and female occupations to solely reflect differences in human capital and productivity. Gender pay gaps are thus seen as a spurious by-product of different endowments and preferences of occupational incumbents. In contrast, a second camp believes that wage disparities are rooted in unequal social norms and power resources, and therefore point to labor market discrimination against women. Gendered allocation in the labour market gives way to valuative discrimination, whereby employers tend to undervalue 'female' as opposed to 'male' work (Petersen and Saporta, 2004).

2.1 Explanations highlighting differences in productivity

The first camp draws heavily on Gary Becker's (1985: 36) New Home Economics and emphasizes the importance of household specialization among partners. The basic idea is that men specialize in paid work and invest more in job-specific skills. Whereas, women

specialize in child care and choose mother-friendly occupations which demand less effort and less intensive training. Employers thus pay lower wages in female-dominated occupations because workers' marginal productivity in these occupations is lower than in male-dominated ones. This productivity differential stems from two mechanisms. One mechanism is unequal investment into human capital. Since women, on average, take on more responsibility for child rearing and housework than men, they will be more likely to interrupt their employment careers and work part-time than men. This more tenuous attachment to paid work is expected to decrease the incentive for both women to invest in their own - and employers to invest in their female employees' - job-specific human capital (Polavieja, 2008: 202; see also Polavieja, 2012). Men should thus receive more *on-the-job training*. The resulting sex differences in job-specific skills and time spent in vocational training are held to be the crucial factor explaining lower wages in female rather than male occupations (Tam, 1997: 1656). In testing this hypothesis empirically, the wage gap between male- and female-dominated occupations should disappear once differences in jobholders' tenure and on-the-job training are taken into account. Tam (1997) is correct in asserting that male occupations will be more intensive in terms of job-specific vocational training. Vocational education was originally devised to train craftsmen and is thus still more relevant to male-dominated than female-dominated occupations. And although women have surpassed men in graduation rates from upper secondary *general* educational programs, they are still less likely than men to obtain an upper secondary *vocational* education (OECD, 2012: 53).[1] For this reason, one underestimates the skill requirements of female occupations by only controlling for job-specific skills, but not general skills.[2]

Several implications of this hypothesis can be tested empirically. To begin with, the wage gap between male- and female-dominated occupations should disappear once differences in jobholders' tenure and on-the-job training are taken into account. Moreover, on-the-job training is closely linked to the way a country organizes vocational education – and here our study's comparative setting proves useful. Vocational training is highly standardized and embedded in the national educational system in Germany and Switzerland, but acquired to a larger extent through informal on-the-job training in Britain – as in the United States (Charles et al., 2001: 376). Job-related training should thus be captured, to some degree, in workers' initial formal educational attainment in Germany and Switzerland, but not in the more informal British (and American) system of apprenticeships. Accordingly, on-the-job training

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should be more consequential for the explanation of sex-differences in occupational wages in Britain (and the U.S.) than Germany and Switzerland.

A second mechanism stressed by New Home Economics originates in women's greater investment into domestic work. The idea is that "child care and other housework are tiring and limit access to jobs requiring travel or odd hours" (Becker, 1985: 35). Married women and mothers are expected to avoid occupations that make high demands in terms of constant availability, non-standard hours, overtime work, or business travel. By selecting themselves into less onerous occupations with lower financial rewards, women exchange lower wages for more 'family-friendly' working conditions (Polavieja, 2008: 200). Female-dominated occupations may be less attractive in terms of wages, but compensate for their lower pay by offering otherwise more desirable features than male-dominated occupations.We can again spell out the argument's implications for the empirical analysis. The idea of compensating differentials should apply to women with children, but not to childless women. The moment at which gender specialization should negatively affect women's careers is birth of the first child (Becker, 1985). If household specialization is the key mechanism, it is difficult to see why women without children should be more likely than men to forego earnings in order to get a less demanding, but more comfortable and family-friendly job. More generally, controls for individual differences in time spent on housework and childcare (investment into the household) and time on overtime work (investment into the job) should explain away the wage gap between male- and female-dominated occupations.

2.2 Explanations highlighting differences in social norms and power

Counter to the mechanisms discussed above, sociological theories refute the notion that wages are solely determined by workers' marginal productivity. Two other mechanisms operating at a group level – social norms and power resources – are also held to be relevant. For Lalive and Stutzer (2010: 936), the importance of the bargaining process for wage setting strongly suggests that non-economic factors also affect people's earnings. According to the "cultural devaluation" perspective, one such factor is a gender norm which privileges men over women on the labor market and thus considers male work to be more valuable than female work (England et al., 2007: 1238).

Male labor market priority is expressed by the belief that men have to support a family and thus need to earn higher wages, whereas women's earnings are merely supplementary to total

household income. Lalive and Stutzer (2010: 937) review an extensive literature in social psychology, which shows that both women and men consider it appropriate for earnings to be lower for women than men (e.g. Jasso and Webster, 1997). Likewise, experimental research consistently finds that women tend to pay themselves lower earnings and to ask for less in wage bargaining than do men (e.g. Säve-Söderbergh, 2007). The implication is that the wage penalty of occupational feminisation should be, within the same occupation, larger for women than men. Among a sample of tertiary educated German workers, both men and women's wages suffer from placement in female-dominated occupations following graduation, but the negative effect is 4 percentage points greater for women than men (Leuze and Strauß, 2012: 16). A British study finds that women are just as likely to be promoted as men – yet the wage rewards associated with promotion are lower for women than men (Booth et al., 2003: 314). Similarly, a Swedish analysis of matched employee-firm data reports male employees to participate to a greater extent in firm profits than female employees (Nekby, 2003).

The existence of a gender norm also makes it difficult to interpret the effect of having children on wages. Men may earn higher wages once they have children not because they become workaholics and devote more time to their job. Rather, having children may bestow higher social status on men as the breadwinner of a family and thereby increase their moral bargaining power in wage negotiations.

It is notoriously difficult to set up an empirical test of the cultural devaluation hypothesis. Traditionally, the existence of cultural devaluation – or active discrimination – has been inferred indirectly from the size of an occupation's sex-composition coefficient, after controlling for differences in human capital. We also have to rely on this procedure.

Social norms interact with power resources, most clearly so in wage bargaining. Eileen Appelbaum argues that: "wages depend largely on the respective bargaining power of business and labor, and on … normative factors" (in Jacobs and Sternberg, 1990: 460). Similarly, Arulampalam et al. (2007: 183) believe women wield less bargaining power because of a "social custom whereby a man's career takes precedence". More generally, subordinate groups such as women and minority men are seen as having less political power and thus less leverage to bargain over wages (Catanzarite, 2003: 17).

One possible institutional mechanism is trade union representation. Through their history as organizers of craft and industrial workers, trade unions have traditionally been stronger in

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male than female occupations. Consequently, the median voter in unions used to be a male worker, and the design of union wage policies and priorities tended to favor male over female occupations (Jacobs and Steinberg, 1990: 460, Arulampalam et al., 2007: 183).

