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Equalities Office

Putting equality at the heart of government

The Gender Pay Gap in the UK 1995–2007:

Part 1 – Research report

Wendy Olsen, Vanessa Gash, Leen Vandecasteele, Pierre Walthery and Hein Heuvelman

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February 2010

The Gender Pay Gap in the UK 1995–2007: Part 1 – Research report

By Wendy Olsen, Vanessa Gash, Leen Vandecasteele, Pierre Walthery and Hein Heuvelman

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Preface

The internationally recognised 6* Centre for Census and Survey Research (www.ccsr.ac.uk) offers this research report as an output of the Government Equalities Office (GEO) *Gender Pay Gaps in the UK 1995–2007* project. The authors are grateful for helpful comments from Polly Le Grand, Damian Grimshaw, Nick Shryane and staff at the GEO.

Executive summary

The Government Equalities Office commissioned this research to examine how the gender pay gap (the gap between men and women's average hourly earnings) has changed in the past 10 years, and whether new methodological developments could shed light on the direct and indirect drivers of the pay gap. This report uses the most recently available British Household Panel Survey (BHPS) data to examine the pay gap in 1995–97 and in 2004–07 using panel regression techniques, while also providing a decomposition of the gender pay gap over time.

Looking at the causes of the gender pay gap allows us to examine why men and women's earnings differ. The pay gap fell from 24 per cent during the period 1995–97 to 19 per cent in 2004–07. For full-time working women, the pay gap was now only 15 per cent compared with 18 per cent in 1995–97.

One of the reasons for differences in male and female earnings is how men and women participate in the labour market. UK women's labour force participation rates are about 15 percentage points lower than men's rates, and there has been little change in UK women's tendency to work part-time hours. Approximately 38 per cent of women workers worked part-time hours in both time periods, compared with 7 per cent of men.

The poor calibre of many part-time posts is an ongoing concern, given women's disproportionate involvement in part-time jobs. Indeed, previous research has found that many women have to downgrade occupationally in pursuit of reduced hour posts. The poor quality of many part-time jobs is confirmed by the data used: part-time jobs tend to have lower skill profiles than full-time jobs and are less likely to be permanent or unionised. This is reflected in the part-time pay gaps which were high, at 31 per cent, in 2004–07.

As there is considerable debate concerning the best measure of the gender pay gap, we include several different measures, including part-time, full-time and overall pay gaps. We have measured the overall pay gap as the percentage difference between all women's earnings and all men's earnings per hour. Even though the pay gap has decreased since the 1990s, women in full-time jobs in 2004–07 were still earning 15 per cent less per hour than full-time men. Men's average full-time wages were £12.71 per hour, and women working full-time earned on average just £10.85.

A wage model for each time period, controlling for all variables associated with pay differentials including education, unemployment, tenure, a sex segregation scale (which measures the degree of male prevalence in each occupational group), firm size, industrial sector, region, trade union membership and gender, could reveal the main causes of the pay gap. We simulated the effect on the pay gap of bringing women's experience up to the level of men's. The decomposed simulated effects of the wage regressors are then calculated as the main direct drivers of the pay gap.

Decomposition by simulation answers the counterfactual question: 'What changes in men's and women's circumstances would be able to close the gender pay gap?' The simulation method calculates a series of simulated pay rates which, in total, would close the pay gap.

This method attributes about 17 per cent of the pay gap in the UK, or 40p out of the total gap of £2.32 per hour, to sex segregation. For the part-time pay gap, even more of the gap is explained by sex segregation. Sex segregation is socially embedded in job design, choices about careers such as hairdressing or plumbing, and the promotion prospects associated with particular jobs.

Employment in the public sector works in the opposite direction, protecting women's pay in the 2000s. Additionally, trade union membership also decreases the gender pay gap and its effect has grown in importance between the 1990s and now.

The gender pay gap is based on estimates of wages for all wage earning employees; however, our omission of non-employees could result in selection bias. We found the gender component of the pay gap to shrink when selectivity-adjusted wage estimations were calculated. Three factors were found to constrain women's supply to paid work: having children in the home, especially young children; having a health problem that limits one's ability to do work; and having a spouse who earns enough to make staying at home affordable (Table 5.2). In 1997 it was standard for a higher-earning male partner to decrease the likelihood that the female partner would be employed. But in 2007 this effect had disappeared in Great Britain. Instead, household income increases the likelihood of (or is associated with) women taking up paid work. In general, the rise in women's earnings seems to be important in changing the breadwinner model in Britain. It is interesting to reveal that in 2007 it is low-income women who are more likely to stay at home without employment than high-income women.

When we included a measure of work history on earnings we established that time spent in full-time employment has a positive effect on earnings while time spent in part-time work brings no wage gains. The impact of taking career interruptions was also found to be highly negative. While a full-time employee's wage increases by 3 per cent per year, women who spent time in family care were found to have lower earnings (Table A5.1).

Taking time off paid employment for family care work can have a cumulative effect. Each part-time working woman in 2007 had done on average nine years of full-time paid work, seven years of part-time paid work, and four years of unpaid family care work. These four years of family care work caused a 4 per cent lower hourly wage, which can be difficult to overcome later in life. Consequentially, women's lower earnings are borne cumulatively over time, making the net gender effect of a career interruption much larger than the wages lost during the time spent in family care.

The report also examines how the causal factors associated with the gender pay gap in Great Britain have changed in importance over time (see Figure 2.1). Over the longer term 1970–2000, for example, educating girls has caused education gradually to become a smaller cause of the gender pay gap in Britain. It is currently no longer a major contributor to the pay gap while other new factors are. These factors include male-dominated industries and employers' use of part-time work.

While pay in banking, insurance and finance was on average 22 per cent higher than other sectors in 2004–08 (a smaller differential than in 1995–97), the banking sector's upward wage differential is felt more by men (26 per cent) than women (17 per cent). The pay gap decomposition allows the test to control for other factors such as education, which might be associated with this sector. On balance the contribution of the banking, insurance and finance industry to the pay gap was nil in 1997 and was 4 per cent of the pay gap in 2007. The manufacturing and construction industries also contribute to the pay gap (5 per cent and 8 per cent of the 2007 pay gap respectively) because they are both male-dominated and high-wage sectors for an average worker. The hotel and catering sector also contributes to the pay gap because of a large wage differential in that sector, but the sector's effect has declined over 10 years analysed.

The research provides the latest figures for the UK, as well as for Scotland, Wales and Northern Ireland. In assessments of the gender pay gap that have male full-time employees as the denominator, Scotland's overall pay gap rose by 3 per cent, though there was no improvement for Scottish part-time workers, for whom the pay gap was 36 per cent in 2004–08 (even worse than the 35 per cent part-time pay gap in 1995–97).

Welsh women working part time earn 28 per cent less than full-time men, though the pay gap is much higher than for full-time women workers, who earn 17 per cent less than men. Northern Ireland's full-time pay gap is just over half the UK average, at 10 per cent in 2008. The province's part-time women earn 31 per cent less than its full-time men. A discussion of regional differences is provided in section 4.

Of the English regions, the Greater Manchester region has one of the smallest pay gaps: full-time women slightly more than men, and overall the women there earned 93 per cent as much as men – a 7 per cent overall gap. Tyne and Wear also has a small gender pay gap. Inner and outer London and the South East have large gender pay gaps, while the South West is more moderate in its gender pay gap. Statistical tests of the regional differences in the pay gap show a rather wide confidence interval. This means that differences of just 2–3 per cent are frequently insignificant while differences of 12 per cent or more are frequently significant. For instance, the overall pay gap in the Greater Manchester region in 2004–08 was 7 per cent, and it was 18 per cent in Northern Ireland, compared with the UK average of 20 per cent.

The pay gap was studied over the life course. Statistical tests suggest that the pay gap as modelled here is insignificant at school-leaving age, becomes positive at age 27, and then rises to a peak pay gap level of 28 per cent of men's wages at age 45. The pay gap declines after that. The pay gap model underlying this estimate is of high quality. Clearly this pattern of impact is focused on the child-bearing years and thereafter.

We also investigate how the gender pay gap differs for high and low earners. We note that women are disproportionately found among the lowest one-tenth of earners while men are disproportionately found among the highest decile of earners. This tendency decreases in severity in the 2000s, when slightly more women were employed in the highest deciles; however, these women still only accounted for 37 per

cent of the highest earners in 2007 (rather than half). While we found women to be prevalent among the low paid in this analysis, we found no evidence of women earning particularly low pay, relative to men, at upper or lower levels of the distribution of wages. That is, the pay gap was the same among low-earning and high-earning women after we controlled for a series of covariates.

1. Introduction

There is a long tradition of analysis of the gender pay gap both in the United Kingdom and internationally. The Government Equalities Office commissioned a study to assess how the gender pay gap has changed and whether new methodological developments could shed light on the indirect and direct drivers of the pay gap. This report uses the most current panel data for the United Kingdom and compares these data with the gender pay gap in the 1990s. The report applies wage regressions for the years 1995–97 and 2004–07[1] to examine how the drivers of the pay gap have changed over time. In the aggregate the pay gap in Great Britain has moved from 24 per cent to 19 per cent of men's wages over this decade. Women working part time also show an improvement in wages – their pay gap has declined from 36 per cent to 31 per cent of men's full-time wages over the same period.

This report uses a variety of explanatory variables that account for women's lower pay. These include the industrial sector of the work, with workers in banking for instance found to earn very high wages, as well as firm size and region. The report includes a measure of how the length of career interruptions for family care negatively affects women's wages (workers can expect to earn 1 per cent lower wage rates now for each year of past family care work).

Innovations are made here in statistical method while ensuring that the breakdown of the causes of the pay gap is easy for readers to understand. We (1) use bootstrapping to get an interval of accuracy around the pay gap; and (2) apply a simulation method that allows a decomposition of the gender pay gap which reveals all contributing factors to the pay gap. Our specific approaches are described in more detail in Olsen et al., 2009 (a research design report for this project).

Currently women who earn less than men (or vice versa) are able to seek legal redress in the UK if they can demonstrate either direct or indirect discrimination. This report, however, cannot demonstrate discrimination *per se*.

In our statistical models we explain that a large portion of the gender pay gap is due to differences in male and female employment. When we add controls to our models we decrease the negative wage rate differential of women to 9 per cent of wage rates from

[1] This report is based on the following waves of the BHPS data: Waves E, F and G (corresponding to 1995, 1996 and 1997) and waves N, O, P and Q (broadly corresponding to 2004, 2005, 2006 and 2007).

a high of 16 per cent in 1997. In 1997 the part-time pay gap was nearly £4.00 per hour (£10.96–£7.01). The gender residual of 90p reflected nearly a quarter of this large gap in absolute terms. While this is much less than the total pay gap, which was running at 21 per cent of men's full-time wage rates in 2007 (i.e. £1.86 on a base men's wage of £12.71 an hour; see Table 3.2), this unexplained component remains a key factor in the current analysis.

This report shows occupational sex segregation to be a significant driver of the pay gap, accounting for 17 per cent of the pay gap in 2007 and 16 per cent of the pay gap in 1997 (see Table 4.1). In other words a large portion of the gender pay gap is due to women's concentration in low-paid occupations that have low proportions of male co-workers. The second report of this project offers a detailed explanation for the gender differentials found in employment.

This report begins by reviewing the drivers of the pay gap. In this literature review (section 2) we note that some previous studies have focused on the gender pay gap among full-time workers only, giving lower estimates of the gender pay gap. We urge giving equal attention to the part-time pay gap and the overall pay gap. Section 3 provides some descriptive statistics identifying the ongoing differential in UK men and women's labour force participation rates and women's tendency to work in part-time jobs, as well as basic gender pay gap measures. Section 4 presents a breakdown of the main components of the pay gap in 1997 versus 2007. Section 5 shows that career interruptions and labour supply factors partly explain the large female residual. The strongest difference in the impact of wages between both time periods is the previous work history. Section 6 analyses how the gender differentials in earnings vary across the wage distribution. Section 7 sets out the conclusions.

2. The drivers of the gender pay gap in Britain

This section reviews the recent empirical findings regarding the gender pay gap in the United Kingdom. We start with an overview of recent figures.

2.1 The gender pay gap in the UK: recent figures

According to recent research, the full-time gender pay gap has seen an improvement in recent years. Daniels (2008) finds that a full-time male employee in 2007 earned on average 17.2 per cent more than full-time female employees. This figure is down from 20.7 per cent in 2001 (Annual Survey of Hours and Earnings data, Daniels, 2008).

This finding seems to be robust to the data used, as Leaker finds a similar trend with the New Earnings Survey and Labour Force Survey (LFS) data (Leaker, 2008). Grimshaw and Rubery (2001) argue that a substantial part of the female labour force, and in particular female part-time work, is predominantly centred in low-status jobs. As a result, the gender pay gap worsens from 20 per cent to 27 per cent once part-time work is taken into account (figures for 1995, New Earnings Survey). Harkness (1996) found that whereas the gender pay gap for female full-time employees had been closing since the 1970s, the pay gap of part-time female employees compared with men's had remained surprisingly constant. This report aims to contribute to the literature by providing up-to-date research into the gender pay gap of both full-time and part-time workers. This report's analysis of the British Household Panel Survey (BHPS) updates these older figures but is broadly consistent with their explanations of the pay gap.

2.2 The main drivers of the gender pay gap

A typical gender pay gap study will try to disentangle the drivers behind the gender pay gap. This involves finding and modelling the determinants for the wages of females, males and all employees. The outcomes of these models are used to decompose the gender pay gap into its constitutive elements. This decomposition exercise is based on two important factors. Firstly, it takes into account the importance of determinants such as education level, labour market experience and occupational group for somebody's wage. Secondly, the gender differences in the distribution of these determinants is taken into account. Using this methodology we can see, for instance, that the average number of years of work experience differs between men and women, and hence this accounts for a large portion of the pay gap. Conversely, we could determine that education is an important determinant of wages, but because education

levels have become more equal between men and women, it is not a large determinant of the gender wage gap. In what follows we outline the main drivers of the gender pay gap, and we make a broad division between human capital, institutional factors and cultural factors. After summing up the main drivers of the gender wage gap we will look at the relative size of the different drivers found in previous research.

Human capital

A main concern of previous research into gender earnings inequality has been how to determine the part of the gender wage gap that could be explained by productivity-related differences between employees. Human capital is seen as a main driver of gender wage inequality and it refers to skills, qualifications and experience which make someone more attractive in the labour market. Employment experience is an important determinant of human capital. Overall, 19 per cent of the gender wage gap has been attributed to work history (Olsen and Walby, 2004). A recent study by Swaffield (2007), using BHPS data, shows that full-time labour market experience is an important contributor to the gender wage gap. The more detailed the measure of work history, the larger the share of the gender pay gap it explains. Swaffield finds that the unexplained portion of the gender pay gap reduces by almost 40 per cent when detailed measures of labour market experience are used. Education itself is another important determinant of human capital. It is found to be important for wage determination but it is surprisingly unimportant in the decomposition of the pay gap (8 per cent of the gap; Olsen and Walby, 2004).

Institutional factors

While the main interest in the gender wage gap has been its link with human capital, the institutional context of gender wage inequality forms another crucial element of the gender wage gap (Olsen and Walby, 2004). The wage determining process can be seen as subject to a set of rules and constraints, linked to social settings at different levels: the state and its system of welfare provision, the occupational group, and sector- and workplace-specific labour markets. In this respect, Grimshaw (2000) finds important differences in the gender wage gap between the public and the private sector in the United Kingdom. The smaller gender pay gap in the public sector could be linked to the centralisation of wage setting. Moreover, the narrowing of the gender pay

gap in the public sector played an important role in the narrowing of the overall gender pay gap between 1986 and 1995 (ibid.).

The gender segregation of the occupation in which people work is also an important factor. Generally, previous research has shown that people employed in occupations where women are over-represented tend to earn lower wages in the United Kingdom (see Olsen and Walby, 2004). In a recent study, Mumford and Smith (2007) show that both occupational segregation and workplace segregation contribute substantially to the gender wage gap. People who work in occupations or workplaces where the majority of the workforce is female are paid lower wages than they could get elsewhere, given their qualifications, experience and other characteristics. It is not clear yet whether the root cause of lower pay for women who work in female-dominated occupations is discrimination, or hidden differences in lower productivity. Tests of the impact of occupational segregation must 'control' for other factors that influence productivity and wage-bargaining, such as firm size and unionisation, to avoid misattributing the cause to occupational segregation.

