1. Introduction

Recent policy initiatives attempt to reduce the gender wage gap by creating pressure on workplaces. President Obama signed two executive orders limiting pay secrecy within firms and UK law recently changed to require all but small employers to annually publish their own gender pay gaps. While Kim (2015) presents evidence suggesting such policies may succeed, there remains a long history of economic studies emphasizing that much of the gender wage gap flows from differences across firms (Bayard et al. 2003). In examining Britain, Drolet and Mumford (2012 p. 529) make clear "that men and women face a more equal pay structure within their workplace than they do across workplaces." Such evidence leaves in doubt the extent to which the gender wage gap can be reduced by further emphasis on equality within workplaces.[1]

In this study we return to examine British workplaces and use three cross-sections of matched employer-employee data. We show that over the period from 1998 to 2011, the unadjusted gender wage gap fell modestly from -.261 to -.211 log wage points while the adjusted pay gap remained roughly constant. The decline in the unadjusted gap largely reflects the diminishing importance of workplace fixed effects. In Gelbach (2016) decompositions, the workplace effects provide a large majority of the explanatory power in the earliest cross-section. This falls monotonically with workplace effects losing two-thirds of their explanatory power. The declining importance of the workplace emerges both when using a typical list of workplace level controls and when using workplace fixed effects. This suggests the recent emphasis on gender gaps within the firm may be increasingly warranted at least in Britain. While segregation of employees across firms remains and contributes to the gender wage gap, it no longer dominates the gap as it once did.

Our finding that the importance of unobserved workplace level differences is shrinking contributes to a large literature. Woodcock (2008) shows that depending on specification, ten to twenty percent of the raw gender wage differential in the US reflects firm effects. Women are less likely to work for high wage firms. Cardoso et al. (2016) shows that one-fifth of the gender gap in Portugal results from segregation of employees across firms and another fifth through job segregation. Card et al. (2016) use the same Portuguese data to show that the gap resulting from gender segregation across firms is largest for the low skilled. This causes them to worry that policies designed to equate pay within the firm will disproportionately benefit high skilled women. Jewell et al. (2020) use UK Annual Survey of Hours and Earnings (ASHE) data and confirm that segregation across firms is far more important than segregation across occupations with 16 percent of raw gap accounted for by firm-specific wage effects.

We undertake an examination of British employer-employee data over time to identify the trend in the workplace effect on the gender wage gap. We note that workplaces are within firms and so provide complementary evidence. Specifically, they are the unit of observation on the peers that most employees would use when examining their relative pay. While many firms will have only a single workplace, others may have multiple workplaces. While workplace

[1] Indeed, Bruns (2019) shows that in Germany the difference across workplaces is becoming more dramatic. This happened, in large part, because high-wage workplaces experienced higher wage growth and employed disproportionately more men.

effects remain important throughout our examination, their size and so relative importance markedly diminishes. In what follows, we describe our data and empirical approach. We then present the empirical results and conclude.

2. Data and Approach

We draw data from the 1998, 2004 and 2011 Workplace Employment Relations Survey (WERS) cross-sections (DBIS, 2015). WERS matches workplace level questions asked of managers with questionnaires from 25 randomly selected employees, or from all employees in workplaces with fewer than 25. To reflect sampling, all estimates are employee weighted to represent the population. The 1998 WERS does not interview very small workplaces so we limit attention in all waves to those with at least ten employees. Our final samples are 26585, 20785, and 19576 employees for 1998, 2004 and 2011 clustered in 1781, 2061 and 2375 workplaces respectively.

The dependent variable is the log hourly wage constructed by dividing weekly wages by usual working hours per week. We run variants of the following OLS specification:

$$logy_{i(j)} = log\left(\frac{w_{i(j)}}{h_{i(j)}}\right) = \beta_0 + \beta_1\xi_{i(j)} + \beta_2'\boldsymbol{X}_{i(j)} + \beta_3'\boldsymbol{W}_j + \varepsilon_{i(j)}, \quad (1)$$

where i indexes employees and j indexes workplaces. $\xi_{i(j)}$ is a dummy taking the value of 1 if employee i in workplace j is female and 0 otherwise. $\boldsymbol{X}_{i(j)}$ is a vector of observable employee covariates, $\boldsymbol{W}_j$ is a vector of observable workplace covariates and $\varepsilon_{i(j)}$ is the disturbance term.

We first estimate the unconditional gap. A second estimate adds the personal characteristics of age, age squared/100, married, dependent children, disability, non-white, a series of educational qualifications, and if the employee has a vocational/professional qualification. A third specification adds tenure, tenure squared/100, current union membership, permanent job, temporary job, and eight occupational dummies. A fourth specification uses the unique matched workplace controls. These include the log number of employees, if the workplace is part of a larger organization or a single independent workplace, if it is in the private sector and if it is foreign owned, the share of eight occupational groups, the share of employees above age fifty and the share of employees below age twenty-one. We also add the share belonging to a trade union, the share of women, eleven industry dummies and nine regional dummies. We believe that these variables capture most of the workplace heterogeneity. As an alternative, we run a fifth specification that replaces the workplace controls with workplace fixed effects.