Again, as with social norms, the effect of differential bargaining power is difficult to grasp empirically. One approximation is union membership: union members should benefit from collective bargaining and receive, all else equal, higher wages than non-members. Where unions are dominated by men, and union priorities set accordingly, union membership should be more beneficial for pay in male than female occupations. However, over the last two decades, male union dominance has waned in some countries as jobs in public services have replaced manufacturing as the primary union stronghold. Women's union density rates have consequently surpassed those of men not only in Scandinavia, but also in Britain starting from 2002. In contrast, Germany's union movement still remains squarely in male hands, with men's union density rate being twice that of women's in the early 2000s (Visser, 2011). While data on union density by gender is less systematic in Switzerland, survey evidence suggests male density rates to be 1.6 times those of women's (reference not disclosed). Accordingly, belonging to a union should be more instrumental for men than women in Germany and Switzerland, but not necessarily in Britain. As such, we expect union membership to be more pertinent in explaining any wage gap between male and female occupations in Germany and Switzerland than in Britain.

2.3 Overview of the hypotheses

In sum, our study examines four hypotheses of the effect of occupational feminization on wages. Table 1 gives a schematic overview. Hypothesis 1 highlights sex-differences in accumulated job-specific skills. It predicts no effect of occupational feminization on earnings once all the standard human capital variables and measures for tenure and on-the-job training have been taken into account. On-the-job training should be particularly consequential for the earnings gap between male and female occupations in Britain. Hypothesis 2 emphasizes gender-differences in housework and expects women to accept lower wages in return for less exacting working conditions. The wage effect of occupational feminization should disappear once we control for women's greater investment into childcare and housework, and men's greater investment into paid work through overtime. Hypothesis 3 focuses on social norms and argues that employers consider female jobs inherently less valuable than male jobs. It

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expects the wage gap between female and male occupations to persist even though differences in human capital, childcare and housework are accounted for. Finally, hypothesis 4 highlights the role of power and union membership, and expects men to exhibit greater leverage in wage bargaining. Union membership should be a particularly strong mediating factor of the wage gap between women's and men's occupation – most strongly so in Germany and followed by Switzerland, where the union movements are more heavily male-dominated than in Britain.

Table 1: Overview of the hypotheses

Hypo-thesis	Focus	Mechanism	Country difference	Outcome – gender wage gap
H1	Investment into job-specific skills	Disparity in job-specific skills explains the wage gap between male and female occupations	On-the-job training more consequential for wages in GB than CH and DE	Productivity-related: no longer significant
H2	Investment into paid work and childcare	Women forgo wages for a job with less exacting working conditions	No	Productivity-related: no longer significant
H3	Social norms and cultural devaluation	Social norms prioritize men on the labor market and ascribe higher value to male work	No	Discrimination persists: effect remains negative
H4	Power resources and union membership	Men have more bargaining power than women, notably through collective organization	Unions more consequential for gender wage gap in DE than CH and, above all, GB	Discrimination persists: effect remains negative

3. Data, measures and method

3.1 Data

Our empirical analysis is based on longitudinal data from the British Household Panel (BHPS), the German Socio-Economic Panel (SOEP), and the Swiss Household Panel (SHP). These nationally representative surveys collect information on a wide range of respondents' socio-demographic characteristics and labour force participation. We draw on unbalanced panels that comprise 18 waves of data from the BHPS (1991-2009), 20 waves (1991-2010) from the SOEP, and 13 waves (1999-2011) from the SHP, including booster samples[3].

We restrict our estimations to employees (ages 18-64)[4], working 15 hours or more per week[5]. The self-employed, those in the armed forces, full-time education or government schemes are excluded as the wage setting process of these workers is markedly different. Observations with missing values on relevant covariates are dropped from our analysis. The remaining British sample contains 10 733 individuals (5 337 women; 5 396 men), the German sample 17 095 individuals (7 853 women; 9 512 men) and the Swiss sample 4 127 (2 001 women and 2 126 men). On average, men appear a total of 12 years, and women 11, of the British panel; men in 11 years and women 10 years in the German sample; men in 8 years and women in 7 years in the Swiss sample. Each person contributes a minimum of two years. Tables A.1 to A.3 in the appendix provide summary statistics for the samples.

3.2 Individual and occupational measures

The first decision to be made is how to aggregate over 300 occupations in our three samples. Many of these occupations are empty in some waves and too small in other waves to permit robust wage estimations. Therefore, we group occupations according to the 'micro-class' concept introduced by Grusky and Weeden (2001).[6] This classification combines occupational categories on the basis of their social closure, which is brought about through wage-bargaining processes (unionisation), access to training, and returns to education. It provides us with a coherent, cross-nationally comparable measure of 81 occupations (Grusky and Weeden, 2001). One drawback of this classification is the loss of detail in terms of jobs actually performed by men and women – and previous research indicates that the wage effect of occupational feminization is the greater the finer the job decomposition (Tomaskovic-Devey and Skaggs, 2002: 105).

Our dependent variable is the natural logarithm of individuals' gross monthly wages, expressed in real terms: constant 2005 pounds sterling (for Britain), 2005 euros (for Germany), 2005 Swiss francs (for Switzerland)[7]. To ensure that potential outliers arising from measurement error do not bias our wage equations, we drop one percent of observations each at the top and bottom of the wage distribution.

Our key independent variable is the share of women in a given occupation. This share ranges from 0 to 100 and is calculated for each year on the basis of the Labour Force Survey for Britain (UK-LFS, spring quarter 1991-2008)[8], the Socio-Economic Panel for Germany (SOEP, 1990-2010) and the Swiss Labour Force Survey (SLFS, 1998-2011). In order to

eliminate spurious variation due to small samples, we average the weighted proportions across two waves for Germany and Switzerland, such that we arrive at a share of women for a given occupation in 1991 by taking the mean proportion of women in 1990 and 1991, and so on.

By taking an annual measure we address a shortcoming of the few panel studies in the feminization literature. The feminization of occupations implies that shares of women are growing, and vary over time. However, in previous longitudinal studies, an occupation's share of women has been measured at one single point in time and therefore kept artificially stable over the observation period (e.g. England, 1988 – but not MacPherson and Hirsch, 1995). This means that fixed effects analyses are limited to the fraction of workers who change jobs. In not constraining the share of women in an occupation to be the same across years, and observing change over a longer time period, we broaden our scope. This allows us to test the effect of both remaining in feminizing occupations, and moving from male to female occupations, on a worker's monthly wages.

The usual determinants in wage equations make up our independent variables: number of hours normally worked per week (delimited to 60 hours), current job and firm tenure, part-time status, temporary contract[9], past unemployment experience, and detailed regional controls[10]. A series of 1-digit industry[11], public sector and firm size indicators should control for social closure mechanisms operating at the organisational level and pick up industry specific skills (Tomaskovic-Devey and Scraggs, 2002; Tam, 1997). Good measures for accumulated individual skill and human capital are central to the study of occupational feminization and wages. For Britain, we use a person's level of education according to the International Standard Classification of Education (isced), while for Germany and Switzerland we take years of education – regardless of whether they lead to a general or a vocational degrees, both types of education are highly standardized in the two countries. Work experience in the German models is a measure of total years spent in fulltime work, with the exception of those who only reported part-time work experience. Unfortunately, we are forced to approximate work experience using age in the British models. While this is problematic given the differences in spells of inactivity between men and women, previous studies using the BHPS suggest that – once other variables such as tenure are properly controlled for – age serves as a reasonable proxy for work experience (see e.g. Bryan and Seliva-Sans, 2011).