Cultural factors

It can also be argued that the culture and value system with respect to gender roles has an effect on gender inequality in wages. Women's and men's ideas about gender roles in the household and labour market can – to a greater or lesser degree – be stereotypical. Hence, there are important gender differences in labour market attitudes and aspirations. Some authors take these domestic labouring norms and gender stereotypes as cultural givens, but others see them as malleable and open to policy levers (McRae 2003). Specific gender stereotypes and role models will also influence men and women's negotiation strategies and the resulting starting salaries and pay rises (Babcock and Laschever, 2003). In her recent study on the UK gender pay gap, Swaffield (2007) finds that differences between women in their gender role values are an important driver of the female wage. Yet she found empirical evidence that gender stereotypical attitudes are not a main component in gendered earnings *differences*. Decomposition methods are crucial to making this important distinction.

The relative size of gender pay gap drivers

Once the main factors that drive or explain the gender pay gap have been established, one can assess the size of the different contributing factors. In Olsen and Walby's study (2004), the determining factors are full-time work experience (19 per cent), interruptions to employment for child care and other family care (14 per cent), differences in education level (8 per cent), occupational segregation (10 per cent), and other institutional factors (8 per cent). Mumford and Smith (2007), using the British Workplace Employee Relations Survey of 1998, find that 25.7 per cent of the gender wage gap is explained by individual level productivity characteristics, while up to 31.7 per cent can be explained by occupational and workplace segregation. After identifying the size of the determining factors, one is left with the proportion of the gender pay gap that remains unexplained by the drivers outlined above. Most research evidence shows that the largest part of the gender pay gap remains unexplained (Makepeace et al., 2004; Joshi et al., 2007; Swaffield, 2007). The unexplained part amounts to 38 per cent of the gender wage gap in previous research on the BHPS sample (Olsen and Walby, 2004). The component of the gender pay gap that cannot be explained by human capital indicators is sometimes attributed to gender discrimination in the labour market. However, this is not the only possible explanation because there are always 'unobserved' individual characteristics on which we have no information in our study (Harkness, 2006). Examples of unobserved individual characteristics are motivation or assertiveness. Another unobserved factor could potentially occur when individuals accept lower wages for work they regard as more pleasurable. The latter could be referred to as compensating differentials (Kilbourne et al., 1994). Nonetheless, statistical developments allow for the removal of unobserved heterogeneity from model specifications by specifying an individual fixed-effects term (Blinder, 1973; England et al., 1988), a technique deployed in this report.

2.3 Change in the drivers of the gender pay gap over time

An interesting question relates to how the drivers of the gender wage gap have evolved over time. Is there any evidence that the drivers of the gender wage gap have changed over the last 10 to 20 years? The research evidence on this topic is fairly limited, but a number of studies have employed British cohort studies to gain insights into these trends (Makepeace et al., 1999; Makepeace et al., 2004; Joshi et al., 2007). The most recent study by Joshi et al., (2007) investigates the full-time gender wage gap – and its main components – for people from three different cohorts born in 1946, 1958 and 1970 respectively. They find that gender inequality in wages for people in their early 30s has decreased over time, from a gender pay gap of 30.5 per cent for the earliest cohort to a gap of 8.2 per cent for the most recent cohort. Over time, a smaller share of gender wage inequality is explained by human capital and work experience, even to the extent that full-time employed women of the youngest cohort (1970) should have earned more than their male colleagues at the age of 30 given their characteristics such as qualifications and work experience. Yet, while the gender wage gap decreases over time when comparing different cohorts in their early 30s, it is shown to increase substantially between age 33 and age 42, and more of the gender pay gap is explained by human capital and work experience at age 42. These studies, based on the British Cohort Studies, only look at one or two cohorts when assessing the changing importance of the different drivers of the gender pay gap. Our study contributes to the literature by looking at drivers of the gender pay gap for the whole labour-active population on the basis of the most recently available BHPS data.

2.4 A summary of the pay gap drivers over time

The preceding review of literature forms the starting-point for the research, but in this section we also summarise our main results as a taster of the material which appears in sections 3 to 6 of this report. This first glance surveys change over the period 1995–2007 in the causes of the British gender pay gap (Figure 2.1). The main purpose of Figures 2.1 and 2.2 is to indicate the larger and smaller factors, and which factors have increased or decreased in importance over time. These factors are discussed in more detail in what follows.

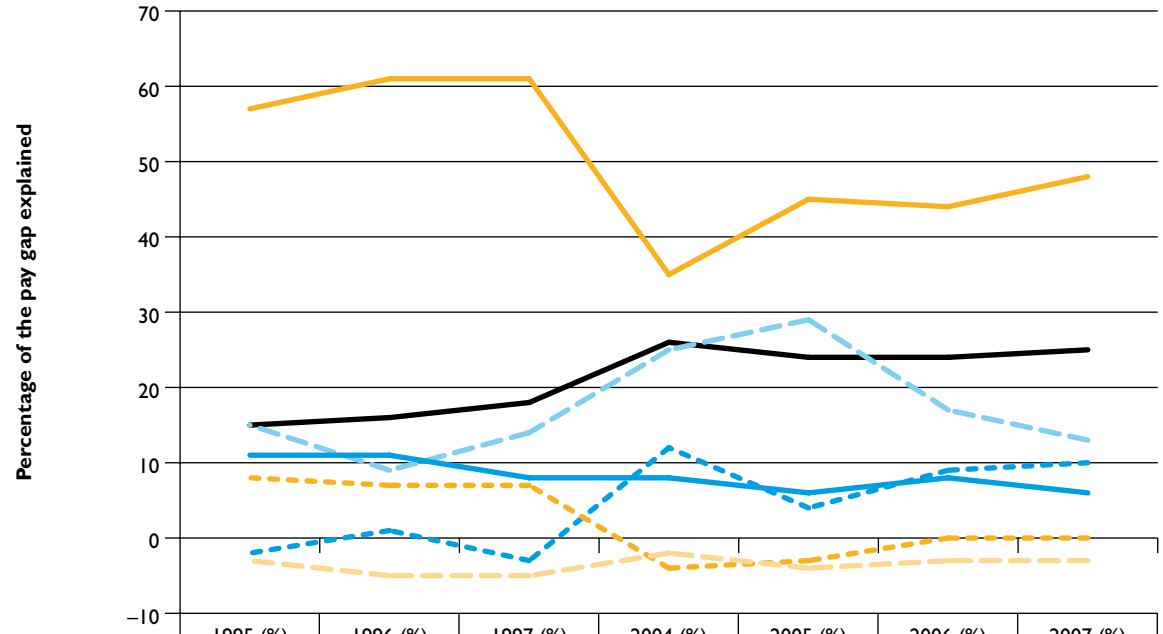
In Figure 2.1, each line on the graph shows the percentage of the gender pay gap that is attributable to one main driver. Each main driver could potentially be reduced if policy action were to inhibit its gender-specific effects. Over the longer term 1970–2000, for example, educating girls has gradually caused education to become a smaller cause of the gender pay gap in Britain. Formal education is no longer a major contributor to the pay gap while other new factors are. These factors include the workings of the public sector, male-dominated industry, and employers' use of part-time work. Here we examine whether these factors do, in fact, still affect the pay gap. Figure 2.2 breaks down the institutional factors in more detail.

A first finding from Figure 2.1 is that many of the determinants of the wage gap have remained fairly stable over time. This is the case with firm size, occupational segregation, many of the institutional factors and the effect of unemployment. On the other hand, the role of formal education seems to have decreased in importance, a finding which is in line with previous research (Joshi et al., 2007).

The share of the pay gap between men and women that is explained by gender alone has become smaller in 2005–07 compared with 1995–97. This means that the determinants we look at are better at explaining gender wage inequality and a smaller part remained unexplained in the 2000s.

We also show explicitly in section 5 that a great part of the impact of 'being female' on the pay gap is due to career interruptions to carry out family care work. These results are shown in detail for 2007 in Table 5.1 and seem to suggest that career interruptions have a strong negative impact on earnings. Additionally, the impact of career interruptions on the gender pay gap is shown in Figure 5.3.

Figure 2.1: Main drivers of the pay gap in Great Britain, including gender, 1995–2007[2]



	1995 (%)	1996 (%)	1997 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)
Female	57	61	61	35	45	44	48
Education	11	11	8	8	6	8	6
Ever unemployed	–3	–5	–5	–2	–4	–3	–3
Occupational segregation	15	9	14	25	29	17	13
Institutional factors	8	7	7	–4	–3	0	0
Industry-specific effects	–2	1	–3	12	4	9	10
Labour supply factors	15	16	18	26	24	24	25

Note: Decomposition by simulation. See Annex 4 for details.

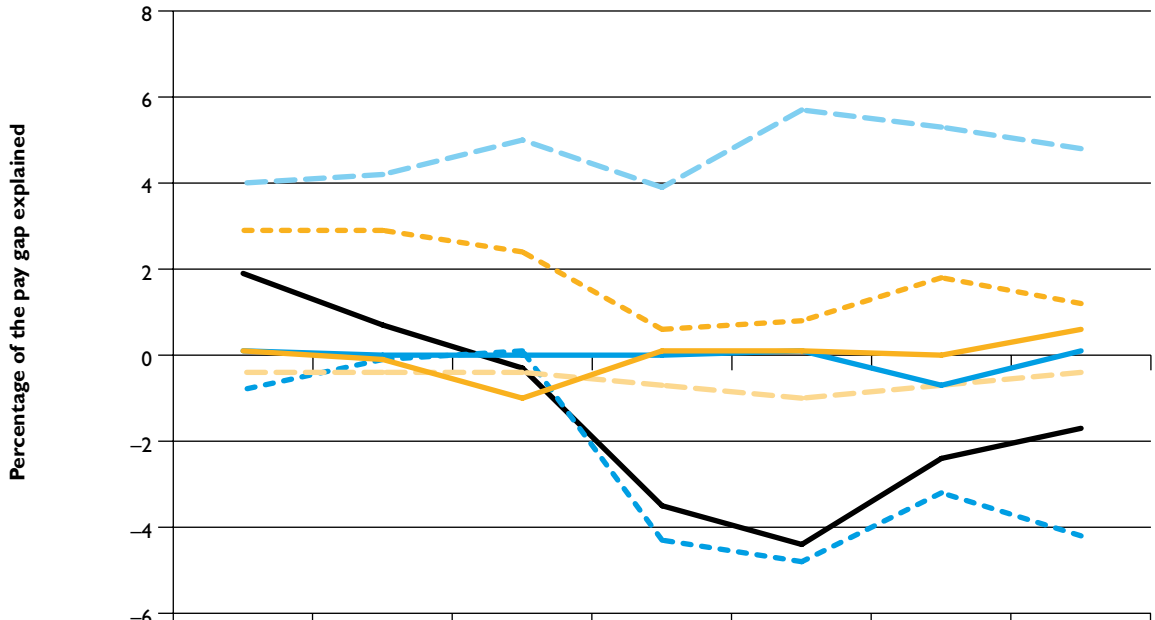
Source: BHPS waves E, F, G, N, O, P and Q.

Base: Employed individuals aged 16 to 65 inclusive, Great Britain.

Figure 2.2 looks at some of the institutional factors influencing the pay gap in detail. Whereas the overall trend of institutional factors was slightly downwards in Figure 2.1, a breakdown by factor shows that many factors remained stable between the 1990s and the 2000s. On the other hand, union membership and working in the public sector have become advantageous for female employees in 2005–07, compared with 1995–97.

[2] The gender component covers all unobserved or excluded characteristics that are systematically related to gender.

Figure 2.2: Main institutional drivers of the pay gap in Great Britain, 1995–2007



	1995 (%)	1996 (%)	1997 (%)	2004 (%)	2005 (%)	2006 (%)	2007 (%)
In current job <1 year	0.1	–0.1	–0.1	0.1	0.1	0.0	0.6
In current job >4 years	0.1	0.0	0.0	0.0	0.1	–0.7	0.1
Firm size 25–49	–0.4	–0.4	–0.4	–0.7	–1.0	–0.7	–0.4
Firm size 50–499	4.0	4.2	5.0	3.9	5.7	5.3	4.8
Firm size 500+	2.9	2.9	2.4	0.6	0.8	1.8	1.2
Employed in public sector	–0.8	–0.1	0.1	–4.3	–4.8	–3.2	–4.2
Union membership	1.9	0.7	–0.3	–3.5	–4.4	–2.4	–1.7

Note: Decomposition by simulation. See Annex 4 for details.

Source: BHPS waves E, F, G, N, O, P and Q.

Base: Employed individuals aged 16 to 65 inclusive, Great Britain.

In summary, in this section we reviewed the existing literature on what drives the UK gender pay gap, and we summarised the kinds of findings which are spelt out in more detail in the next four sections. These relate to structural, institutional, industrial and person-specific factors that contribute to the pay gap and their relative weight. We begin by reviewing some crucial facts about women's part-time work, the pay gap, and pay.

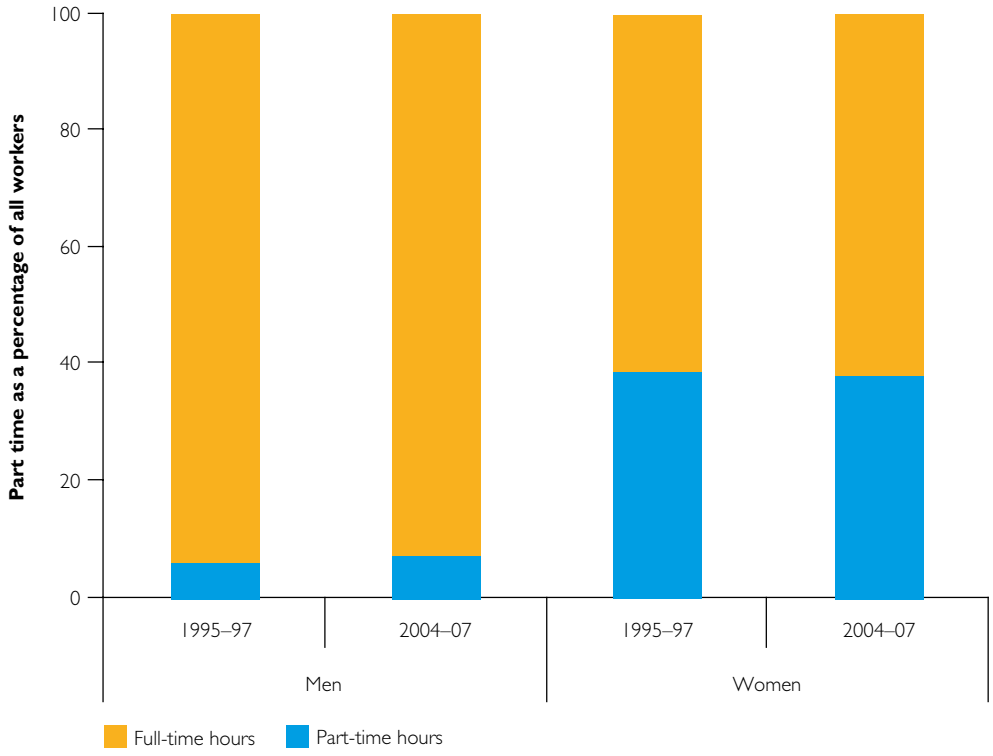
3. The pay gap and the UK labour market 1995–97 to 2004–07

This section outlines the patterns of labour market participation of women in the UK during our data window. As gender differentials in paid employment contribute to the pay gap, this section outlines some of these differences.

In the UK women's labour force, participation rates are about 15 percentage points lower than men's, and this disparity shows little variation over time (OECD various years). Additionally, there are considerable differences in men and women's working time. Figure 3.1 presents the proportions of workers in part-time employment (5–29 hours a week) and full-time employment (30+ hours a week) for men and women. We find very few men working part time (between 6 and 7 per cent) in both time periods, while 38 per cent of women work part time. The tendency for women to have such high part-time rates is consistent across time, though we do note some important differences regionally. For instance in London we find women are slightly more likely to work full time.