3. Results

Table 1 reports results from the five specifications. Panel A shows 1998, Panel B shows 2004 and Panel C shows 2011. In Panel A the raw gender wage gap is .261 log points (column 1)

and falls only marginally when conditioning on personal characteristics (column 2). It falls to .213 log points when conditioning on further personal and job characteristics (column 3). It falls markedly to about .111 log points when adding workplace characteristics (column 4) and to .102 log points when we replace workplace characteristics with workplace fixed effects. The unconditional gender wage gap is .226 log points in 2004 (Panel B) and 0.211 log points in 2011 (Panel C). The pattern of the reduction in the gender wage gap as the controls are added remains largely as in Panel A. [2]

Table 1. The Gender Wage Gap

	(1)	(2)	(3)	(4)	(5)
Panel A. WERS 1998					
Female	-0.261***	-0.252***	-0.213***	-0.111***	-0.102***
	(0.016)	(0.014)	(0.011)	(0.008)	(0.008)
Constant	1.944***	0.263***	0.458***	0.336***	0.803***
	(0.016)	(0.073)	(0.069)	(0.087)	(0.062)
Observations	26,585	26,585	26,585	26,585	26,585
R-squared adjusted	0.055	0.346	0.479	0.558	0.623
Panel B. WERS 2004					
Female	-0.226***	-0.218***	-0.188***	-0.117***	-0.114***
	(0.015)	(0.011)	(0.010)	(0.010)	(0.011)
Constant	2.283***	0.577***	0.728***	0.812***	1.080***
	(0.015)	(0.056)	(0.059)	(0.088)	(0.062)
Observations	20,864	20,864	20,864	20,864	20,864
R-squared adjusted	0.035	0.269	0.397	0.458	0.514
Panel C. WERS 2011					
Female	-0.211***	-0.197***	-0.151***	-0.097***	-0.096***
	(0.019)	(0.014)	(0.013)	(0.011)	(0.011)
Constant	2.582***	0.745***	0.964***	1.080***	1.361***
	(0.023)	(0.074)	(0.074)	(0.101)	(0.072)
Observations	19,576	19,576	19,576	19,576	19,576
R-squared adjusted	0.032	0.334	0.485	0.576	0.637

Notes. The controls variables in each column are outlined in the text. Standard errors are clustered at the workplace level. Level of significance: *** p<0.01, ** p<0.05, * p<0.1.

Yet, as is well understood, these apparent relative contributions depend on the ordering of the added controls. Table 2 reports the Gelbach (2016) decomposition which nests the Oaxaca-Blinder decomposition. It builds off understanding omitted variable bias to quantify the role of various covariates in explaining the gender wage gap independent of order. The workplace level controls provide the bulk of the explanatory power in the early years, but this declines. The fixed effects in 1998 explain .113 log points or 72 percent of the explained gap. In 2004 the fixed effects explain .070 log points or 63 percent of the explained gap. In 2011 the fixed effects explain only .049 or 43 percent of the explained gap. Measured absolutely or relatively, the importance of workplace characteristics declines dramatically.

[2] Estimates on the full set of covariates are available upon request.

A sensible way to gain perspective compares how much the gender gap would decline if the unexplained residual within the firm vanished to the decline if all inter-workplace differences vanished. The unexplained residual gap is -.102 in 1998 and *smaller* than the inter-workplace contribution of -.113. The unexplained residual gap in 2011 is -.096 and *much larger* than the inter-workplace contribution of .049. This is a dramatic reversal.

Table 2. Gelbach Decomposition – Contribution to the Gender Wage Gap

	(1)	(2)
	Without workplace fixed effects	With workplace fixed effects
Panel A. 1998		
Column 2	-0.002	-0.003
	(0.004)	(0.003)
Column 3	-0.039***	-0.042***
	(0.007)	(0.006)
Column 4	-0.109***	---
	(0.012)	
Column 5	---	-0.113***
		(0.013)
Total difference	-0.149***	-0.158***
	(0.015)	(0.016)
Panel B. 2004		
Column 2	-0.007*	-0.007**
	(0.004)	(0.003)
Column 3	-0.031***	-0.035***
	(0.007)	(0.007)
Column 4	-0.072***	---
	(0.009)	
Column 5	---	-0.070***
		(0.009)
Total difference	-0.110***	-0.112***
	(0.014)	(0.014)
Panel C. 2011		
Column 2	-0.010*	-0.009**
	(0.005)	(0.004)
Column 3	-0.055***	-0.056***
	(0.007)	(0.007)
Column 4	-0.051***	---
	(0.009)	
Column 5	---	-0.049***
		(0.010)
Total difference	-0.115***	-0.114***
	(0.016)	(0.017)

Notes. Coefficients indicate the gender wage gap explained by the variables in each column of Table 1. Standard errors are in parentheses. In column 1 "Total difference" shows the gender wage gap between columns 1 and 4 of Table 1. In column 2 "Total difference" shows the gender wage gap between columns 1 and 5 of Table 1. Level of significance: *** p<0.01, ** p<0.05, * p<0.1.