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In order to address expectations related to occupational differences in general skill requirements, we construct an aggregate measure of an occupation's educational level by averaging the share of incumbents with low (score of 0), intermediate (score of 0.5) and high education (score of 1). To get at job skill specialization, for Britain and Switzerland we impute an occupation's share of incumbents who have received any form of training or work related courses in the reference year from the Labour Force Surveys. This occupational measure is supplemented by an individual indicator for training received in the reference year of the panel. For Switzerland, as a further test of educational-occupation match and to control for unobserved skill specialization that might result from tenure, we include a binary indicator (no 0; yes 1) in answer to '*do your qualifications correspond to your job?*'. The German models include three precise binary indicators of self-reported job training requirements, coded one if a job requires (i) on-the-job training, (ii) special courses, or (iii) further training, such as technical college.

Differential investment into work and the household is captured with variables for unpaid overtime hours per week, marital/cohabiting status, hours spent on housework per week, and the number of dependent children in the household. Hours of housework are capped at 50 hours per week, while unpaid overtime in the main job is originally capped at 23 hours in the German data, and imposed as 28 hours per week for Britain.[12]

Most pertinent to theories of power resources is union coverage at the firm level. The British models test whether a person's workplace has an established union. For the Swiss SHP, we only have information on individual membership in a work association or a trade union. The same question on union membership was asked in the German SOEP, but only in four waves (1993, 1998, 2001, 2003).[13]

Occupational feminization is likely to take place in occupations for which there is growing labor demand – and change in labour demand is largely exogenous, driven by technology. But since it may also affect the evolution of our key parameters – occupational feminization and wages –, we must control for it. We do so by introducing a measure of the annual share of total employment in a given occupation (based on the labour force surveys for Britain and Switzerland, and SOEP for Germany). Over the time under study, the annual employment share decreases for occupations such as metal fitters and office clerks, but increases for occupations such as health semi-professionals and managers.

3.3 Model specification

When analyzing the effect of occupational feminization on wages, we need to address the issue of unobserved heterogeneity. Notably the theories of New Home Economics imply that unmeasured abilities and preferences may explain the negative association between the share of women in an occupation and wages. The idea is that women and men select themselves into certain occupations, which yield different wage returns, on the basis of personal attributes that are often unobservable in survey data. Occupations that are more 'female' could predominantly attract less productive women, who sort into less demanding jobs because they prioritize family care over paid work, and thus accept a condition of earning lower wages (MacPherson and Hirsch, 1995). Fixed effects panel models eliminate time-invariant, unmeasured characteristics such as individual preferences, capabilities and motivations, since parameters are estimated on the basis of within-person changes only (Halaby, 2004). In other words, these models only take into account the variance that stems from changes in individuals' lives over time, but not from changes between different people. Regressions are estimated separately for men and women and we adopt a step-wise approach. The independent variables relevant for each hypothesis are added to our baseline model, and are then removed, to examine net effects. Previous findings suggest that wage effects are stronger at distinct values of the share of women in an occupation. We test for such nonlinearity in a second set of analyses by decomposing our indicator into percentage bands.

4. Findings on how occupational feminization affects wages

We begin our analysis with descriptive statistics. Figures 1a to 1c show how an occupation's monthly wages vary depending on the share of women in the occupation. Unlike our multivariate analysis, this computation is set at the aggregate level of occupations and focuses on occupational median wages. Three results are noteworthy.

First, we observe systematically higher median wages for men than women, regardless of the share of women who work in an occupation. The male-female wage gap is largest in occupations holding between 50 to 60 percent of women in Britain and occupations holding 60 to 70 percent of women in both Germany and Switzerland.

Second, the median wage in all countries is highest in occupations which employ between 30 to 40 percent women. Examples of such occupations are accountants, architects or

commercial managers. Wages then gradually decline as women's share in an occupation increases. Leaving aside the small minority of entirely female occupations, the low-point for monthly wages is reached in occupations with between 70 and 80 percent women, such as nursery school teachers or sales assistants. In these female-dominated occupations, the *male* median wage is 64 per cent lower in Britain, 34 percent lower in Germany and 33 percent in Switzerland, than the *male* median wage in male-dominated occupations where women account for only 30 to 40 percent. *Female* median wages in occupations with a share of 70 to 80 percent women are also substantially lower than *female* median wages in occupations with a share of 30 to 40 percent women – a 40 percent differential in Britain, 36 percent in Germany, and 29 percent in Switzerland. These two results suggest that wage disparities between male- and female-dominated occupations are (a) marginally higher for men than women, and (b) narrower in Germany and Switzerland than in Britain. Third, although not as low as those at the female end of the occupational distribution, median wages are also very low in occupations employing more than 90 percent of men. We deal here with mostly low-skilled occupations in production and craft such as heavy machine operatives, mechanics or plumbers – and technological change has depressed firm's demand for these jobs over the last few decades. Moreover, the lower wage levels in these heavily male-dominated occupations suggests that the relationship between the share of women in an occupation and earnings is not linear.

We move on from descriptive statistics to estimate separate fixed-effect models for British women and men (Table 2), German women and men (Table 3) and Swiss women and men (Table 4). These analyses are set at the individual level and the dependent variable is logged monthly earnings. In our baseline model we simply introduce the key independent variable "female share in an occupation" (henceforth FEM), alongside controls for labor demand (share of employment in a given occupation), time (in years) and normal hours worked per week. In a second model, we add a set of standard controls in wage equations: age, work experience, former unemployment, education, part-time work, temporary contract, public sector setting, firm size, region, and sector. In a third model we further introduce variables for job-specific human capital, before removing these measures again and entering ones for differential household investment in a fourth model. A fifth model integrates workplace union coverage, or union membership, into the wage equations.

Figure 1. Share of women in an occupation and an occupation's median gross monthly wage

Figure 1a: Britain, 1991-2009
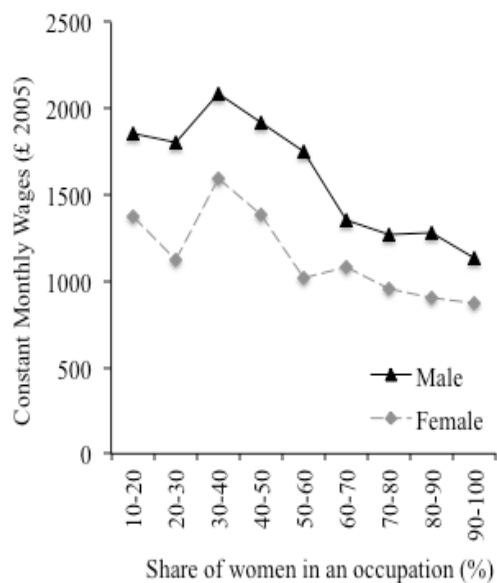
Figure 1b: Germany, 1991-2010
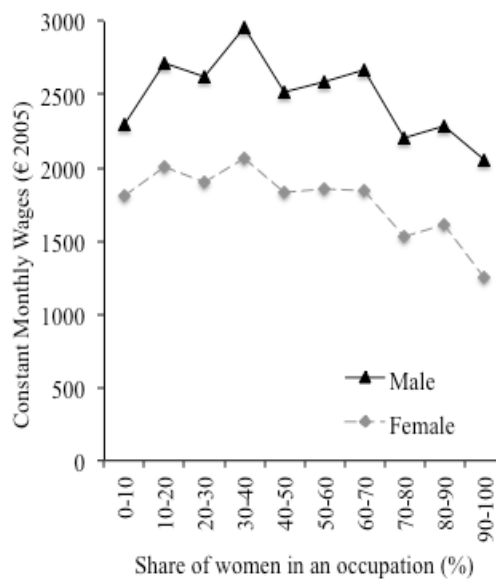
BHPS 1991-2009; N=1458 (pooled cross-section: 81 occupations * 18 waves)