Table 3.1 presents some socio-demographic characteristics as well as job characteristics of part-time and full-time working women for both grouped time periods. We find part-time workers to be twice as likely as full-time workers to be responsible for children within the household and to have a child aged less than 3 years old. We also note that women in part-time jobs tend to have greater numbers of children in total in the household. Moreover, these tendencies do not vary much across our two time periods. Women in part-time jobs in the mid to late 2000s were just as likely to be responsible for children as was the case in the mid to late 1990s. Women in full-time jobs tend to have spent slightly more time in education, and also tend to be a little younger (at the mean) than women in part-time jobs.

Figure 3.1: Distribution of full-time and part-time work by gender in Great Britain, 1995–97 and 2004–07



Note: Data are weighted with probability weights.

Source: BHPS waves E, F, G, N, O, P and Q.

Base: All employees individuals aged 16–65 inclusive, Great Britain.

Previous research has consistently found part-time jobs to be of inferior quality to full-time jobs in the UK (e.g. Connolly and Gregory, 2008), with many workers found to occupationally downgrade in their pursuit of reduced hours (Tomlinson et al., 2009). The BHPS sample analysed here, which includes booster samples for Wales and Scotland, confirms the tendency for part-time work to be associated with lower occupational worth than full-time work. We find part-time work less likely to be permanent, unionised and in the protected public sector. While part-time workers have slightly longer job tenure, by about half a year, they are considerably less likely to be in a highly skilled post. The combined effect of high rates of female part-time employment as well as the comparatively poor quality of this employment has significant implications for the gender pay gap.

Table 3.1: Socio-demographic and job characteristics of part-time and full-time workers in Great Britain

	1995–97		2004–07	
	Part-time job	**Full-time job**	**Part-time job**	**Full-time job**
Socio-demographic characteristics	**Proportion**	**Proportion**	**Proportion**	**Proportion**
Responsible for dependent child	0.42	0.18	0.41	0.18
Youngest child less than 3 years old	0.14	0.07	0.16	0.07
	Mean	Mean	Mean	Mean
Age	39.58	36.70	40.54	38.50
Number of dependent children	0.86	0.36	0.83	0.35
Years spent in education	10.87	11.83	11.74	12.34
Job characteristics	**Proportion**	**Proportion**	**Proportion**	**Proportion**
Job is permanent	0.84	0.94	0.92	0.96
Workplace has union	0.40	0.54	0.43	0.56
Job in public sector	0.11	0.16	0.13	0.18
Higher professional occupations (service class 1+2)	0.17	0.44	0.22	0.47
	Mean	Mean	Mean	Mean
Tenure in months in current job	58.23	51.67	60.64	54.48

Note: Data are weighted with probability weights.

Source: BHPS waves E, F, G, N, O, P and Q.

Base: Employed women aged 16–65 inclusive, Great Britain.

3.1 The UK gender pay gap

Table 3.2 presents the gender pay gap for hourly wage rates between 2004–07 and 1995–97 for Great Britain using the BHPS. The figures vary considerably depending on which measure is used. One standard measure compares women's overall hourly earnings with men's full-time earnings, by which the pay gap is 21 per cent in 2004–07. This measure assumes that full-time men offer a valid and usual baseline for pay in the employment labour market. Bonus payments are included in pay, but unpaid overtime is of course excluded. Part-time work by men is considered to be relatively unusual and possibly subject to vagaries of both low and high wages, although it has grown to 10 per cent of male employees and perhaps should now be included in pay gap measures. The overall pay gap measure used by the Government Equalities Office has all men

in the denominator, which (as shown) gives a pay gap for 2004–07 of 19 per cent. It is lower because the part-time male employees' pay is on average lower than the pay of other men. Finally we also consider the full-time pay gap and the part-time pay gap. The definition of the part-time pay gap also has to be carefully specified. We use part-time women's wages versus full-time men's wages. Again, this is because full-time men are thought to offer a basic and usual standard for the wages that the labour market offers to each type of work.

The overall pay gap has decreased by 4 percentage points since the 1990s from 24 per cent to 19 per cent, or 25 per cent to 21 per cent depending on which denominator is used. Men's average rate of full-time pay was £12.71 an hour and women's average was £10.85 an hour in 2004–07, while the rates were lower in the 1990s. The wages are inflation-adjusted so the rise from £8.20 to £10.10 per hour reflects a real rise in women's average pay. The part-time pay gap, as could be predicted, is much larger than the overall pay gap and is essentially double the full-time gap in the two time periods. Women's wages increased more than men's wages between the time periods. These figures include paid overtime but not unpaid overtime. The figures exclude extreme outliers that lie above and below 0.05 per cent of the earnings distribution. This involved the exclusion of 200 cases for respondents earning less than £1.50 an hour as well as workers earning more than £50 an hour. The exclusion of extreme outliers is only done for the bivariate calculations below, which are more prone to mis-specification given the absence of other controls. The proportions of men and women excluded were equal. The data analysed rely on individual recall of wages over the month and week preceding the survey. Working time is determined from the number of hours per week the respondent claims to be working in their current job. The data in Table 3.2 refer to Great Britain.

Table 3.2: The gender pay gap in hourly earnings by working time in Great Britain

Great Britain	Female hourly pay in £	Male hourly pay in £	Full-time pay gap	Part-time pay gap	Overall pay gap (1): full-time male denominator	Overall pay gap (2): all male denominator
2004–07						
Full time	10.85	12.71	0.15			
Part time, <30 hrs a week	8.77	8.75		0.31		
All employees	10.10	12.42			0.21	0.19
1995–97						
Full time	8.94	10.96	0.18			
Part time, <30 hrs a week	7.01	8.21		0.36		
All employees	8.20	10.79			0.25	0.24

Note: Overtime payments and paid overtime hours have been included. The full-time pay gap is defined as the percentage difference between full-time women's and full-time men's hourly earnings. The part-time pay gap is defined as the percentage difference between part-time women's and full-time men's hourly earnings. Two versions of the overall pay gap are presented. The first has full-time men as the denominator, while the second has all working men as the denominator. All wages are in real 2007 British pounds.

Source: BHPS waves E, F, G, N, O, P and Q.

Base: Employed individuals aged 16–65 inclusive, Great Britain.

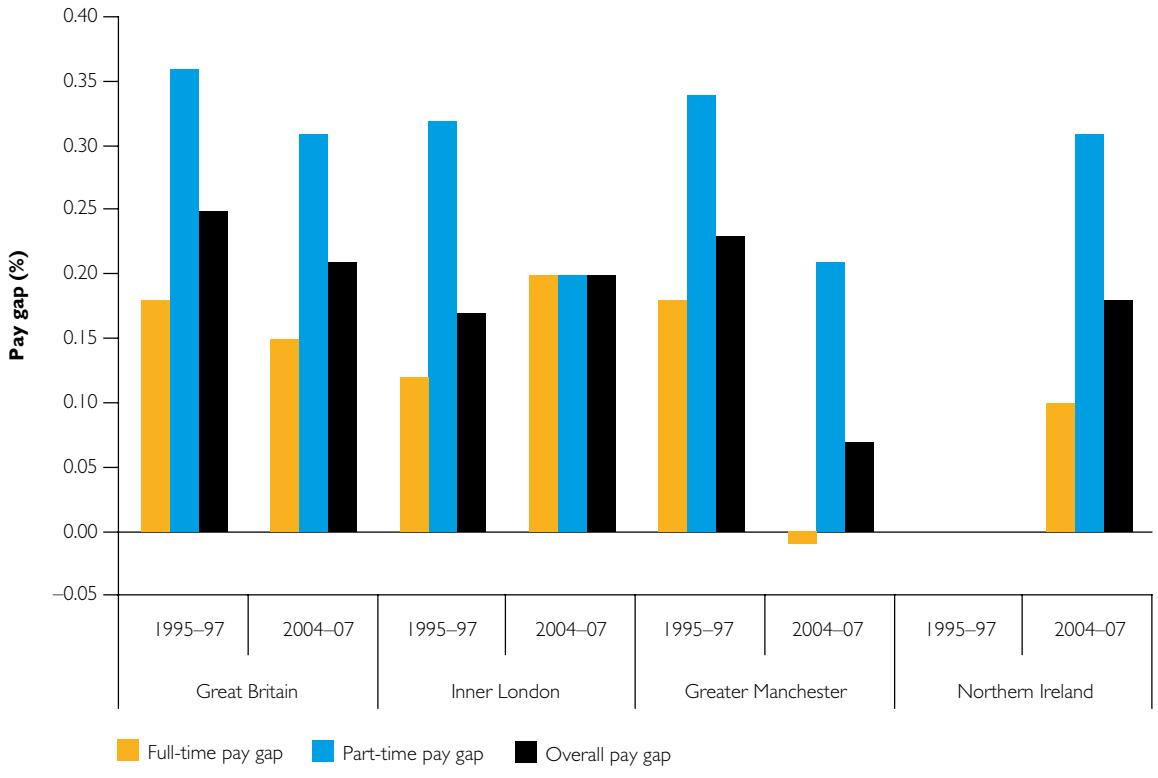
Figure 3.2 presents the gender pay gap in Great Britain and in selected regions in graphical form. There has been considerable variation by region and time. The pay gap varies when either male or female average wages move. These figures for different regions are prone to measurement error due to small sample size. Three sub-regions are of particular interest given their divergent tendencies: Inner London, Greater Manchester and Northern Ireland.

3.2 High pay gap in inner London

Inner London exhibits an increase in the overall gender pay gap (increasing by 3 percentage points) between the 1990s, a time of high unemployment, and the 2000s, a time of economic boom. This is a function of two separate dynamics (see also Greater London Authority, 2005). The first is the increase in the full-time pay gap in the 2000s, from 12 per cent to 20 per cent, and the second is the comparatively large proportion of female full-time workers in the London region. So while female part-time workers in London exhibit a dramatic decrease in their part-time pay gap between the

1990s and the 2000s, this constitutes a smaller proportion of the gender pay gap overall. It is also worth noting in Table A4.3 (Annex 4) that the mean earnings of Londoners are much higher than those in other regions. In fact, female workers in London as an aggregate category (that is including part-time workers) earn more per hour than full-time male workers across Great Britain in both the 1990s and the 2000s. Nonetheless, the increase in the full-time male wage in London in the 2000s was such that the gender pay gap did not decrease as dramatically in the London region as it did in others. The mean full-time wage for men in London increased from £14.34 an hour in the 1990s to £17.23 in the 2000s.

Figure 3.2: The gender pay gap in hourly earnings by region and working time in the United Kingdom



Note: Data are weighted with probability weights.

Source: BHPS waves E, F, G, N, O, P and Q.

Base: Employed individuals aged 16–65 inclusive, United Kingdom.

3.3 Low pay gap in Greater Manchester

The change in the gender pay gap in Greater Manchester in the 2000s is astonishing. It decreases from 23 per cent, below the national average in the 1990s, to 7 per cent between 2004 and 2007. This dramatic turnaround is due to developments in both full-time and part-time employment. The part-time pay gap in Manchester is found to decrease by 13 percentage points over time, while the full-time pay gap decreases by 19 percentage points, so that female full-time workers earn more per hour than male full-time workers in 2004 and 2007.

3.4 Low pay gap in Northern Ireland

Figure 3.2 also presents a breakdown of the pay gap for Northern Ireland, and it only does so for the 2000s as the Northern Irish sample only began in this period. We find the overall pay gap in Northern Ireland to be less than that for Great Britain for the same time period and also note that the pay gap is particularly low for full-time workers, at 10 per cent. The BHPS data are consistent with Annual Survey of Hours and Earnings data in showing such a low pay gap in Northern Ireland.

This section has presented a review of the differences in men and women's mean earnings in the UK. We now move on to analyse the role of particular drivers.

4. The main drivers of the pay gap: A comparison of 1997 and 2007

This section of the report decomposes the gender pay gap to reveal the explanatory factors behind the gendered pay differentials revealed in the previous section. Decomposition provides an assessment of the causes of the gender pay gap as well as an assessment of the size of their impact on the pay gap. We provide a decomposition of the pay gap for two time periods, 1997 and 2007, with 2007 being the most recently available UK panel data.

4.1 Comparing the pay gap in 1997 and 2007

Figure 4.1 presents the main causes of the 1997 and 2007 pay gap. A small number of additional drivers exist but have not been included in the Figure as they account for such a small proportion of the pay gap. Figure 4.1 reveals the largest single cause of the gender pay gap to be gender, i.e. unobserved characteristics correlated with gender, followed by occupational segregation, formal education and institutional factors. Institutional factors include firm size and public/private sector and are explained in greater detail below. We also include industrial sector and exposure to unemployment. Each factor is discussed in turn.

The largest single cause of the gender pay gap is simply gender, with 'being female' a large and unexplained part of the wage equation. Wages were 12 per cent lower for women in 2007 and 16 per cent lower in 1997, even after controlling for age, education, whether they had been unemployed, firm size, job tenure, public sector, being in a trade union, region and the industry they work in. The extent of this pay differential is remarkable given the size of the R-squared for each model (0.45 for the 1997 wage model and 0.41 for the 2007 wage model), and the number of controls added to the models (see Annex 2, Table A2.1). The gender 'residual' in the wage equation presented is the percentage of the wage level that is explained by the variable measuring 'being female', and it is therefore important to reflect on this large gender residual. Previous studies that used the Oaxaca three-term decomposition method tend to omit a discussion of the gender residual, suggesting that it is unexplained. However, here we present a decomposition by simulation in order to offer a plausible assessment of this 'unexplained' gender effect.

Each component is affected firstly by the difference between men's and women's 'endowments', i.e. levels of each factor analysed. For instance, for education there is a tiny difference from 12.3 years for men to 12.2 years for women (see Table A4.6). This difference is then multiplied by the response of wage per unit of that factor, e.g. 0.078 for education. For each year of education, wages go up by 7.8 per cent; but the pay gap is affected by only 1 per cent (–0.0133 to be exact) since the women's education differs little from the men's. By multiplication, each factor is constructed on a scale that corresponds with the gender pay gap itself. The simulation method is a consistent mathematical method requiring judgements about which factors to include in the wage equation and in the decomposition. We display the logic of the decomposition method in Annex 4.

We account for the gender residual itself according to three components. Firstly, and at its most basic, women may be paid less because normatively many people value work done by women less, due to the belief that women's work is inferior to that performed by men. Secondly, women may be paid less if they or their employer operate according to a 'breadwinner' ideology, where the earnings of women need not match those of men as the man is deemed the principal earner in a household. Thirdly, gendered stereotypes of women's capabilities in the workplace, held by managers and sometimes by female workers, can result in women being sidelined to inferior positions within the firm and in them being overlooked for promotion. It is very difficult for statistical analysis to separate out the relative impact of these three factors. These three factors together – socially and culturally – could explain the large negative gender residual in wages. They may work in tandem.

On the other hand, two arguments presented by neoclassical economists would suggest that the gender residual is merely a gender-patterned productivity effect. Firstly, there is the suggestion that women seek employment which allows them to balance both paid work and unpaid care and that they accept lower wages in pursuit of these 'compensating differentials'. The theory of compensating differentials argues that disamenities in a job's characteristics will incur a wage premium in a competitive market. Similarly, desired job characteristics, such as job autonomy or provision of work-life balance, are effectively 'bought' for a lower wage. Such a scenario is highly problematic, however, given the ongoing expectation that women are responsible for the majority of child care and domestic work. Whether women choose lower wages or

are coerced into accepting them by their domestic duties is a basic tension in the pay literature. We cannot resolve this tension using the evidence about pay that we have gathered in this project. A second argument is of unobserved heterogeneity. This asserts that we are failing to measure some underlying (and legitimate) cause of pay level that is highly correlated with being female. Such underlying causes of lower pay might include worker disinterest, a lack of talent, low commitment or taking too much time out of paid employment in order to deal with children's activities or sickness. Both of these competing arguments are carefully tested in the next stage of our research when panel data analyses are used. In a cross-sectional analysis, the gender residual remains a topic for discussion rather than one which empirical findings can help us interpret.