Redoing the decomposition to include each workplace control reveals that the share female explains .069 log points in 1998 but fell monotonically to .027 log points in 2011. Similarly, whether the workplace is in manufacturing contributed .025 log points in 1998 and fell monotonically to .006 log points in 2011. While other characteristics contribute (the full Gelbach decompositions are available upon request), these two are the largest drivers of the reversal we identify in the Gelbach decompositions.

The traditional Oaxaca decomposition sheds further insight on the role played by these two workplace characteristics. Separate wage equations by gender show that the coefficient on percent female for the male subsample is. -.131 in 1998, -.108 in 2004 and -.122 in 2011. This is shown in the first row of Panel A in Table 3. This relative stability can be contrasted with that for percent female for the female subsample which falls monotonically: -.206 in 1998, -.134 in 2004 and -.045 in 2011. Using the male shares shown in row 2 of Panel A, these suggest that the difference in coefficients accounted for -.025 of gap in 1998, -.009 in 2004 and .028 in 2014. Using the male coefficients, the difference in share female accounted for is -.043 of the gap in 1998, -.033 in 2004 and -.032 in 2011. The declining role of the difference in female share and the reversal in the difference in coefficients results in the share female variable essentially playing no net role in explaining the gender wage gap in 2011 (.028 minus .032). The female base is less dramatic but shows the same trend.

Table 3. Oaxaca Decomposition

	WERS 1998		WERS 2004		WERS 2011	
	Male sample	Female sample	Male sample	Female sample	Male sample	Female sample
Panel A. Share Female Decomposition						
Coefficient share female	-.131	-.206	-.108	-.134	-.122	-.045
Average share female	.332	.658	.335	.639	.362	.627
Using share male: Differences in coefficients account for:	-.025		-.009		.028	
Using male coefficients: Differences in share female account for:	-.043		-.033		-.032	
Panel B. Manufacturing Decomposition						
Coefficient manufacturing	.163	.048	.109	.019	-.009	-.138
Average manufacturing share	.340	.126	.264	.087	.189	.067
Using male manufacturing share: Differences in coefficients account for:	-.039		-.023		-.024	
Using male coefficients: Differences in manufacturing share account for:	-.035		-.019		.001	

Notes. The first row of Panel A shows the coefficients of the share female variable as obtained by OLS regressions in male and female subsamples. The second row of Panel A shows the average share of female employees in male and female subsamples. The first row of Panel B shows the coefficients of the manufacturing sector dummy variable as obtained by OLS regressions in male and female sub-samples. The second row of Panel B shows the average share of the manufacturing sector in male and female sub-samples.

The coefficient on the manufacturing dummy variable has declined for both genders but the difference in the coefficient by gender has remained relatively stable. The manufacturing coefficient for males was .163 in 1998, .109 in 2004 and -.009 in 2011 (first row of Panel B).

This was matched by the coefficient for females declining from .048, to .019, to -.138. Using the male shares in manufacturing reported in the second row of Panel B, the difference in coefficients accounted for -.039 of the gap in 1998, -.023 in 2004 and -.024 in 2011. Using the male coefficients as reported in first row of Panel B, the difference in manufacturing share accounted for -.035 of the gap in 1998, -.019 in 2004 and .001 in 2011. In this case the female base shows a more dramatic picture with a very large positive contribution (in favor of women in 2011).

The summary is that while the pattern of coefficients is largely responsible for the declining role of the share female, it is the shrinking of manufacturing together with more nearly equal shares by gender that is responsible for the declining role of the manufacturing dummy. In both cases, these two important workplace level variables matter less in determining the gender earnings gap over our period of observation.

4. Conclusion

We show the declining relevance of inter-workplace differences in explaining the British gender wage gap. Workplace differences explained the bulk of the gap in the early years but fell monotonically. Indeed, someone wishing to create more equal wages would prefer to eliminate the inter-workplace contribution in the first year of the data but would prefer to eliminate the residual within workplace difference in the last year of the data.

Historically, the legal emphasis has been on plaintiffs identifying themselves as subject to gender discrimination by their employer and seeking a remedy. While some legislation has attempted to encourage voluntary action by employers (the UK's Duty to Promote Gender Equality legislation in 2007), action by plaintiffs largely remains the mechanism for enforcement. Two criticisms have been leveled against this legal approach. First, much of the gender gap is not within the employer and so will not be changed even if within firm gender equality is achieved. Second, the employees subject to gender discrimination within the firm may not recognize it. More recent policy requiring firms to provide information on the gender gap may help ameliorate this second concern. Our research suggests that the relative importance of the pattern across firms has been declining in explaining the gender gap. This change argues that substantial reductions in the gender wage gap may be still be possible by narrowing within firm differences and so the recent policy of providing within the firm information is particularly relevant.

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