SOEP 1991-2010; N=1600 (pooled cross-section: 80 occupations * 20 waves)

Figure 1c: Switzerland, 1999-2011
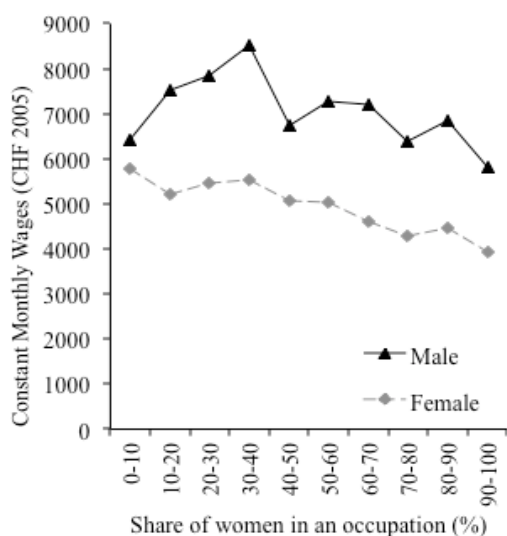
SHP 1999-2011; N=14014 (pooled cross-section: 78 occupations* 13 waves)

What are the main findings of these five models? Our baseline regression shows that moving from a male to a female occupation – or staying within an occupation that feminizes

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– results in a much larger fall in a person's wage in Britain than in Germany or Switzerland: in Britain, it entails a wage loss of 18 percent for women and 22 percent for men[14]. In Germany, shifting from a male to a female occupation leads to a wage decline of 7 percent for both women and men. In the Swiss case, moving to a female-dominated occupation negatively affects wages only for women, resulting in an 11 percent drop in monthly wages. Once we introduce controls for human capital, firm size, type of contract, sector and region (model 2), the wage penalty associated with moving from a fully male to a fully female occupation becomes substantially smaller. While it still amounts to 11 percent for British women and 12 percent for British men, similar to the 9 percent penalty found for Swiss women, the effect shrinks to 5 percent for German women and 3 percent for German men. Not only are the coefficients largest for Britain, model fit is better: our panel data account for almost twice as much within-variance in individual wages in the British than in the Germany and Swiss samples.

The hypothesis that job-specific skills go some way towards explaining why wages are lower in female than male occupations is supported by our third model. We find a substantial wage effect for tenure and, above all, the different measures of an occupation's requirements in terms of education and training. The positive effect of these education and training requirements on wages is larger for women than men in all three countries. While the negative wage effect of FEM remains significant and large for British men and women, significant and small for German men and women, it disappears for Swiss men. For Swiss women, the coefficient of FEM is negative and sizeable – but since the standard error is large as well, this effect is no longer significant. In sum, even when controlling for education and training requirements – job-specific skills –, we see a substantial wage penalty accompanying occupational feminization for British workers, and a moderate wage penalty for German workers. Contrary to our country hypothesis, job-specific skills reduce the wage gap between male and female occupations to a greater extent in Germany and Switzerland than in Britain.

Our fourth model confirms that differential investment into paid work and the household matters for wages. In all three countries, unpaid overtime work is associated with higher wages, whereas hours devoted to housework lead to lower pay. Gender differences emerge with respect to two other characteristics of household upkeep: being married and having dependent children. While marriage increases wages equally for men and women in Britain, its beneficial effect on wages is limited to men in Germany and Switzerland. More marked is

the gender difference with respect to children. Even though we control for hours of housework, we still find that having children is associated with lower pay for women in all three countries. Having two or more children in the household entails a massive decrease in women's wages by 8 to 10 percent. For men, having children has no negative effect – on the contrary, the coefficients are positive (but only reach significance in Switzerland).

By and large, we thus obtain the wage effects of overtime, marriage and children predicted by New Home Economics. However, we do not know whether women's wage penalty – and men's wage bonus – associated with children is due to productivity or discrimination. More importantly, these measures of differential investment into work and the household fail to explain why moving into female occupations is associated with lower wages for men and women. If we compare the second and fourth models, the coefficients for FEM remain basically unchanged in all three countries.

Our fifth model incorporates union membership. While we observe the expected positive effect of a workplace union on wages in Britain, this union presence does not account for the differences in wages between male and female occupations. In Germany and Switzerland, the wage effect of union membership is small and statistically insignificant. Yet interestingly, holding union membership constant in Germany leads to a stronger wage effect of FEM for women and men. This suggests that in the absence of unions, the wage gap between male and female occupations would be even larger. At the same time, results from model 5 are difficult to interpret for Germany – as the question about union membership features in only four out of twenty waves and model 5 is therefore estimated using a much smaller sample.

We further probe the plausibility of the differential investment hypothesis by looking at different subsamples. Gary Becker's argument that women specialize in housework and thus choose less demanding jobs should only apply to women with children – but not to childless women. More precisely, his theory points to the birth of a child as the time at which disadvantages in women's careers begin to escalate. If women do not have a child to take care of, they are unlikely to forego higher wages for more family-friendly working conditions. We thus re-estimate model 3 – which includes job-specific skills – for women without children.

Table 2. Determinants of log (monthly) wages in Great Britain: 1991-2009 fixed-effects estimates