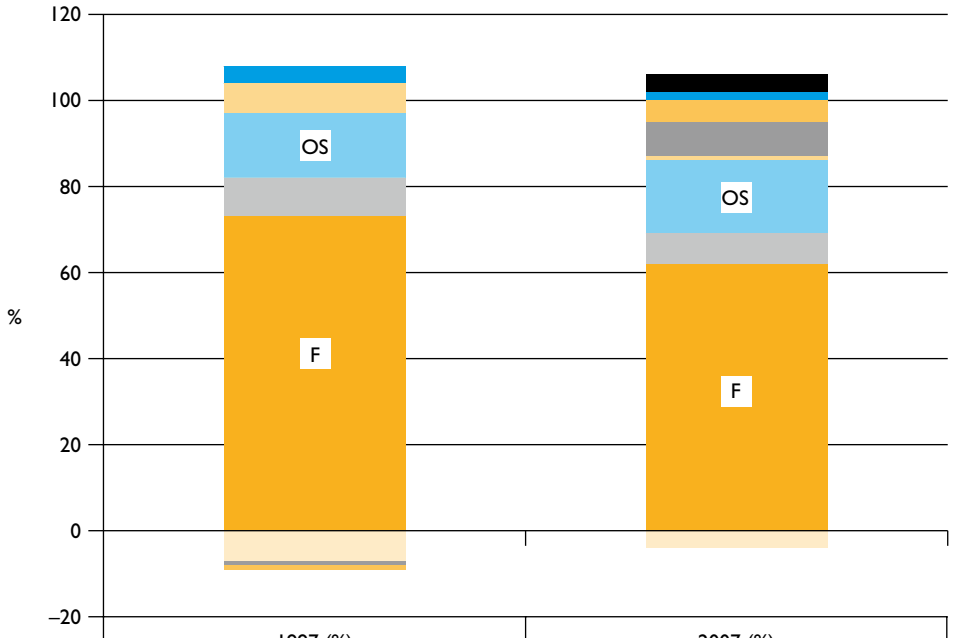
It is also important to note that the gender residual cannot be assumed to reflect direct or indirect discrimination against women. It can – as shown in the above arguments – arise in a manner that omits explicit discrimination.

Moving back to a discussion of Figure 4.1, the next most important driver of the pay gap is occupational segregation – accounting for 15–17 per cent of the pay gap in both time periods. As before, Table 4.1 details how male and female average levels of gender segregation are set out. The measurement of this variable must first be briefly explained. Each individual's occupation is classified into a Standard Occupational Classification job heading (of which there were 26). We then calculate the percentage of workers in the UK who are male for each occupational category. This percentage is then attributed to the occupational position each respondent holds. The highest levels of male segregation are in technical occupations and primary industry. The highest levels of female segregation – involving a very low percentage of male co-workers – are in customer services and caring work. The average level overall was 69 per cent for men and 33 per cent for women in 2006. So the average male works in an occupation where 69 per cent of the workers are male; the average female works in an occupation where 33 per cent of the workers are male. In Annex 4 (Table A4.5 for 2007 and Table A4.8 for 1997), the overall mean of 50 per cent for both is calculated as 5.0 to make regression results convenient to read. In Annex 4 (Table A4.7 for 2007 and Table A4.10 for 1997), the decomposition tables show the large gender difference in occupational sex segregation.

To decompose this factor, we simulate a change from 33 per cent to 50 per cent segregation. Men's segregation does not change. This strategic decision is a major feature of simulation decomposition which differentiates it from Oaxaca-Ransom decompositions (Olsen and Walby, 2004, explain in full why simulation is an improvement which uses most of the conceptual apparatus of the traditional method).

Figure 4.1 also reveals that even though differences in formal education, measured in years, between men and women have regularly declined over recent decades in the UK, education still remains a significant driver of the pay gap. The small difference in women's and men's education is sufficient to create a significant though relatively small factor in the decomposed wage gap. Table 4.1 shows that this factor is just 7 per cent of the pay gap in 2007. It is only a small factor compared with gender itself (which explains 62 per cent of the pay gap in 2007).

Figure 4.1: The causes of the pay gap in Great Britain, 1997 and 2007



	1997 (%)	2007 (%)
SIC7: Banking and financial services	0	4
SIC5: Hotels and catering	4	2
SIC4: Construction	–1	5
SIC3: Manufacturing	–1	8
Institutional factors	7	1
Occupational segregation (OS)	15	17
Ever unemployed	–7	–4
Formal education	9	7
Female (F)	73	62

Note: Decomposition by simulation. See Annex 4 for details. SIC = Standard Industrial Classification.

Source: BHPS waves G and Q.

Base: Employed individuals aged 16–65 inclusive, Great Britain.

Finally, we turn to a range of institutional factors that are usually found to be important in gender pay gap decompositions. These are aggregated in Figure 4.1 because their net effect is small. Table 4.1 shows their effects. Here, working in a large firm is taken to act as a proxy for a variety of features of firms that affect women's and men's wages. Examples of institutionalised practices include promotion and training programmes, treatment of maternity and family-leave issues, job design and whether people get opportunities to work outside their immediate job description. Most of these can be broadly thought of as human resources practices, although in smaller firms the human resource function is not as specialised or explicit as in larger firms. We use the term 'institutional factor' to reflect the fact that social norms underpin how these practices work in organisations. The institutional effect of being in a medium-sized firm in 2007 explained 5 per cent of the pay gap, and being in large firms explained another 1 per cent (Table 4.1).

However, two institutional factors tend to favour women – firstly working in the public sector, and secondly being in a trade union. (Lucifora and Meurs (2006), comment on the public sector impact on wages.) Because it tends to help women more than men, being in a union was measured as a –2 per cent factor in the decomposition of the pay gap. Working in the public sector, similarly, was a –3.7 per cent factor in 2007.

More women than men work in the public sector (16 per cent of women workers and 8 per cent of men workers, after allowing for sampling weights; see Table A4.7). There are also more women than men in the public sector in absolute terms. It is worth noting that the variables measuring public sector working and trade union membership are not significant in 1997. Close study of the separate Northern Ireland data for 2007 shows that the trade union and public sector effects are strongly protective for women's pay there, too. The public sector and unionised workplaces thus appear to be protecting women from gendered lower pay, but only significantly so in the 2007 data.

Table 4.1: Detailed components of the pay gap causality for Great Britain, 2007 and 1997

	Simulation	Simulation	Simulation	Simulation
	2007 effect in log wage units	1997 effect in log wage units	% of the whole gap in 2007	% of the whole gap in 1997
Female	–0.1232	–0.1727	61.7	73.3
Years of education	–0.0133	–0.0218	6.6	9.2
Ever unemployed	0.0082	0.0153	–4.1	–6.5
In current job >4 years	–0.0011	0.0003	0.5	–0.1
In current job <1 years	–0.0002	0.0000	0.1	0.0
Occupational segregation (male percentage*10)	–0.0332	–0.0365	16.6	15.5
Firm size 25–49	0.0009	0.0011	–0.4	–0.5
Firm size 50–499	–0.0106	–0.0132	5.3	5.6
Firm size 500+	–0.0028	–0.0060	1.4	2.6
Public sector employment	0.0074	0.0009	–3.7	–0.4
Union membership	0.0036	0.0008	–1.8	–0.4
SIC3: Manufacturing	–0.0150	0.0032	7.5	–1.4
SIC4: Construction	–0.0098	0.0013	4.9	–0.5
SIC5: Hotels and catering	–0.0037	–0.0093	1.9	3.9
SIC7: Banking and financial services	–0.0070	0.0009	3.5	–0.4

Note: A difference of 0.05 in log wage units implies a 5% wage difference in £ per hour. The simulation effect is [(men's average – women's average)*coefficient] with the exception of the segregation component which is [(5 – women's average)*coefficient].

Source: See Annex 4. BHPS waves G and Q.

Base: Employed individuals aged 16–65 inclusive, Great Britain.

Note: Base categories are: SIC8 (other services); the South West; and firms with under 25 employees.

In the pay gap equation, we have allowed for age and tenure in a particular job to be proxies for the gradual development of human capital, skills and experience. The 'tenure' variables are named 'insider' (more than four years of tenure in that job) and 'outsider' (less than one year of tenure in that job). Women in 2006 tended to be slightly less likely than men to be 'outsiders'. A small gain in the pay gap therefore arose from the insider status of women (<1 per cent of the pay gap in 2007). However, 'age' itself is still associated with pay differences, and Figure 4.2 illustrates the strong pattern that we find for 2007 only.

4.2 The role of industrial sectors

We also test whether industrial location, such as banking and finance, or construction, has had a net effect on the gender pay gap. The base case for these industries was all other services, with over half of the workers in the base case. The effect of manufacturing on the pay gap was substantial (8 per cent of the gap) in 2007 because men's wages are so much higher than women's there. Construction, like manufacturing, played a larger role (5 per cent of the pay gap) in 2007 than in 1997. Banking as an industrial sector here includes banking, finance and insurance; as a cause of the pay gap this sector accounted for 4 per cent of the pay gap in the 2000s, compared with no effect in the earlier period. These percentages are rounded off from Table 4.1 above. The transport sector (SIC6) does not have a significant effect so is omitted from Table 4.1.

Some detail helps to illuminate the findings on industrial sectors. Those women who work in banking were doing rather well compared with other women, earning 16 per cent higher wages than the base case (which is a male in the South West region), as shown in Table A4.5. Women in the two highly male-dominated industries (manufacturing and construction) still get much lower wages than men in those industries, all else being held equal. In the banking, insurance and finance sector, the extra pay going to an average man was 26 per cent, compared with the extra 17 per cent paid to an average woman per hour in that sector.

The evidence about industrial sectors is integrated into the pay gap decomposition in two steps. Firstly, the wage estimates have the industrial sector as a control factor. This allows for general productivity differences that are specific to one sector to be weeded out. Secondly, the decomposition then tests for a gender difference in the impact of industrial sector. The results in Table 4.1 show that the industrial location of women does contribute to the pay gap. Industrial location is very important in three main industrial areas: manufacturing, construction, and the broad area of banking, insurance and financial services. In 2007, 16 per cent of the overall pay gap could be attributed to the industrial location of the men and women. But in 1997 only 4 per cent or less could be attributed to this factor (Table 4.1, the last four rows). Pay movements and the differential employment of men and women within the sectors are responsible for a shift over time in this factor. Grimshaw and Rubery (2001) and Grimshaw (2000) would describe the sectoral location of the worker as a proxy for a number of typical institutional factors characterising that sector. These could include the tendency for

systematic discrimination, gender-differentiated payment of bonuses (which are included in our wage measure), and other factors specific to that industry's wage structure.

The tables in Annex 4 show the differential male and female coefficients for gender-specific regression models (See Tables A4.5 and A4.7 – columns headed B_m for male regression coefficients and columns headed B_f for female regression coefficients). These are a good indicator of differential returns to segregation. As found by Olsen and Walby (2004) using BHPS 2002, some women actually benefit somewhat from the impact of gender segregation on wages. Specifically, women in male-dominated jobs also obtain the wage premium associated with male-dominated industries, or at least part of it.

In 1997, workers in the banking, finance and insurance industrial sector earned 18 per cent more than all other workers after controlling for education, age, years in the current job, etc. This surprising result suggests that special conditions there enabled them to earn such high wages. In 2007 this figure was 22 per cent (see Table A2.1 in Annex 2).

4.3 Regional differences in pay and the pay gap, 1997 and 2007

Finally, looking at the regions, there were a few regions with higher than average wages, primarily those in or near London (see Figure A4.1). However, the regional location of the employee did not contribute significantly to the pay gap. Although Scotland, Wales and most of the northern regions of England had small negative wage differentials, they were not statistically significant (see Annex 4). Their wage rates overall must be considered to have been equal (in 1997) to the levels in the South West region of England. In 2007 most of the northern regions did not significantly differ from the South West in terms of wage rates, which the exceptions of Wales (which had an 8 per cent lower average wage) and Merseyside (which had a 12 per cent higher wage than the South West). Tests of the gender impact of regional residence have been carried out. These included multilevel modelling and a bootstrapping estimate of the pay gap within each region. The width of the statistical estimate's roughness can increase according to how small the regional sample is. For some regions, the pay gap was not found to be significantly different from zero when the BHPS small samples were used. The impact of regional unemployment was found to be insignificant on both wage levels within regions and on the regional and national gender pay gap.

From all these tests of regional effects, it can be concluded that the BHPS data do not tend to support the idea that regional location makes a contribution to the size of the pay gap. However, factors which vary regionally and which are examined elsewhere in our model can be very important. In Annex 4 we show that the predominance of public sector employment, for example, is generally high in regions where the pay gap is low (Figure A4.2). It is the residual contribution of region to the pay gap which is insignificant, after all the other factors have been allowed for.

4.4 How pay differences vary with age

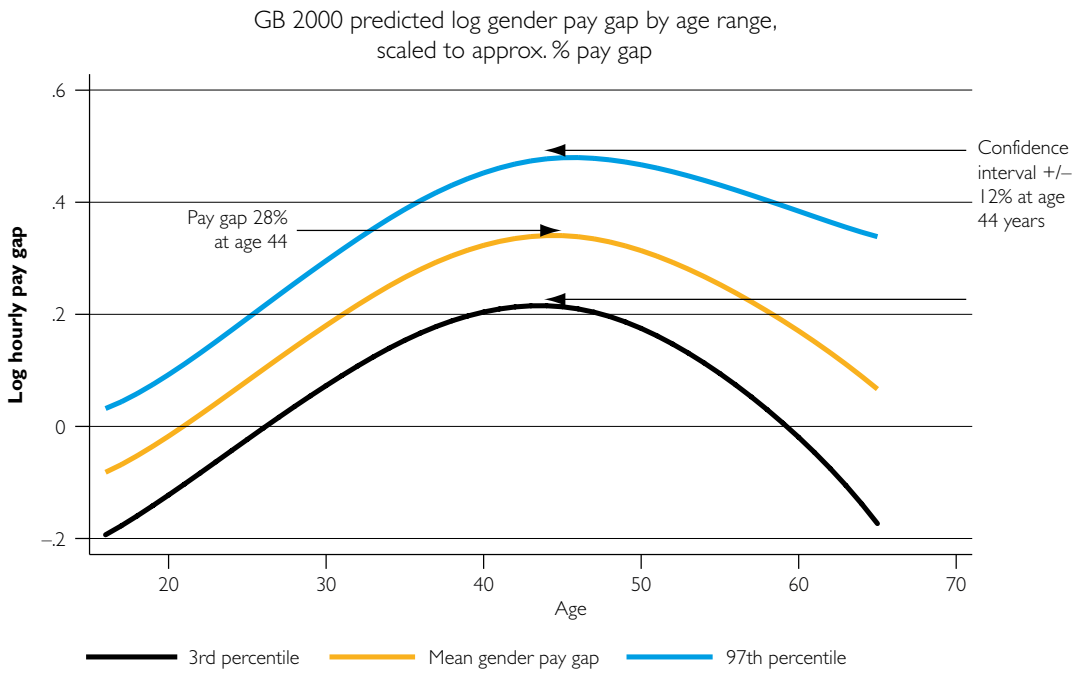
In this section we seek to expand on the impact of age on pay differences between men and women. In Figure 4.2 the predicted pay gap is plotted for each age group from 16 to 65. The upper and lower confidence interval limits depict 94 per cent confidence that the actual values would lie within these limits. This is the probability-based logic of bootstrapping which is useful for small samples like the BHPS (Olsen et al., 2009; Efron and Tibshirani, 1993). The standard confidence limits have been estimated using a manual method which does not assume that the risk of error is distributed evenly above and below the pay gap.[3] In practice a 94 per cent level was found convenient, and the 3 per cent risk of being wrong is included in the upper area of the interval, with a 3 per cent risk of being wrong (in the other direction) included in the lower part of the interval.

In Figure 4.2 the vertical axis measures the pay gap in logged wages. The horizontal axis is the age of the worker. The predicted log gender wage gap takes a curved shape. The Figure allows us to see that the pay gap is zero for the 16–20 age group, then rises to a peak until about age 45 and then declines after that. This particular shape is specific to Great Britain. This tendency is not the same for every region within Great Britain but it is the dominant tendency and is statistically significant. By looking at the confidence interval, we can see that at 27 years of age, the pay gap becomes significantly positive. (The lower line cuts the horizontal axis at that age.)

For 16 year olds a negative pay gap is forecast, but this gap is not statistically significant, i.e. it is basically zero. At the high end of the age range the confidence interval widens. The simulations for 16–18 year olds and 60–64 year olds thus have less robustness compared with middle ranges of age.

[3] The 3 per cent and 97 per cent percentiles are used instead of 2.5 per cent and 97.5 per cent because we are working from the actual ranked resampled data and must choose integer values.

Figure 4.2: Pay gap in Great Britain by age, 2007



Source: BHPS wave Q.

Base: Employed individuals aged 16–65 inclusive, Great Britain.

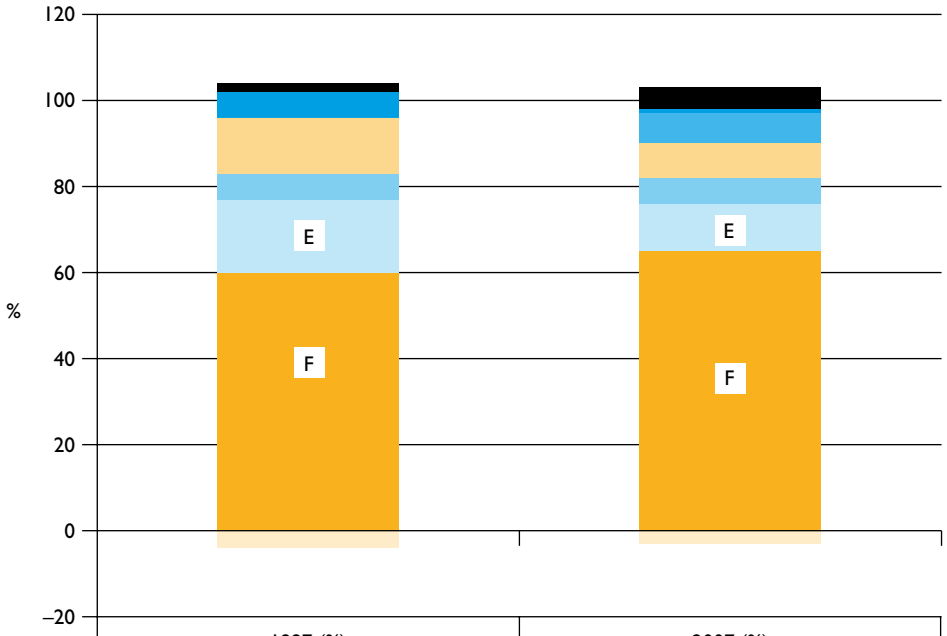
Note: The vertical axis refers to pay gap levels of 40% (marked 0.4), 20% (0.2) etc.

As shown, the pay gap confidence interval varies from +/– 12 per cent around the average pay gap for one-year age intervals. Larger samples are obtained using five-year age intervals, for which the confidence interval is +/– 8 per cent. The national confidence interval is +/– 5 per cent (e.g. for the 21 per cent pay gap in 2007, from 16 per cent to 26 per cent) using the BHPS dataset under these bootstrapping methods.

4.5 The part-time pay gap

The part-time pay gap in 1997 and 2007 is depicted in Figure 4.3 below. Here the wages of women who work part time are taken as a proportion of men's full-time wages. The part-time pay gap is considerably larger than the overall pay gap (see Tables A6.1 and A6.2 for decomposition details). In Annex 6 we also depict the full-time pay gap decomposition, for reference (Figure A6.1 and Table A6.3).

Figure 4.3: The part-time gender pay gap in Great Britain, 1997 and 2007



	1997 (%)	2007 (%)
SIC7: Banking and financial services	2	5
SIC5: Hotels and catering	6	1
SIC3: Manufacturing	0	7
Institutional factors	13	8
Occupational segregation	6	6
Formal education (E)	17	11
Female (F)	60	65
Ever unemployed	–4	–3

Note: Decomposition by simulation. See Annex 4 for details.

Source: BHPS waves G and Q.

Base: Employed individuals aged 16–65 inclusive, Great Britain.

The part-time pay gap's causal factors are similar to those for the overall pay gap. Education played an important role for women who worked part time in 1997, but then shrank as a cause of the part-time gender pay gap in 2007. Most other factors listed earlier remain present for the part-time pay gap. Nonetheless, it is worth noting that the effect of occupational segregation is much smaller among part-time workers, perhaps because part-time employment is a form of occupational segregation. Additionally, there are few protective factors of part-time workers' wages.

4.6 Panel data analysis

Before moving on to section 5, we apply fixed-effects models to the pooled panel data (1995–97 and 2004–07 respectively) to establish whether there is evidence of worker heterogeneity, which may be the cause of the female residual. Fixed-effects models help us to determine the mean effect of changing factors on changing wages, year on year. Table A6.5 in Annex 6 presents our fixed-effects model. The fixed-effects results omit both gender and other time-constant variables. The model specification is thought to offer less-biased measures of productivity growth, such as the marginal returns to education as a result of the removal of workers' time-constant unobserved heterogeneity. However, we find very few significant variables because changes in major causal factors are rare – e.g. education rises by a whole year only for formally registered students. We do find, however, that joining a trade union (i.e. getting a job in which membership of the trade union is arranged on entry, or joining a union within a given job) is positively associated with wage levels.

In addition to the fixed-effects analysis, we studied the effect of a grand mean regression (also shown in Table A6.5) – i.e. a regression of the unobserved worker heterogeneity term that is an 'error' cleared out of the further education model (Polachek and Kim, 1994). Our findings were unsurprising. We again found the female residual to constitute a large component of the wage model. In the 1990s it was –14 and in the 2000s it was –7, which is a lot smaller. This suggests that there is a large portion of worker unobserved heterogeneity associated with gender. However, the grand mean model does not offer us an indication of what that unmeasured heterogeneity may be.

5. How ongoing differences in male and female market participation contribute to the pay gap

This section examines two additional drivers as possible explanations for the gender residual in the pay gap. The gender residual is the 'unexplained' difference between the pay of men and women. First, we look at career interruptions as a factor driving the unexplained gender residual. Second, we look at labour supply. Factors influencing labour supply include domestic care responsibilities, household wealth and health; poor health also limits a worker's ability to do paid work.

5.1. Career interruptions

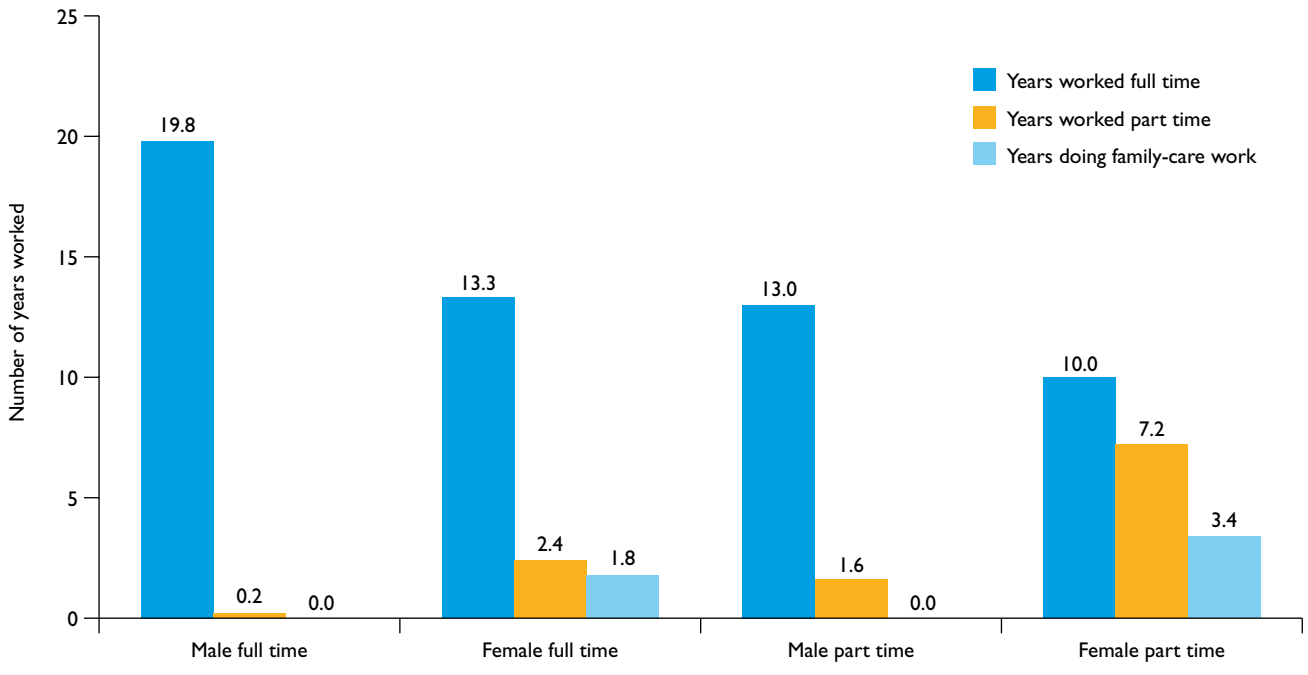
In this section, we investigate the impact of work history on the pay gap. We introduce respondents' work history into the wage equation to show the inter-dependencies between work history, human capital and part-time work experience. The wage regressions used in this section control for all the covariates analysed so far, as well as for work-life history variables. However, we had to remove age from these factors in order to avoid its inherent multi-collinearity (overlap) with years of work-life history.

First, we studied changes in wages over time by doing regressions for each panel year. While the coefficients were generally stable over time, there is evidence of an increasingly negative impact of family care work on pay, and this needs closer examination (Olsen et al., 2009). Rather than present the results for each of the years analysed, we restrict ourselves to the results for 2007. The main findings are summarised in Table 5.1 and in Figure 5.3 below. We begin this section, however, with a description of the work-life histories of workers in 2007.

Figures 5.1 and 5.2 illustrate the cumulative years spent in different economic activities by gender, and the labour market status of respondents in 2007. In 2007, respondents had potentially 17 years of survey data on which to base their work-life histories, as well as the recall period prior to 1990/91 (the first year of the BHPS dataset). Figure 5.1 shows that the work-life histories of men and women differ significantly. In 2007, men in full-time jobs had, on average, 20 years of full-time work experience, while women in full-time jobs had only 13 years. We note that men, on average, have virtually

no experience of taking time off to do family-care work, while women take 2–3 years off on average. Moreover, it is interesting that, while men in full-time jobs tend not to have any experience of part-time work, women in full-time jobs do.

Figure 5.1: Work histories of full-time and part-time work and family care, United Kingdom

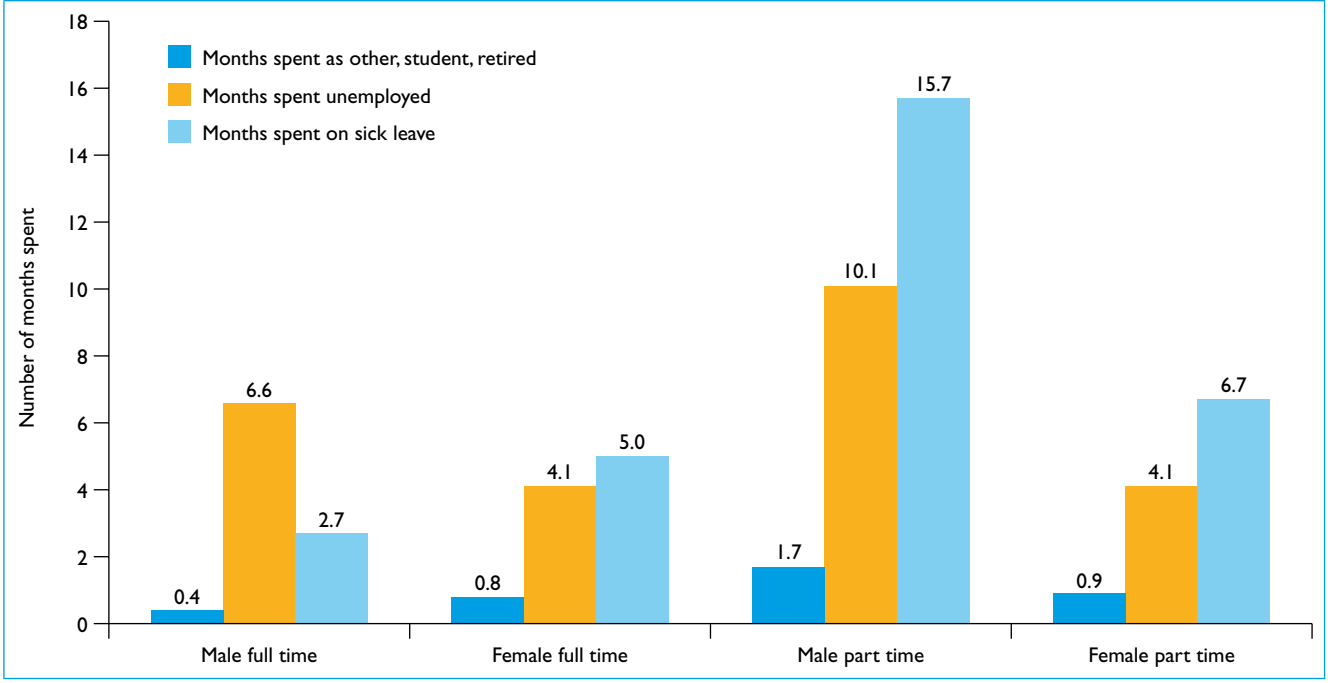


Note: The respondents are grouped into four clusters here, according to their 2007 labour force status, by sex and whether their working hours were full time or part time (5–30 hours/week).

Source: BHPS wave Q..

Base: Employed individuals aged 16–65 inclusive, United Kingdom.

Figure 5.2: Work histories of sick leave, unemployment and other categories, United Kingdom



Note: The respondents are grouped into four clusters here, according to their 2007 labour force status, by sex and whether their working hours were full time or part time (5–30 hours/week).

Source: BHPS wave Q.

Base: Employed individuals aged 16–65 inclusive, United Kingdom.

Figure 5.2 presents further work-life histories of time spent on sick leave, in unemployment and in other market categories. We find very high levels of unemployment among men, especially male part-time workers.

The relationship between work-life histories and wages is crucial to our explanation of the gender pay gap. Table A5.1 in Annex 5 shows the positive association of an extended full-time work-life history with current pay, as well as the ambiguous relationship of wages with a history of part-time work.

The work-history data can be understood to capture both the effects of labour supply and job design factors over the long term. We note that those who have done family care work or part-time work attract a pay penalty. We also note that the impact of simply 'being female' is reduced to 8 per cent in this improved model. It is clear from

this model, however, that the market punishes those who do family care work by giving them persistently lower pay in later years. These findings are consistent with earlier results about women returners (Tomlinson et al., 2008).

While the work-life history variables are clearly an important explanatory factor of the female residual in the wage equation, the effect of their inclusion (a decrease in the female residual from 11 per cent to 8 per cent) could be misinterpreted. Until men are just as likely to take time off to engage in domestic work, the inclusion of variables with a strong female bias risks explaining away the effect of gender on outcome.