	M1 Base	M2 Human Capital	M3 Job Specific Skills	M4 Differential Household Investment	M5 Unions
WOMEN					
Share of women in occupation	**-0.17 (0.02)**	**-0.11 (0.02)**	**-0.11 (0.02)**	**-0.10 (0.02)**	**-0.11 (0.02)**
Mean education of occupation			**0.15 (0.03)**		
Follows job training (occupation mean)			**0.25 (0.06)**		
Received job training (last 12 months)			0.00 (0.00)		
Job tenure			**0.00 (0.00)**		
Job tenure squared/100			**-0.01 (0.00)**		
Married/Living as couple				**0.03 (0.01)**	
1 child in household				**-0.04 (0.01)**	
2 or more children in hh				**-0.10 (0.01)**	
Hours of housework (per week)				**-0.00 (0.00)**	
Hours of overtime (per week)				**0.01 (0.00)**	
Union coverage in workplace					**0.05 (0.01)**
Human capital and sector controls introduced	No	Yes	Yes	Yes	Yes
R2 within	0.46	0.53	0.53	0.54	0.53
N			38 311		
n			5 337		
MEN					
Share of women in occupation	**-0.21 (0.02)**	**-0.12 (0.02)**	**-0.13 (0.02)**	**-0.11 (0.02)**	**-0.12 (0.02)**
Mean education of occupation			**0.05 (0.02)**		
Follows job training (occupation mean)			**0.18 (0.06)**		
Received job training (last 12 months)			**-0.00 (0.00)**		
Job tenure			**0.00 (0.00)**		
Job tenure squared/100			**-0.01 (0.00)**		
Married/Living as couple				**0.03 (0.01)**	
1 child in household				0.01 (0.01)	
2 or more children in hh				0.01 (0.01)	
Hours of housework (per week)				**-0.00 (0.00)**	
Hours of overtime (per week)				**0.01 (0.00)**	
Union coverage in workplace					**0.05 (0.01)**
Human capital and sector controls introduced	No	Yes	Yes	Yes	Yes
R2 within	0.26	0.41	0.41	0.43	0.41
N			40 861		
n			5 396		

Notes: **p <0.05**   Human capital controls are annual weeks employed, age and its square, unemployment experience, managerial duties, temporary status, level of education (ISCED), firm size, public sector, 1 digit (SIC) industry and detailed regional controls; All models control for normal weekly workhours, occupational demand (%) and year. Robust standard errors in parantheses.

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Table 3. Determinants of log (monthly) wages in Germany: 1991-2010 fixed-effects estimates

	M1 Base	M2 Human Capital	M3 Job Specific Skills	M4 Differential Household Investment	M5 [a] Unions
			WOMEN		
Share of women in occupation	**-0.07 (0.02)**	**-0.05 (0.01)**	**-0.03 (0.01)**	**-0.05 (0.01)**	**-0.08 (0.02)**
Mean education of occupation			**0.09 (0.02)**		
Job requires on-the-job training or courses			**0.02 (0.01)**		
Job requires vocational training			**0.04 (0.01)**		
Job requires further college (technical/university) training			**0.03 (0.01)**		
Job tenure			**0.01 (0.00)**		
Job tenure squared / 100			**-0.01 (0.00)**		
Married				**-0.02 (0.01)**	
1 child in household				**-0.04 (0.01)**	
2 or more children in hh				**-0.08 (0.01)**	
Hours of housework (per week)				**-0.00 (0.00)**	
Overtime hours per week				**0.01 (0.00)**	
Union member					0.01 (0.01)
Human capital and sector controls introduced	No	Yes	Yes	Yes	Yes
R2 within	0.23	0.29	0.3	0.31	0.34
N			54 351		8713
n			7 853		3444
			MEN		
Share of women in occupation	**-0.07 (0.01)**	**-0.03 (0.01)**	**-0.02 (0.01)**	**-0.03 (0.01)**	**-0.05 (0.02)**
Mean education of occupation			**0.03 (0.01)**		
Job requires on-the-job training or courses			**0.02 (0.01)**		
Job requires vocational training			**0.02 (0.01)**		
Job requires further college (technical/university) training			**0.06 (0.01)**		
Job tenure			0.01 (0.00)		
Job tenure squared / 100			**-0.00 (0.00)**		
Married				**0.02 (0.01)**	
1 child in household				0.00 (0.00)	
2 or more children in hh				0.01 (0.01)	
Hours of housework (per week)				**-0.00 (0.00)**	
Overtime hours per week				**0.01 (0.00)**	
Union member					-0.01 (0.01)
Human capital and sector controls introduced	No	Yes	Yes	Yes	Yes
R2 within	0.13	0.21	0.21	0.22	0.26
N			68 563		11786
n			9 512		4 662

Source: SOEP 1991-2010

Notes: **p <0.05** [b] 1991, 1993, 1998, 2004. Human capital controls are work experience and its square, unemployment experience, temporary status, years of education, firm size, public sector, 1 digit (NACE) industry and detailed regional controls; controls for age are included in the women's models; All models control for normal weekly workhours, occupational demand (%) and year. Robust standard errors in parantheses.

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Table 4. Determinants of log (monthly) wages in Switzerland: 1999-2011 fixed-effects estimates

	M1 Base	M2 Human Capital	M3 Job Specific Skills	M4 Differential Household Investment	M5 [a] Unions
			WOMEN		
Share of women in occupation	**-0.10 (0.04)**	**-0.09 (0.04)**	-0.05 (0.05)	-0.08 (0.04)	-0.07 (0.04)
Mean education of occupation			0.05 (0.09)		
Follows job training (occupation mean)			**0.16 (0.08)**		
Received job training (last 12 months)			**0.02 (0.01)**		
Corresponding job qualifications			**0.04 (0.01)**		
Married				**-0.07 (0.02)**	
1 child in household				**-0.05 (0.01)**	
2 or more children in hh				**-0.10 (0.01)**	
Hours of housework (per week)				**-0.00 (0.00)**	
Trade union member					0.01 (0.01)
Human capital and sector controls introduced	No	Yes	Yes	Yes	Yes
R2 within	0.23	0.26	0.27	0.29	0.26
N			10 092		9 210
n			2 001		1 998
			MEN		
Share of women in occupation	-0.05 (0.03)	-0.03 (0.03)	0.00 (0.03)	-0.03 (0.03)	-0.02 (0.02)
Mean education of occupation			**0.15 (0.05)**		
Follows job training (occupation mean)			0.03 (0.05)		
Received job training (last 12 months)			0.01 (0.00)		
Corresponding job qualifications			**0.02 (0.01)**		
Married				**0.05 (0.01)**	
1 child in household				0.01 (0.01)	
2 or more children in hh				**0.02 (0.01)**	
Hours of housework (per week)				**-0.00 (0.00)**	
Trade union member					0.01 (0.01)
Human capital and sector controls introduced	No	Yes	Yes	Yes	Yes
R2 within	0.06	0.16	0.16	0.17	0.17
N			11 845		10 876
n			2 126		2126

Source: SLFS; SHP 1999-2011

Notes: **p <0.05**   [a] excludes 2010   Human capital controls are work experience and its square, temporary status, years of education, firm size, public sector, 1 digit (NACE) industry and detailed regional controls; controls for age are included in the women's models. All models control for normal weekly workhours, occupational demand (%) and year. Robust standard errors in parantheses.

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The results are shown in Table 5 and run counter to the expectation of New Home Economics. They suggest that occupational feminization not only affects the wages of women with children, but also those of childless women – although time and energy spent on childcare should not be a factor. Regardless of whether women have children or not, the wage penalty associated with FEM is substantial. For childless women, the wage effect of moving from a completely male to a completely female occupation amounts to 14 percent in Britain, 9 percent in Switzerland and 4 percent in Germany.

Table 5. Determinants of log (monthly) wages for women without children

	Great Britain	Germany	Switzerland
Share of women in occupation	**-0.14 (0.03)**	**-0.04 (0.02)**	-0.09 (0.05)
Human capital and sector controls introduced	*Yes*	*Yes*	*Yes*
Job specific skill measures	*Yes*	*Yes*	*Yes*
R2 within	0.48	0.22	0.27
N	24 450	33 984	15 097
n	4 406	6 134	3 308

Source: BHPS; SOEP; SHP

Our final analysis tackles the question of whether the effect of FEM on wages is linear. We examine this issue by estimating a full model which includes all the control variables from models 2 (human capital), 3 (job-specific skills) and 4 (household investment). In this model, our continuous variable FEM (the share of women in an occupation from 0 to 100%) is decomposed into six categories: less than 30% of women, 30-40%, 40-50%, 50-60%, 60-70%, and more than a 70% of women in an occupation.

Figure 2 presents the regression coefficients by showing the percentage change in an individual's wage associated with moving from a very male occupation (reference category of 0-30% men in occupation) to mixed-gender and increasingly female occupations. These figures clearly demonstrate that the impact of occupational feminization on wages is not linear, but mainly sets occupations holding less than 40 percent of women apart from occupations holding more than 60 percent of women. As long as women make up a minority within an occupation (less than 40 percent of an occupation's incumbents), it does not make a

difference for wages whether there are 10 or 35 per cent of women in the three countries under study.
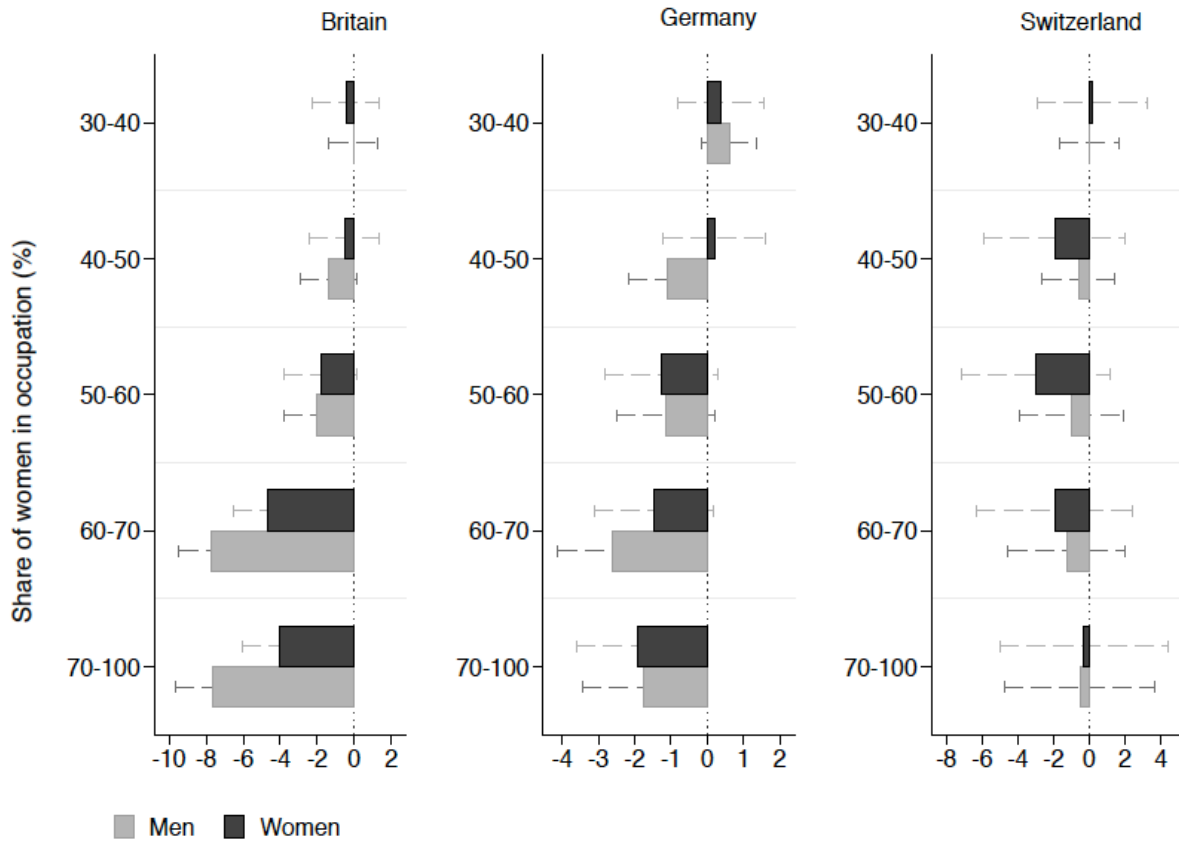
Figure 2. The wage effect of switching from a male (0-30%) to a feminizing occupation (in percent): Britain, 1991-2009; Germany, 1991-2010; Switzerland, 1999-2011

After introducing all our controls for human capital, job-specific skills and household investment, the dampening wage effect of FEM apparent in the previous linear regressions is still visible in Britain and Germany, but becomes insignificant in Switzerland. The wage penalty associated with crossing the boundary of 60% FEM amounts to 4 percent for British women and to two per cent for German women. Interestingly, the costs of occupational feminization are somewhat higher for men: moving from an occupation with less than 30 percent of women to an occupation holding between 60 and 70 percent of women comes with a wage decline of 8 percent for British men and 3 percent for German men.

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5. Conclusion

This paper opened with the question of whether workers who remain in, or move into, feminizing occupations earn lower wages. A tentative answer to emerge from our panel-data analyses is that, in the absence of controls for differences in human capital and firm properties, employment in a completely female occupation is associated with a substantially lower wage than employment in a completely male occupation. This monthly wage penalty amounts to 18 percent in Britain, 7 percent in Germany and 10 percent in Switzerland. Once we account for differences in human capital, firm characteristics and job-specific skills, the effect of occupational feminization on wages in Germany and Switzerland diminishes, but a substantial negative effect remains in Britain. For British women and men, moving from an entirely male to entirely female occupation still entails – everything else being equal – a wage loss of approximately ten percent.

Therefore, contrary to the prevailing idea in economics, wage disparities between male and female occupations do not disappear once we control for relevant differences in worker productivity. Variation in job-specific skills, overtime work, childcare and housework does not explain why British workers earn lower wages in female, as opposed to male, occupations. Furthermore, it is not only women with children, but also childless women and men who earn lower wages working in female-dominated occupations. Since our analyses are based on fixed-effects estimators and thus only use variation within individuals over time, we can additionally discard selection effects which lead different people (e.g. more productive workers) to different occupations (e.g. male occupations). The implication is that factors beyond productivity must be operating.

Thus, our analysis provides only partial support for the job-specific skill hypothesis – and very little support for the differential investment hypothesis. Likewise, differences in union membership and union coverage are unable to explain the lower wages found in female occupations. Although belonging to a union and working in a unionized firm are admittedly imperfect measures of workers' power resources in the labor market, and as such our evidence in this respect is tentative at best.

How can we interpret the failure of these different hypotheses to explain the effect of occupational feminization on individual wages? Our reading of these findings is that wage disparities between male and female occupations are, to some extent, rooted in unequal gender norms and thus imply labor market discrimination against women. But of course, a

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thorny issue with 'residual analyses' such as ours is that they call for indirect inference, and are as a result in a defensive position from the outset (Weeden, 2002).