Table 5.1: Impact of work-life history components on wages

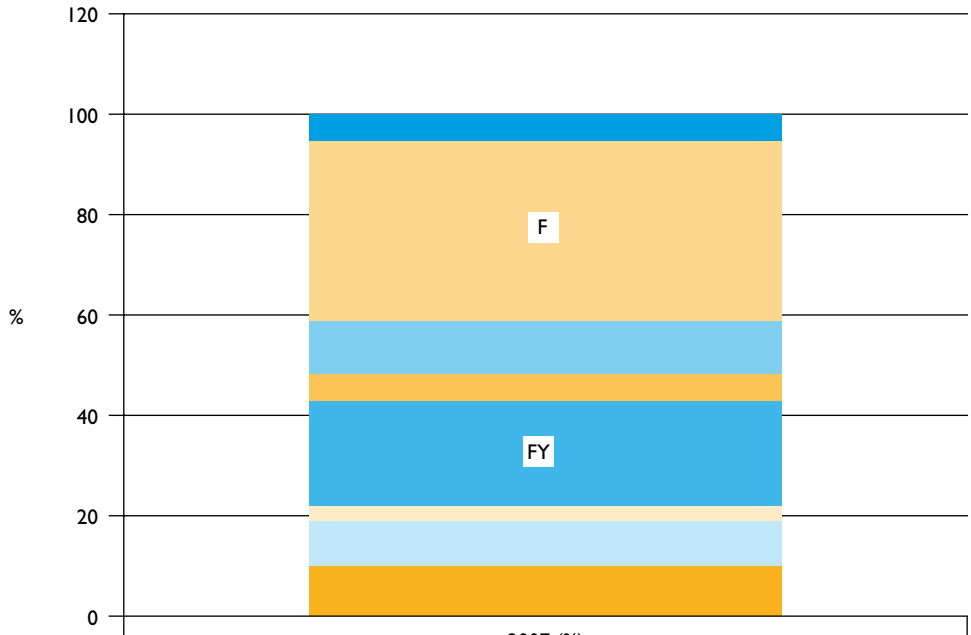
Factor	Impact type	Scale of impact of driver
Full-time work	A positive impact	+3 per cent higher hourly wages per year worked, tailing off at mid career
Part-time work	No net impact	The impact is nil
Family care work years	Negative impact	–1 per cent lower hourly wages for every year spent on family care work
Sickness leave and other disabled periods	Negative impact	–0.4 per cent lower hourly wages per month spent off sick from work
Maternity leave	No impact	The term 'maternity leave' allows for the woman to stay employed, and is ambiguous; stints are generally short; impact on wages nil
Unemployment months	Negative impact	Wage 'scarring' estimates vary.

Table 5.1, which summarises the impact of work-life history variables on earnings, shows that time spent in full-time work has a positive effect on wages, whereas the work-experience accrued in part-time jobs brings no obvious wage gains. Perhaps unsurprisingly, the overall impact of ever having done any family care work was highly negative (e.g. –14 per cent in 2007). We created an estimate of the impact per year spent on domestic care work (see Table A5.1 in Annex 5), where the work history wage equation is shown. For each year spent in domestic care work about 1 per cent lower wages (per hour) were earned in the later period (2007) when a wage was observed.

At the higher age levels, there is a tailing-off of the human capital accrued in employment. This effect reflects a mixture of high-income early retirements and the falling wage rates of older people. The results suggest that a path-analysis method is likely to succeed in parsing out causality further (Bollen, 1989; Muthén, 1984).

Finally, Figure 5.3 presents the drivers of the gender pay gap inclusive of work-life history variables. It is interesting to note the extent of the impact of work-life history, with 'being female' accounting only for 36 per cent of the gender pay gap in 2007, compared with previous models. Nonetheless, 'being female' is still the largest driver of the gender pay gap. The second largest factor is the difference between men and women in the time spent in full-time work.

Figure 5.3: Impact of career interruptions on the gender pay gap, United Kingdom, 2007



	2007 (%)
Institutional factors	0.0
Education	5.3
Female (F)	36.0
Family years	10.5
Part-time years	5.4
Full-time years (FY)	20.9
Banking and financial services	2.9
Manufacturing and construction	8.9
Occupational segregation	10.1

Note: The full decomposition equation on which this figure is based can be seen in Annex 5, Table A5.2.

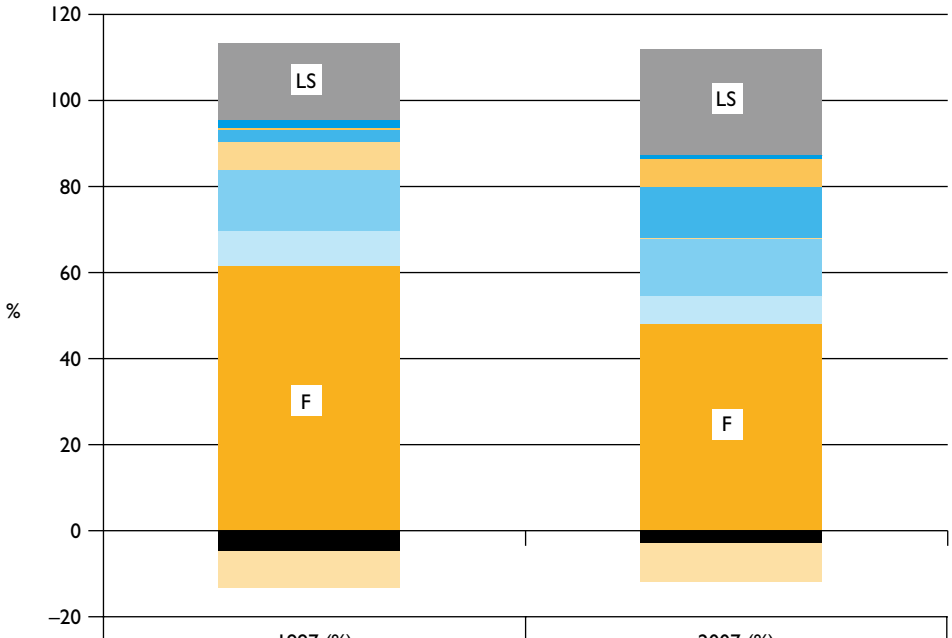
Source: BHPS wave Q.

Base: Employed individuals aged 16–65 inclusive, United Kingdom.

5.2 Labour supply factors

The gender pay gap is based on estimates of wages for all wage-earning employees; however, our omission of non-employees may result in selection bias. In this section, we therefore make a selectivity-adjusted wage estimation, which allows an estimated wage for each adult regardless of their working status. Table 5.2 shows selection equations for 1997 and 2007. Figure 5.4 shows that the gender component of the pay gap shrinks when labour supply factors are allowed for. The pay gap explanation is improved, but not changed much, in the sense that the decline in institutional factors and the role of education and occupational segregation are present, just as before.

Figure 5.4: The gender pay gap with labour supply factor adjustments, 1997 and 2007



	1997 (%)	2007 (%)
Labour supply factors (LS)	18.0	24.5
SIC7: Banking and financial services	–8.6	–8.9
SIC5: Hotels and catering	1.9	0.9
SIC4: Construction	0.5	6.5
SIC3: Manufacturing	2.7	11.8
Institutional factors	6.6	0.4
Occupational segregation	14.2	13.2
Ever unemployed	–4.8	–3.0
Education	8.0	6.4
Female (F)	61.5	48.1

Note: The figures in the data table are based on the decomposition method used in Table A6.1 in Annex 6.

Source: BHPS waves G and Q.

Base: All individuals 16–65 inclusive, Great Britain.

A further exploration of the demographic and household factors that affect labour supply is provided below (Table 5.2). This shows that three factors constrain women's supply to paid work: having children in the home, especially young children; having a health problem that limits their ability to do work; and having a spouse who earns enough to make staying at home affordable. The third factor has a surprising pattern. In 1997, it was standard for a higher-earning male partner to decrease the likelihood that the female partner was employed. But in 2007, this effect had disappeared in Great Britain. Instead, household income as a whole is important, and indeed increases the likelihood of (or is associated with) the woman going out for paid work. In general, the rise in women's earnings seems to be important in changing the breadwinner model in Britain. It is interesting to see that, in 2007, it is low-income women who are more likely to stay at home without employment than high-income women. Note that 'income' in these models includes all possible sources of income, including earnings, interest payments, profit and benefits. Spouse's income is calculated here as gross earnings.

From Table 5.2, it appears that caring for someone increased a woman's likelihood of working in 1997. However, this factor was not significant in 2007, and was of low significance in 1997. It refers specifically to caring in the household, or for a child when they are ill, or for someone outside the household. This factor seems not to be associated with employment once the presence of children in the household is controlled for. Instead, simply the presence of a child of less than three years old, or other children, can reduce a person's likelihood of being employed.

Table 5.2: Factors affecting labour supply				
The probit model used in selectivity-adjusted regressions	**1997**		**2007**	
The dependent variable is having paid employment	**Coefficient**	**Significance**	**Coefficient**	**Significance**
Age	0.1209	***	0.1374	***
Age squared	–0.0017	***	–0.0018	***
Does caring[l]	0.0730	*	0.0154	
Number of own children in household	–0.0989	***	–0.1110	***
Youngest child <3 years	–0.1695	**	–0.0302	
Limiting health problems	–0.6599	***	–0.5728	***
Household income (£K)	0.4556	***	0.3217	***
Household income squared (£K)	0.0000	***	0.0000	***
Partner's income (£K)	–0.2121	***	–0.0249	
Partner's income squared (£K)	0.0000	***	0.0000	*
Constant	–2.1502	***	–2.6619	***
Rho (the measure of relevance of labour supply to the wage estimate)	–0.6817	*significant*	–0.7947	*significant*

Note: These estimates are based on maximum likelihood estimation of the wage equation alongside this model of the likelihood of having paid work. See also Table A6.5 in Annex 6.

Source: BHPS waves G and Q.

Base: Employed individuals aged 16–65 inclusive, Great Britain.

[l] The caring measure here is doing caring work for someone outside the household, or being responsible for a child in the household, or nursing a child when they are ill.

The selectivity adjustment shown in Table 5.2 above also measures the extent to which labour supply factors influence wages. If labour supply factors were irrelevant, they would have a statistically insignificant effect. Instead, we have a very significant Inverse Mills Ratio (IMR) (Table A6.5 in Annex 6). This measures the way that workers with high chances of being employed are forecast to have higher wages. This supply effect influences the pay gap if some low-earning people work who would not have been expected to work. Working through a long-term limiting illness is a good example. These people are employed even though their disability causes them to have lower pay. In both 1997 and 2007, people with health problems that limit their ability to do things are less likely (than the base case) to be employed. Having young children at home also strongly affects labour supply downwardly. 'Being female' is also associated with a lower labour supply. In this sense, caring duties are an indirect cause of the pay gap in both

periods. There was little change over time in the impact of the IMR as shown in the panel results above.

The most interesting result in Table 5.2 is that there has been a strong reduction in the impact of the spouse's income on the likelihood of a person working. In the background, in both periods, being in a high-income household overall tends to make a person more likely to be employed. (The lowest-income households may have an unemployed, non-employed or ill person, and thus low income overall, so the causality for this association is ambiguous.) Once this is controlled for, it is possible to measure the remaining impact of the spouse's income, setting the income to zero for those without a spouse. In 1997, the overall effect of a spouse's income on a person's likelihood of being employed was strongly negative. The household type in which some mothers with caring work were financially dependent on a high-earning spouse in 1997 is consistent with this finding. However, in 2007, the effect had disappeared. That would imply that, overall, having a high-earning spouse was unambiguously likely to make a person more, not less, likely to be employed in 2007 (by reference to the household income variable). It is not clear what dynamics lie behind this change. We have explored the distribution of spending on child care, which has gone up, and it is possible that easier access to child care has enabled more high-income families to keep both partners in work than in 1997. The results are consistent with (but do not prove) a rise in the supply of, and access to, child care. We cannot comment on whether the child care was affordable.

From a close study of both the 1997 and the 2007 results, and the corresponding panel data that take three years 1995–97 and four years 2004–07 to give a larger sample, we are able to argue conclusively that obstacles to labour supply – especially doing caring work for young children, but also poor health and having a wealthy household – do cause those workers who have the lowest chances of being employed to get lower wages. In general, the workers with a high chance of being employed are men and those women without children. Women are constrained, mainly in households where there are young children. As a result, caring as an obstacle to labour supply is strongly gendered, whereas a person's health is not strongly gendered. We tested the variable 'having a condition that limits one's ability to do work' for its effect on wages and the pay gap. Its direct effect on the gender pay gap itself was not significant in any model (although it is strongly associated with lower wages). But the other gender-specific

labour supply factors are important. If the women doing caring work are not employed, this does not affect the pay gap in that year. (They have no wage.) If they are employed, they tend to have lower pay. In this sense, caring duties (which increase the odds of non-employment) are an indirect cause of the pay gap in both periods. There was no change in the impact of this pattern over the decade (see Annex 6 for evidence).

In this section, we first showed that the pay gap's 'female' component is partly explained by the presence of family care interruptions in a woman's career, and partly by the fact that men tend to have longer careers in full-time work, which is better paid. One can call this a productivity effect, since full-time work is thought to increase people's human capital. We also showed that the role of long periods of part-time work appears to be mildly negative. Finally, we showed that between 1997 and 2007 labour supply factors grew in importance as a background cause of the pay gap, taking weight off the mysterious 'female residual'. A range of other factors remain in the pay gap explanation even when labour supply factors are allowed for. For example, past experiences of unemployment seem to have affected men more than women in 2007, and hence to be (on balance) protective of women's pay relative to men's; and gender segregation plays a continuing role in bolstering and causing the gender pay gap in 2007, even when labour supply factors are allowed for. Among the labour supply factors, the most important was having a need for child care at home. In summary, the dynamics of labour supply have affected the pay gap, and in this context the spouse's earnings are less important in 2007 than they were in 1997.

6. Pay gap details for the top wage earners and lowest 10 per cent of wage earners, for 1997 and for 2007

In this section we examine the gender wage gap across the wage distribution. Most gender pay gap analyses focus on an assessment of the pay gap at the mean male and female wage. Figure 6.1 shows the full female and male wage distributions for 1997 and 2007. The figures show considerable variation across the earnings distribution, indicating that the mean wage hides interesting differences across the distribution. Overall, we see that, in both 1997 and 2007, the male wage curve is shifted more towards higher wages than is the female wage curve. We also note that female employees have a higher concentration in the lower wage end of the wage distribution and the female modus is lower than it is for men. Furthermore, female wages show a somewhat sharper peak, indicating that there is less variation in women's wages, compared with men's.

Figure 6.1: Female and male wage distribution (log hourly real wage, 1997 and 2007, BHPS)

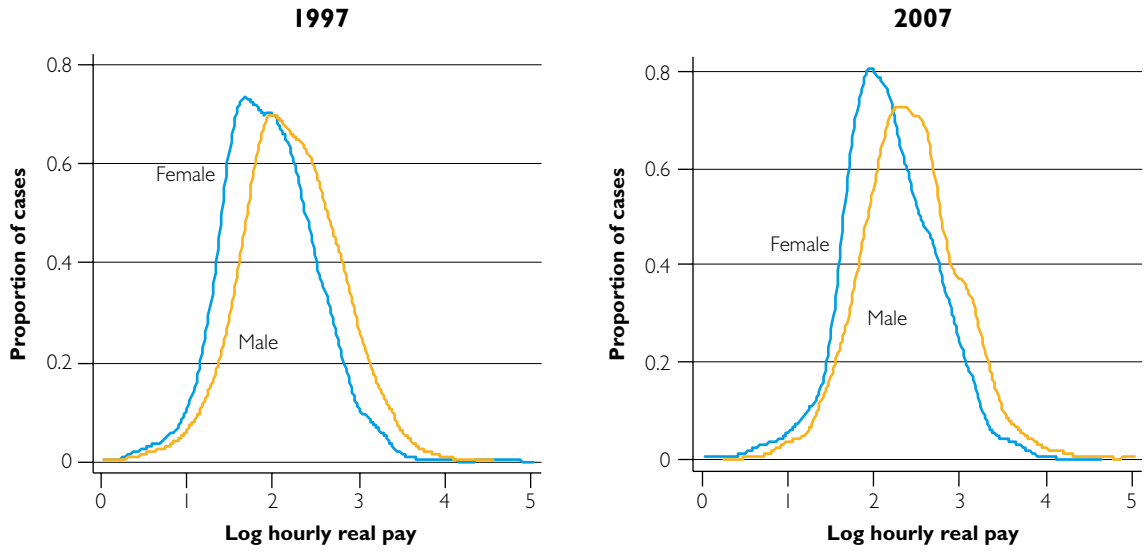
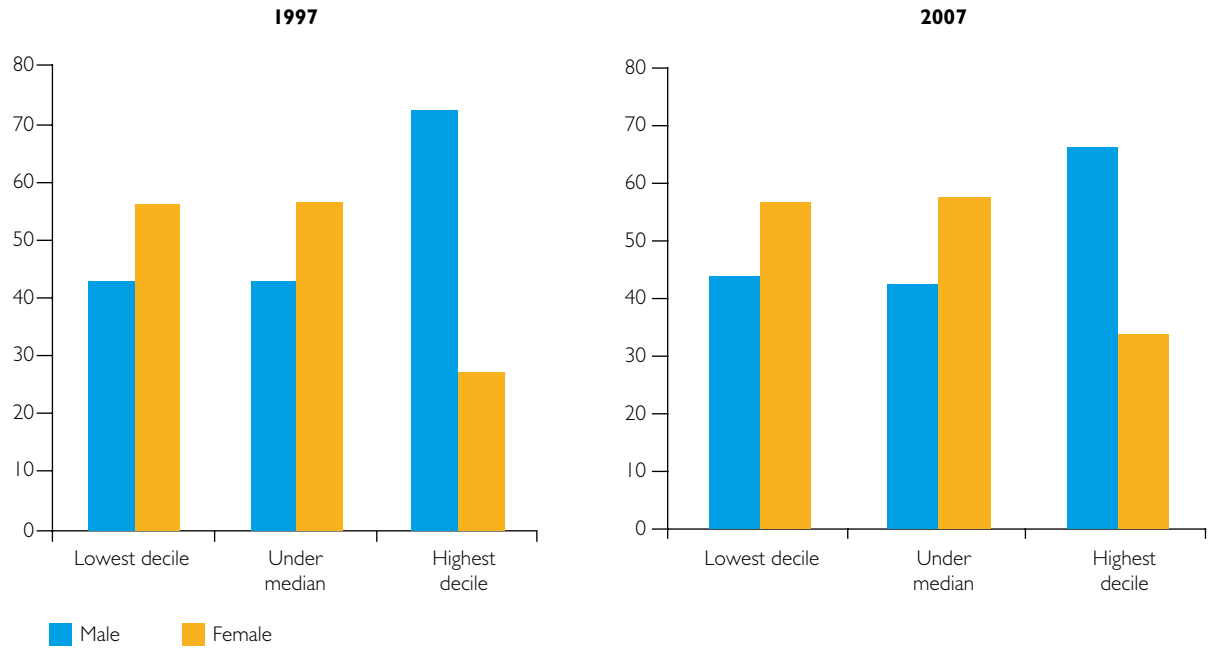


Figure 6.1 also shows the female and male wage distribution for 2007. It generally shows a similar picture as for 1997. Nonetheless, we see that for the high wage regions, the male and female wage curves tend to lie closer to each other in 2007 than in 1997.[4]

[4] This is, when the few outliers, at both sides of the distribution, are not taken into account.

This would suggest somewhat less gender wage inequality at the top of the distribution in 2007. An inspection of the percentage of men and women in the different wage deciles in Figure 6.2 confirms this finding. The percentage of women in the top decile increased from 27 per cent in 1997 to 34 per cent in 2007. This change in the top of the wage distribution does not change average figures. The percentage of employees earning less than the median wage is stable between 1997 and 2007, with 57 per cent made up of female employees.

Figure 6.2: Percentage of male and female employees according to wage decile, 1997 and 2007



Note: The ranked hourly log wage rates of all BHPS employees in 1997 and 2007 were broken down by decile and sex of respondent to give this graph.

Source: BHPS waves G and Q.

Base: Employed individuals aged 16–65 inclusive, Great Britain.

The next step in investigating the gender wage gap over the wage distribution is to assess the effect of wage determinants at different points on the distribution. This can be done using the quantile regression technique. Quantile regression allows us to estimate a regression model at different quantiles (such as 10th quantile, median and 90th quantile) of the wage distribution. Generally, we can say that a quantile regression for the

10 per cent decile pays less attention to the highly paid than does standard regression, and more attention to the wages (and other characteristics such as education level) of the low paid. Quantile regression locates the line of best fit for a special case centred around a specific quantile. The quantile regression for the 10 per cent decile assigns half the weight of errors to those with the lowest 10 per cent of wages, and half the weight to those to the right of this, i.e. the other 90 per cent of the distribution. In this way, by re-weighting the data, a new optimal line of best fit is obtained.

Table 6.1: Quantile regression results, 2007

	QUANTILES					
	10th Quantile Coeff.		50th Quantile Coeff.		90th Quantile Coeff.	
Female	–0.1059	***	–0.1269	***	–0.0917	**
Age	0.0685	***	0.0598	***	0.0784	***
Age squared	–0.0008	***	–0.0006	***	–0.0008	***
Years of education	0.0564	***	0.0753	***	0.0892	***
Ever unemployed	–0.0730	***	–0.1008	***	–0.1127	***
In current job >4 years	0.1634	***	0.1156	***	0.0144	
In current job <1 year	–0.2339	**	–0.0998		–0.1000	
Occupational segregation (male percentage*10)	0.0193	***	0.0186	***	0.0280	***
Firm size 25–49	0.0813	*	0.0360		0.0194	
Firm size 50–499	0.1471	***	0.1047	***	0.1093	**
Firm size 500+	0.1833	***	0.1630	***	0.1602	***
Public sector employment	0.0978	**	0.0866	**	0.0941	
Union membership	0.1016	***	0.1219	***	0.0527	*
Pseudo R-squared	0.2169		0.2640		0.2769	
Number of observations	4059		4059		4059	

* p<0.05 **p<0.01 ***p<0.001.

Note: Dependent variable is the log hourly wage among employees – 2007. Coverage is Great Britain, employees only. Base case is private sector, firms with under 25 employees, never unemployed, male. Regression models are controlled for region and type of industry, for which the base case is South West region and industry SIC8 (other services).

Source: BHPS waves G and Q.

Base: Employed individuals aged 16–65 inclusive, Great Britain.

In Table 6.1, we see the quantile regression results for 2007, while Table 6.4 shows the results for 1997. The 2007 results show the same determinants of wages as are found in the regressions in the other sections of this report, and also the direction of the effect is largely similar to the mean regressions. For instance, people with higher education levels have a higher wage, while people who experience unemployment have lower wages. We find this to be the case across the whole distribution. Furthermore, people in female-dominated occupational groups or in smaller firms can expect lower wages, while wages are higher for people in the public sector and for members of a union.

The quantile regressions add to our understanding of pay dynamics by showing how the size of various determinants vary at different quantiles of the wage distribution. The coefficients in Table 6.1 suggest that education, unemployment experience and occupational segregation have a greater impact for higher earners (those earning at the 90th percentile). Conversely, the importance of being an insider (those with job tenure of 4 years or more) and of working in a larger firm seems to be stronger for the lower wage group (at the bottom 10 per cent of the wage distribution).

The coefficients of 'years of education' and 'ever unemployed' are compared in the tables below (Tables 6.2 and 6.3), together with their 95 per cent confidence intervals.

We see, for instance, that the coefficient of 'years of education' for the 10th quantile in 1997, 0.0559, can be expected to lie between 0.0452 and 0.0665. Overall, Table 6.2 suggests that the effect of years in education is statistically stronger for the 50th and the 90th quantile in both 1997 and 2007, than for the 10th quantile. This means that educational level is a less strong predictor of wage differences in the lower earnings group. Whereas the wage increase expected for a year of extra education is £1.09 (per hour) for the middle and higher wage earners, it is £1.06 for every additional year of education for the lower earnings group (£1.09 is 9 per cent of a typical mid-range wage of £12.00). This finding suggests that an increase in the education level of women will have a more equalising effect on the gender pay gap among middle and higher earners than among low earners.

Table 6.2: Comparison of coefficients and confidence intervals of 'years of education' in different quantile regressions, 1997 and 2007

			Coefficient	95 per cent confidence interval	
1997	10th Q	Years of education	0.056	0.045	0.067
	50th Q	Years of education	0.082	0.077	0.088
	90th Q	Years of education	0.090	0.082	0.098
2007	10th Q	Years of education	0.056	0.048	0.065
	50th Q	Years of education	0.075	0.069	0.082
	90th Q	Years of education	0.089	0.077	0.102

Note: Q refers to quantile.

Source: BHPS waves G and Q.

Base: Employed individuals aged 16–65 inclusive, Great Britain.

The same exercise was conducted for the effect of 'ever unemployed' over the different quantiles. While the coefficients suggest that people who have ever been unemployed have a stronger reduction in their wage when they are at the top of the wage distribution, this is not statistically significant (i.e. we find that all confidence intervals overlap). It is also worth noting that the effects of being an insider, of occupational segregation and of belonging to a union did not differ significantly between the different quantiles.

Table 6.3 shows the effect of the 'gender' coefficient on wages by earning quantiles, with the complete model controlling for the covariates already mentioned. For both the 1997 and the 2007 regression, women have a lower wage than men, after taking into account the gender differences in education level, age, sector of employment, etc. This is the case for the different quantiles of the wage distribution. Table 6.3 shows that the confidence intervals of the gender coefficients at different quantiles overlap. This suggests that the level of unexplained gender inequality is similar over the wage distribution, (i.e for low-income earners, in the middle and at the top of the wage distribution).

Table 6.3: Comparison of coefficients and confidence intervals of 'gender' in different quantile regressions, 1997 and 2007

			Coefficient	95 per cent confidence interval	
1997	10th Q	Female	–0.186	–0.249	–0.122
	50th Q	Female	–0.155	–0.188	–0.122
	90th Q	Female	–0.198	–0.244	–0.153
2007	10th Q	Female	–0.106	–0.157	–0.055
	50th Q	Female	–0.127	–0.163	–0.091
	90th Q	Female	–0.092	–0.160	–0.023

Note: Q refers to quantile.

Source: BHPS waves G and Q.

Base: Employed individuals aged 16–65 inclusive, Great Britain.

Table 6.4: Quantile regression results, 1997

	QUANTILES					
	10th Quantile Coeff.		50th Quantile Coeff.		90th Quantile Coeff.	
Female	–0.1857	***	–0.1549	***	–0.1984	***
Age	0.0694	***	0.0703	***	0.0769	***
Age squared	–0.0008	***	–0.0008	***	–0.0008	***
Years of education	0.0559	***	0.0823	***	0.0902	***
Ever unemployed	–0.1035	***	–0.1065	***	–0.1681	***
In current Job > 4 years	0.1437	***	0.0810	***	0.0253	
In current Job < 1 year	0.0220		0.0575		–0.0134	
Occupational segregation (male percentage*10)	0.0136	*	0.0203	***	0.0242	***
Firm size 25–49	0.1381	***	0.0470	*	0.0363	
Firm size 50–499	0.1806	***	0.1347	***	0.1530	***
Firm size 500+	0.2155	***	0.2106	***	0.1336	***
Public sector employment	0.0003		–0.0030		0.0233	
Union membership	0.1542	***	0.1027	***	0.0828	***
Pseudo R-squared	0.2505		0.2990		0.2682	
Number of observations	4,825		4,825		4,825	

* p<0.05 **p<0.01 ***p<0.001.

Note: Dependent variable is the log wage among employees – 1997. Base case is private sector, firms with under 25 employees, never unemployed, male. Regression models are controlled for region and type of industry, for which the base case is South West region and industry SIC8 (ther services).

Source: BHPS wave G.

Base: Employed individuals aged 16–65 inclusive, Great Britain.

The quantile regression results for 1997 are given in Table 6.4. They are similar to the model for 2007 (Table 6.1). An interesting difference relates to the effect of public/private sector. While this coefficient is not significant in 1997, there is a positive effect of being employed in the public sector on wages for the lowest decile and the median in 2007. Furthermore, we see that the gender coefficient is somewhat smaller in 2007; however, this is not statistically significant at the 95 per cent confidence level (see Table 6.3).

Note that the quantile regression results presented in Tables 6.1 and 6.4 aim to unravel the determinants of wage for all employees – i.e. one regression model for both gender groups. However, it could be that the effect of wage determinants is different for males and females (e.g. the wage effect of additional years of education could be different for men and women). Further analyses for 2006 have shown that the most important wage determinants had the same effect for both gender groups at the lower end of the wage distribution. Furthermore, the effects of gender segregation and union membership are stronger for women than they are for men in the middle and higher earnings groups. This means that union membership boosts women's earnings more than men's in the middle and higher earnings groups.

In summary, section 6 has shown that male and female wages also diverge over the wage distribution. Generally, we find that female employees are more concentrated in the lower wage end of the wage distribution, and there is less variation in women's wages than in men's. Furthermore, we find that largely similar factors contribute to gender wage inequality over the whole distribution. But the figures also show that education level has a larger positive effect on wages for the higher earners. This finding suggests that an increase in the education level of women will have a more equalising effect on the gender pay gap among middle and higher earners than among low earners. Overall, the unexplained gender component is largely similar over the different quantiles.

7. Conclusions

This report uses the most recently available BHPS data on the pay gap for the United Kingdom and compares them with the gender pay gap 10 years ago. The study used harmonised time-series data to describe the causes of a substantial fall in the overall pay gap and in the part-time pay gap. The findings are consistent with existing literature, though this report underscores the importance of a correct interpretation of the unexplained female residual. Women's tendency to work in low-paid jobs is partly explained using information on work-life history. Career interruptions, specifically years spent on family care work, were found to have a very negative impact on women's earnings. Time spent in part-time work, on the other hand, is not as pivotal to women's lower wages.

The report summarises the strength of three main areas that drive the pay gap.

The first area concerns the impact of labour market experience (and therefore cumulative human capital) on the pay gap. British women who pursue career breaks to take care of children are likely to have wages that are lower than those of men. This finding is consistent with existing studies of wage 'scarring' via unemployment. Stints of unemployment are, on average, much shorter than stints of family care, and so it is difficult to compare the extent of the scarring; but in both cases there is evidence that it is cumulative over time. We controlled for many background factors, including unemployment and job tenure, before drawing the conclusion that each year of family care work is associated with a 1 per cent decrease in women's wages relative to the average.

The second area concerns the way in which institutions affect earnings. Job design in the workplace was found to lower women's earnings, in the specific sense that women who work in male-dominated jobs, especially in the manufacturing and construction industries, earn lower pay. Women's pay is protected, however, if they are employed in the public sector (for reasons related to pay bargaining). Larger firms have less strong gender pay differences. The gender pay gap was also lower in unionised enterprises and in regions with high unionisation. Women are no more disadvantaged in pay through their tenure in employment (staying longer in firms, or shifting more frequently) than are men. Their tenure is, on average, shorter than that of men, but the impact on wages is minimal once we control for other institutional features that are in this model.

The third principal area concerns gender discrimination and/or traditional gender ideologies. A proportion of both employers and employees may hold traditional gendered ideologies that are not consistent with equal earnings between men and women. When time-series data are used, improving the way in which we control for gendered social norms, we still find a strong female-specific element to the causality of the wage. The unobserved heterogeneity is highly correlated with gender itself. This finding is robust even when panel data are used with a selectivity adjustment for women's labour supply. It does not tell us which factor causes female low pay (for example, worker disinterest, discrimination or stereotypes), but it does establish that removing worker heterogeneity does not remove women's tendency to earn low rates of pay. This study is one of the few that use panel data for Great Britain in this way.

The overall mean gender pay gap in Great Britain as a whole decreased by 4 percentage points from 25 per cent in 1997 to 20 per cent in 2007. The gender pay gaps in Northern Ireland and Greater Manchester were by 2007 very low (18 per cent and 7 per cent, respectively). Each region's pay gap estimates are provided in Table A4.3 in Annex 4.

In the multivariate wage regressions and decomposition analyses, even after we controlled for a series of key covariates, gender itself was still found to be the biggest cause of the gender pay gap. It accounted for 71 per cent of the gender pay gap in 2007, and the gender residual was even larger in 1997. The second largest factor causing the pay gap in both time periods was occupational segregation, and that factor had more impact in 2007 than it did in 1997.