Our analysis leaves one major puzzle unresolved: why is occupational feminization highly consequential for wages in Britain, but less so in the German and Swiss context? Germany and Switzerland do not have smaller gender wage gaps, nor do they have more progressive family policies than Britain. One potential explanation lies in the degree of coordination of wage setting – a dimension on which these countries diverge. Britain's liberal market economy gives employers and single firms much leeway in wage-setting, and facilitates unilateral management control over wages in the majority of workplaces. In contrast, Germany's coordinated market economy, with collective agreements at the sectoral level and powerful works councils at the firm level, constrains employers to engage in collective bargaining over wages – an institutional set-up also prevalent in Switzerland (Soskice, 2005). To the extent that coordination over wages includes more stakeholders and in this way creates a system of checks and balances, an occupation's wages may be secured through more objectively measured dimensions of worker productivity. Hence, employers' scope for "valuative discrimination" of female jobs may be reduced (Petersen and Saporta, 2004, Mandel and Semyonov, 2005). In other words, it may thus be the general wage determination system, particularly whether wages are loosely or closely tied to qualifications, rather than specific gender policies that have the greatest impact on women's relative pay position (Rubery et al., 1997). Evidence for this hypothesis is that Germany and Switzerland had consistently lower levels of wage inequality in the 1990s and 2000s than Britain (OECD, 2011: 87). Yet these remain solely speculations to be tested on a larger sample of economically advanced countries.

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Table A1: British Sample Summary

Variable	Female Mean	Female Min	Female Max	Male Mean	Male Min	Male Max
Natural Logarithm of (monthly) gross real wage						
[£ 2005]	6.96	5.6	8.59	7.41	5.6	8.59
(LFS:Annual) Share of women in an occupation	0.61	0	0.99	0.29	0	0.99
(LFS:Annual) Bands of women: 0-30 %	0.13	0	1	0.62	0	1
30-40 %	0.07	0	1	0.09	0	1
40-50 %	0.08	0	1	0.07	0	1
50-60 %	0.06	0	1	0.04	0	1
60-70 %	0.29	0	1	0.1	0	1
70-100 %	0.37	0	1	0.08	0	1
(LFS Annual) Occupational demand (%)	4.38	0.03	14.28	3.02	0.02	14.28
(BHPS: Annual Mean) Education level of	0.6	0	1	0.55	0	1
Observed in panel (waves)	11.01	2	18	11.72	2	18
Age	38.65	18	59	39.17	18	64
Government regions: 11 not shown						
Normal working hours per week	32.44	15	60	39.34	15	60
Unemployment experience (in last 12 months)	0.03	0	1	0.05	0	1
Annual weeks of employment (current work	50.15	0	52	50.58	0	52
ISCED education level: Primary and low	0.49	0	1	0.48	0	1
Higher secondary and middle vocational	0.12	0	1	0.14	0	1
Higher vocational education	0.23	0	1	0.23	0	1
Degree: First and Tertiary level	0.16	0	1	0.16	0	1
Part-time status	0.26	0	1	0.02	0	1
Temporary contract	0.04	0	1	0.03	0	1
Public sector	0.43	0	1	0.22	0	1
Firm size: Less than 50 employees	0.16	0	1	0.15	0	1
Less than 200	0.22	0	1	0.24	0	1
Less than 500	0.12	0	1	0.16	0	1
Over 500	0.17	0	1	0.19	0	1
Managerial duties	0.19	0	1	0.26	0	1
Supervisory duties	0.17	0	1	0.16	0	1
No managerial/ supervisory duties on the job	0.64	0	1	0.57	0	1
Industry (SIC) ABC: Agriculture, Fishing, &	0.01	0	1	0.02	0	1
D: Manufacturing	0.03	0	1	0.07	0	1
E: Electricity, Gas and Water Supply	0.1	0	1	0.25	0	1
F: Construction	0.04	0	1	0.08	0	1
G:Wholesale and Retail Trade: Repair of Motor	0.13	0	1	0.13	0	1
H: Hotels and Restaurants	0.04	0	1	0.02	0	1
I:Transport, Storage and Communication	0.07	0	1	0.12	0	1
J: Financial Intermediation	0.07	0	1	0.04	0	1
K: Real Estate, Renting and Business Activities	0.11	0	1	0.09	0	1
L:Public Administration and Defence:	0.08	0	1	0.07	0	1
M: Education	0.16	0	1	0.05	0	1
N O: Health, Social and Community, HH	0.17	0	1	0.06	0	1
Job tenure	4.28	0	42	5.14	0	48
Received job training (courses) in past 12 months	0.38	0	1	0.33	0	1
(LFS: Annual Mean) Occupation follows job	0.18	0	0.51	0.14	0	0.51
Married /living as couple	0.69	0	1	0.72	0	1
No dependent children in household	0.67	0	1	0.65	0	1
One child in hh	0.17	0	1	0.15	0	1
Two or more children in hh	0.16	0	1	0.2	0	1
Hours of housework (per week)	12.22	0	50	4.74	0	50
Hours of overtime (per week)	3.01	0	28	5.1	0	28
Union coverage in workplace	0.56	0	1	0.49	0	1
Persons	*5 336*			*5 397*		

Table A2: German Sample Summary

Variable	Female			Male		
	Mean	Min	Max	Mean	Min	Max
Natural Logarithm of (monthly) gross real wage						
[€ 2005]	7.43	6.05	8.82	7.82	6.05	8.82
(Annual) Share of women in an occupation	0.61	0.00	1.00	0.27	0	0.98
(Annual) Bands of women in an occupation: 0-30 %	0.12	0	1	0.61	0	1
30-40 %	0.09	0	1	0.12	0	1
40-50 %	0.1	0	1	0.08	0	1
50-60 %	0.08	0	1	0.04	0	1
60-70 %	0.28	0	1	0.1	0	1
70-100 %	0.35	0	1	0.05	0	1
(Annual) Occupational demand (%)	3.39	0.02	10.60	2.4	0	10.6
(Annual) Mean education level of occupation	0.43	0.00	1.00	0.37	0	1
Observed in panel (waves)	10.25	2	20.00	11.04	2	20
Age	-	-	-	40.66	18	64
Age categories: ages 18-29	0.18	0	1	-	-	-
ages 30-40	0.31	0	1	-	-	-
ages 41-50	0.32	0	1	-	-	-
ages 51-64	0.20	0	1	-	-	-
State Regions: 16 not shown						
Industry: Agriculture	0.01	0	1	0.02	0	1
Energy	0.01	0	1	0.02	0	1
Mining	0.00	0	1	0.01	0	1
Manufacturing	0.19	0	1	0.39	0	1
Construction	0.02	0	1	0.11	0	1
Trade	0.18	0	1	0.1	0	1
Transport	0.04	0	1	0.07	0	1
Financial/Insurance business	0.12	0	1	0.09	0	1
Services	0.45	0	1	0.19	0	1
Work experience (fulltime unless only part-time						
experience)	13.18	0	47	18.78	0	49
Working hours per week	34.12	15	60	39.61	15	60
Unemployment experience (months)	0.48	0	24	0.43	0	24
Years of formal education/training	12.22	7	18	12.09	7	18
Part-time status	0.34	0	1	0.02	0	1
Temporary contract	0.08	0	1	0.05	0	1
Public sector	0.38	0	1	0.22	0	1
Firm size: Less than 5 employees	0.07	0	1	0.04	0	1
Less than 200	0.45	0	1	0.43	0	1
Less than 2000	0.26	0	1	0.27	0	1
Over 2000	0.21	0	1	0.27	0	1
Job tenure	10.06	0	45	11.7	0	50
Job requirements: no training or short introduction to						
job	0.16	0	1	0.11	0	1
Job requires on-the-job training or courses	0.10	0	1	0.15	0	1
Job requires vocational training	0.57	0	1	0.54	0	1
Job requires further college (technical/university)						
training	0.17	0	1	0.19	0	1
Married	0.64	0	1	0.71	0	1
No dependent children in household	0.63	0	1	0.54	0	1
One child in hh	0.22	0	1	0.22	0	1
Two or more children in hh	0.15	0	1	0.24	0	1
Hours of housework (per week)	9.71	0	50	3.34	0	50
Hours of overtime per week	1.68	0	23	2.68	0	23
Trade Union member	0.2	0	1	0.31	0	1
Persons		7 853			9 512	

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Table A3: Swiss Sample Summary

Variable	Female Mean	Female Min	Female Max	Male Mean	Male Min	Male Max
Natural Logarithm of (monthly) gross real wage [CHF 2005]	8.43	7.09	9.79	8.93	7.1	9.83
(SLFS: Annual) Share of women in an occupation	0.61	0.01	0.96	0.31	0	0.94
(SLFS: Annual) Bands of women in an occupation: 0-30 %	0.14	0	1	0.62	0	1
30-40 %	0.11	0	1	0.13	0	1
40-50 %	0.19	0	1	0.12	0	1
50-60 %	0.39	0	1	0.12	0	1
60-70 %	0.05	0	1	0.01	0	1
70-100 %	0.12	0	1	0.01	0	1
(SLFS: Annual) Occupational demand (%)	4.09	0.03	11.72	2.72	0.01	11.72
(SLFS: Annual) Mean education level of occupation	0.6	0.14	1	0.65	0.19	1
Observed in panel (waves)	6.83	2	13	7.49	2	13
Age	-	-	-	43.67	18	64
Age categories: ages 18-29	0.13	0	1	-	-	-
ages 30-40	0.28	0	1	-	-	-
ages 41-50	0.34	0	1	-	-	-
ages 51-63	0.26	0	1	-	-	-
Cantonal Regions: 7 not shown	0.2	0	1	0.16	0	1
Work experience	19.87	0	49	24.38	0	52
Working hours per week	31.92	15	60	41.14	15	60
Years of formal education/training	13.17	9	24	13.96	9	24
Part-time status	0.64	0	1	0.11	0	1
Temporary contract	0.04	0	1	0.03	0	1
Public sector	0.44	0	1	0.29	0	1
Firm size: Less than 100 employees	0.61	0	1	0.5	0	1
Less than 1000	0.27	0	1	0.32	0	1
Above 1000	0.12	0	1	0.18	0	1
Industry: Agriculture, Energy, Mining	0.01	0	1	0.03	0	1
Manufacturing	0.1	0	1	0.25	0	1
Construction	0.01	0	1	0.06	0	1
Trade	0.15	0	1	0.11	0	1
Transport	0.04	0	1	0.09	0	1
Financial/Insurance business	0.07	0	1	0.09	0	1
Services	0.62	0	1	0.38	0	1
Received job training (courses) in past 12 months	0.47	0	1	0.44	0	1
(SLFS: Annual) Occupation follows job training (mean)	0.28	0	0.55	0.27	0	0.75
Corresponding job qualifications	0.81	0	1	0.81	0	1
Married	0.55	0	1	0.69	0	1
No dependent children in household	0.65	0	1	0.54	0	1
One child in hh	0.15	0	1	0.15	0	1
Two or more children in hh	0.2	0	1	0.31	0	1
Hours of housework (per week)	12.21	0	50	5.56	0	50
Trade Union member	0.25	0	1	0.29	0	1
Persons		2 001			2 126	

Endnotes

[1] For upper secondary *general* education, the graduation rates in the OECD were 56 percent for women, but only 44 percent for men in 2010. In contrast, graduation rates from *vocational* programmes were 32 percent for women and 37 percent for men. There are no gender-specific data for Britain, but the gender gap in vocational degrees in Germany is large: in 2010, 52 percent of men but only 42 percent of women chose a vocational educational track (OECD 2012: 53).

[2] This point is well demonstrated by England et al. (2000) in their reply to Tam (1997).

[3] We exclude the Northern Ireland sample in the BHPS, and the high earner sample (G) in SOEP.

[4] Men aged between 18-64 in Britain, and women aged 18-59 in Britain, 18-64 inclusive for women and men in Germany, and men aged 18-64 and women aged 18-63 in Switzerland, as women's legal retirement age differs between the three countries.

[5] As a sensitivity check we estimated our regressions excluding those on a part-time contract. This does not substantially alter our results.

[6] We benefit from the crosswalks generated by Lambert and Griffith (2011). These translate 3-digit 1990 Standard Occupational Coding (SOC90) indicators in the British data, and 4-digit 1988 International Standard Classification of Occupations (ISCO-88) in the Swiss and German data, with minor modifications, into the 'micro-class' scheme. More information can be found at: http://www.geode.stir.ac.uk/

[7] Wages are deflated on the basis of Eurostat's Consumer Price Index (CPI Eurostat index).

[8] The years 1991 and 1992 refer to annual data, as the design of data-collection began to operate on a quarterly basis only in 1993.

[9] Up until 1996 in the SOEP, the question of 'contract duration' was only asked of respondents who had changed jobs in the reference year. As a consequence, we assume constancy across 1991-1995 if no change is reported.

[10] Neither an unemployment spell nor tenure indicator is available for Switzerland. A question on firm tenure was only asked in the first four waves of the SHP, and as a consequence indicators for tenure are absent in the Swiss models. In our checks for the effect of average occupational tenure (SLFS) in the job-specific skills models, estimates were largely unchanged.

[11] For 2007 in the Swiss data, industrial sector is imputed from the previous year if no changes in employer or job are reported since the missing data reach over 10% on this particular item preventing us from dropping such a large portion of our sample.

[12] The question of overtime hours is not asked in the SHP, as a check we modelled an imperfect proxy calculation for overtime hours on the basis of usual hours minus contractual weekly hours, in addition to an aggregate of the proportion of individuals in an occupation who report

50 hours or more usual weekly hours, but neither measures changed our substantive results and were thus excluded.

[13] Accordingly, we are only able to estimate our regressions for union membership on a reduced German sample consisting of four non-consecutive waves. In Switzerland, we exclude the year 2010 from our union models as the question of union membership was not asked in this wave.

[14] Since wages are in log terms, we need to transform the coefficients of our dependent variables; a coefficient of -0.17 for British men thus gives us: 1-exp(0.17)=0.185. This corresponds to a wage drop of 18.5%.