The research has focused on the labour market and its structures and institutions. These are affected by policy factors that influence the gender pay differences. Examples that may require further research include income support and benefit policies for part-time work, support for child care for families with young children and maternity benefits. Public sector equality policies that are clearly protective of women's wages could be showcased. Policy factors that affect occupational segregation are harder to pin down, because job design is located in the evolution of firms. The occupational segregation that features here may also provide indirect evidence of other underlying problems, such as gender stereotyping of certain work roles, notably in construction and manufacturing. On the reverse side, the low pay of women in some service

industries is also an institutionalised pattern. It is possible to argue that policies that discourage single-sex apprenticeships can helpfully challenge sex stereotypes; and that policy attempts to encourage active fathering and to get men to join in female-stereotyped occupations may also be helpful. However, such arguments would require further evidence about the impact of specific kinds of government action.

The assessment of the pay gap across the earnings distribution (section 6) confirmed the tendency for women to earn less than men among high and low earners. Nonetheless, there are interesting differences in this tendency across time. The proportion of women earning wages in the lowest decile decreased between 1997 and 2007, while the proportion of women in the highest decile increased for the same time period. Nonetheless, it is men who dominate the highest earning decile, where, in 2007, they accounted for 64 per cent.

Annex 1: Summary of regression variables

Table A1.1: Weighted† averages of some regression variables, 2007

	2007	
	All employees exclusive of the self–employed	**All individuals of working age (16–65)**
Log real hourly pay	2.306614	
Female	0.5147	0.5252
Age	39.5198	41.0802
Age squared	1719.3570	1871.1920
Years of education	12.2857	12.0095
Ever unemployed	0.4312	0.4356
In current job > 4 years	0.8744	0.6554
In current job < 1 year	0.0116	0.0086
Occupational segregation (male percentage*10)	5.0539	
Firm size 25–49	0.1373	0.0924
Firm size 50–499	0.3450	0.2298
Firm size 500+	0.1782	0.1199
Public sector employment	0.1237	0.0826
Union membership	0.2782	0.1841
SIC0: Agriculture, forestry and fishing	0.0064	0.0115
SIC1: Energy and water supplies	0.0060	0.0039
SIC2: Primary manufacturing	0.0033	0.0024
SIC3: Manufacturing	0.1458	0.1034
SIC4: Construction	0.0503	0.0507
SIC5: Hotels and catering	0.0523	0.0391
SIC6: Transport, storage and communication	0.0562	0.0458
SIC7: Banking and financial services	0.1707	0.1326
Part–time employment	0.2519	0.1662
Is employed	0.9964	0.6568
Inner London	0.0320	0.0316
Outer London	0.0565	0.0573
Rest of South East	0.2168	0.2111
East Anglia	0.0413	0.0443
East Midlands	0.0861	0.0877
West Midlands conurbation	0.0275	0.0304
Rest of West Midlands	0.0522	0.0512
Greater Manchester	0.0447	0.0402
Merseyside	0.0200	0.0218
Rest of North West	0.0418	0.0453
South Yorkshire	0.0293	0.0258
West Yorkshire	0.0341	0.0368

Table A1.1: Weighted† averages of some regression variables, 2007 *(continued)*

	2007	
	All employees exclusive of the self-employed	**All individuals of working age (16–65)**
Rest of Yorkshire and the Humber	0.0344	0.0361
Tyne and Wear	0.0194	0.0189
Rest of the Northern region	0.0397	0.0399
Wales	0.0574	0.0585
Scotland	0.0732	0.0720
Number of observations	**5961**	**9174**

Note: Log hourly real pay and segregation have not been included for the averages for individuals of working age, as including these variables would limit the estimation sample to employees only.

† Weighted means accounting for a clustered survey design.

Source: BHPS waves N, O, P and Q.

Base: Individuals aged 16–65 inclusive, Great Britain.

Table A1.2: Weighted† averages of some regression variables, 1997

	1997	
	All employees exclusive of the self-employed	**All individuals of working age (16–65)**
Log real hourly pay	2.1050	
Female	0.4979	0.5165
Age	37.8670	39.6778
Age squared	1579.4150	1747.0850
Years of education	11.7118	11.3918
Ever unemployed	0.3673	0.3863
In current job > 4 years	0.8553	0.6214
In current job < 1 year	0.0253	0.0177
Occupational segregation (male percentage*10)	5.0060	
Firm size 25–49	0.1323	0.0874
Firm size 50–499	0.3385	0.2182
Firm size 500+	0.1706	0.1103
Public sector employment	0.1142	0.0730
Union membership	0.2913	0.1877
SIC0: Agriculture, forestry and fishing	0.0096	0.0108
SIC1: Energy and water supplies	0.0162	0.0104
SIC2: Primary manufacturing	0.0323	0.0214
SIC3: Manufacturing	0.1935	0.1316

Table A1.2: Weighted† averages of some regression variables, 1997 *(continued)*

	1997	
	All employees exclusive of the self-employed	**All individuals of working age (16–65)**
SIC4: Construction	0.0225	0.0323
SIC5: Hotels and catering	0.2039	0.1500
SIC6: Transport, storage and communication	0.0642	0.0473
SIC 7: Banking and financial services	0.1294	0.1011
Part–time employment	0.2334	0.1479
Is employed	0.9941	0.6318
Inner London	0.0382	0.0425
Outer London	0.0814	0.0776
Rest of South East	0.2176	0.2037
East Anglia	0.0343	0.0369
East Midlands	0.0791	0.0822
West Midlands conurbation	0.0309	0.0376
Rest of West Midlands	0.0555	0.0501
Greater Manchester	0.0431	0.0409
Merseyside	0.0171	0.0213
Rest of North West	0.0497	0.0479
South Yorkshire	0.0245	0.0248
West Yorkshire	0.0314	0.0353
Rest of Yorkshire and the Humber	0.0326	0.0331
Tyne and Wear	0.0199	0.0197
Rest of the Northern region	0.0389	0.0350
Wales	0.0455	0.0508
Scotland	0.0733	0.0751
Number of observations	**4793**	**7660**

Note: Log hourly real pay and segregation have not been included for the averages for individuals of working age, as including these variables would limit the estimation sample to employees only.

† Weighted means accounting for a clustered survey design.

Source: BHPS waves E, F and G.

Base: Individuals aged 16–65 inclusive, Great Britain.

Annex 2: Regression results for main model

Table A2.1: Regression results, cross–sectional, 1997 and 2007

Dependent variable is the log wage among employees

	1997		2007	
	Coefficient	**Significance**	**Coefficient**	**Significance**
Female	–0.1727	***	–0.1240	***
Age	0.0740	***	0.0721	***
Age squared	–0.0008	***	–0.0008	***
Years of education	0.0781	***	0.0781	***
Ever unemployed	–0.1238	***	–0.0991	***
In current job > 4 years	0.0689	**	0.1103	**
In current job < 1 year	0.0348		–0.0935	
Occupational segregation (male percentage*10)	0.0192	***	0.0196	***
Firm size 25–49	0.0747	**	0.0650	*
Firm size 50–499	0.1567	***	0.1504	***
Firm size 500+	0.2044	***	0.1940	***
Public sector employment	0.0146		0.0985	***
Union membership	0.1082	***	0.1005	***
SIC0: Agriculture, forestry and fishing	–0.1611	**	–0.1065	
SIC1: Energy and water supplies	0.1166	*	0.1492	
SIC2: Primary manufacturing	0.0071		0.0129	
SIC3: Manufacturing	–0.0191		0.0886	**
SIC4: Construction	–0.0360		0.1362	***
SIC5: Hotels and catering	–0.1505	***	–0.1030	**
SIC6: Transport, storage and communication	–0.0619		–0.0558	
SIC7: Banking and financial services	0.1782	***	0.2240	***
Inner London	0.2577	***	0.3009	***
Outer London	0.1366	**	0.2291	***
Rest of South East	0.0891	**	0.1062	**
East Anglia	–0.0334		0.0099	
East Midlands	–0.0818		0.0500	
West Midlands conurbation	–0.0508		–0.0727	
Rest of West Midlands	–0.0226		0.0151	
Greater Manchester	–0.0121		0.0257	
Merseyside	–0.0707		0.1230	***
Rest of North West	0.0583		–0.0424	
South Yorkshire	–0.0686		–0.0092	
West Yorkshire	–0.0230		0.0726	
Rest of Yorkshire and the Humber	–0.0270		0.0056	
Tyne and Wear	–0.0208		–0.1239	
Rest of the North	–0.0522		–0.0218	

Table A2.1: Regression results, cross–sectional, 1997 and 2007 *(Continued)*

Dependent variable is the log wage among employees

	1997		2007	
	Coefficient	**Significance**	**Coefficient**	**Significance**
Wales	–0.0812		–0.0858	*
Scotland	–0.0535		0.0093	
Constant	–0.4932	***	–0.4767	***
R–squared	0.4444		0.4108	
Number of observations	**5009**		**6230**	

* p<0.05 **p<0.01 ***p<0.001.

Note:
Base categories are: SIC8 (Other services); South West; and firms with under 25 employees.

Source: BHPS waves G and Q.

Base: Individuals aged 16–65 years inclusive, Great Britain.

Annex 3: Data sources and definitions

Table A3.1: Definition and sources for some regression variables	
Variable name	**Coding details**
Female	Female = 1, Male = 0
Age	Age of respondent
Age squared	The squared age value
Education in years	Count of years in full–time education
Having dependent child(ren)	Whether there are any children under age 16 living in the household
Ever unemployed	Whether ever been unemployed in the years recorded in the BHPS
Occupational segregation index	The percentage male in the occupation using the average in the Standard Occupation Classification two–digit group. Two different variables have been constructed to capture this measure: one variable to be used for the analysis of Great Britain and one variable for use in analysis of the UK. The 1992 classification was used for the segregation index variable for the Great Britain sample. For those without a SOC record, who had a job, the mean male percentage for their sex was imputed. For those without jobs, no data were imputed. The 2000 classification was used for the segregation index variable for the United Kingdom sample. The reason for this is that the 1992 Standard Occupational Classification does not exist for the Northern Ireland sub–sample, whereas the 2000 SOC does.
Firm size 25–49	Firm with 25 to 49 employees
Firm size 50–499	Firm 50 to 499 employees
Firm size 500+	Firm with more than 500 employees
Public sector employment	Works in the public sector
Union membership	Whether respondent is a member of a trade union or professional association in their workplace
Years of full-time work	Number of years (months/12) of full–time work in the years since 1990 for waves E, F, G (or 1999 for waves N, O, P)
Years of parttime work, months of sickness leave, months of family care work, months of other status	As above, these are the total length of all spells in the work history.
Ever had family care work	Whether ever in the years from 1990 to 1995, 1996 or 1997 (or from 1999 to the current date, for the 2004–6 period), the person had reported doing family care as their labour force status

Table A3.1: Definition and sources for some regression variables *(continued)*		
Variable name	**Coding details**	
Do caring work	Doing caring work for someone outside the household (XAIDXHH) or being responsible for a child in the household (XAIDHH) or nursing a child when it is ill (INURSE). Any one of these puts the value of DOCARING to 1, and not doing any of them puts the value at 0	
Limiting illness	Have a limiting illness or condition that limits the ability to do work	
Hazard of non–selection	The Inverse Mills Ratio (or hazard of non–selection) is part of the selectivity adjustment This variable is labelled 'labour supply factors' in decomposition diagrams	
Unemployment rate	From the Annual Population Survey (LFS quarterly surveys), this is the average of the weighted mean of International Labour Organisation unemployment across four quarters centred on the BHPS reference date	
Rho	Rho is the correlation of the error term of the wage regression and the probit model for the likelihood of having paid employment	
Is employed	Whether or not respondent is employed	
Part–time employment	Whether or not respondent is employed on a part–time basis	
SIC	**Standard Industrial Classification**	
	SIC0	Agriculture, fishing and forestry
	SIC1	Energy and water supplies
	SIC2	Primary manufacturing
	SIC3	Manufacturing
	SIC4	Construction
	SIC5	Hotels and catering
	SIC6	Transport storage and communication
	SIC7	Banking and financial services
	SIC8	Other services

Annex 4: Further diagrams, equations and methods used

Table A4.1: Labour market activity status by gender, time and region

	Men		Women		Men	Women
	1995–97	2004–07	1995–97	2004–07	Percentage change between time periods	
Great Britain						
Employed	0.618	0.648	0.567	0.596	0.031	0.029
Self–employed	0.136	0.127	0.043	0.044	–0.009	0.001
Unemployed	0.057	0.040	0.043	0.033	–0.018	–0.009
Potentials	0.051	0.038	0.082	0.051	–0.013	–0.031
Inactive	0.138	0.147	0.266	0.276	0.008	0.010
London						
Employed	0.577	0.626	0.584	0.573	0.049	–0.012
Self–employed	0.169	0.146	0.051	0.074	–0.023	0.023
Unemployed	0.061	0.030	0.042	0.028	–0.031	–0.014
Potentials	0.063	0.055	0.095	0.040	–0.008	–0.055
Inactive	0.130	0.142	0.228	0.285	0.013	0.057
North West						
Employed	0.648	0.642	0.557	0.614	–0.006	0.058
Self–employed	0.102	0.112	0.035	0.023	0.011	–0.012
Unemployed	0.057	0.061	0.049	0.034	0.004	–0.014
Potentials	0.049	0.029	0.076	0.048	–0.019	–0.028
Inactive	0.146	0.155	0.283	0.279	0.010	–0.004
Northern Ireland						
Employed		0.558		0.502		
Self–employed		0.154		0.029		
Unemployed		0.038		0.020		
Potentials		0.032		0.053		
Inactive		0.219		0.396		

Note: Data are weighted with probability weights.

Source: BHPS waves E, F, G, N, O, P, Q.

Base: All individuals, United Kingdom.

Table A4.2: Proportion of workers working part–time by gender, time and region				
	Men		Women	
	1995–97	2004–07	1995–97	2004–07
Great Britain Part–time hours, <30 hrs a week	0.062	0.074	0.388	0.382
London Part–time hours, <30 hrs a week	0.072	0.094	0.326	0.301
North West Part–time hours, <30 hrs a week	0.042	0.079	0.351	0.366
Northern Ireland Part–time hours, <30 hrs a week		0.080		0.392
Note: Data are weighted with probability weights. Source: BHPS waves E, F, G, N, O, P, Q. Base: All individuals aged 16–65, United Kingdom.				

Table A4.3: The gender pay gap in hourly earnings by region and working–time

United Kingdom					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	10.91	12.69	0.14		
Part–time employees, <30 hrs a week	8.87	8.87		0.30	
All employees	10.11	12.41			0.20
All Great Britain					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	10.85	12.71	0.15		
Part–time employees, <30 hrs a week	8.77	8.75		0.31	
All employees	10.10	12.42			0.21
1995–97	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	8.94	10.96	0.18		
Part–time employees, <30 hrs a week	7.01	8.21		0.36	
All employees	8.20	10.79			0.25
REGION 1 (Inner London)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	13.70	17.23	0.20		
Part–time employees, <30 hrs a week	13.83			0.20	
All employees	13.73	16.53			0.20
1995–97	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	12.62	14.34	0.12		
Part–time employees, <30 hrs a week	9.82			0.32	
All employees	11.91	14.04			0.17
REGION 2 (Outer London)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	12.99	15.67	0.17		
Part–time employees, <30 hrs a week	11.00			0.30	
All employees	12.35	15.27			0.21

Table A4.3: The gender pay gap in hourly earnings by region and working–time *(continued)*

1995–97	Female	Male	Full–time pay gap	Part–time pay gap	Overall pay gap
Full–time employees	10.37	12.57	0.18		
Part–time employees, <30 hrs a week	7.95			0.37	
All employees	9.51	12.32			0.24
REGION 3 (Rest of South East)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	11.93	14.36	0.17		
Part–time employees, <30 hrs a week	8.79	8.35		0.39	
All employees	10.74	13.92			0.25
1995–97	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	9.40	12.36	0.24		
Part–time employees, <30 hrs a week	7.19	6.38		0.42	
All employees	8.57	11.90			0.31
REGION 4 (South West)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	9.45	11.72	0.19		
Part–time employees, <30 hrs a week	8.11	8.39		0.31	
All employees	8.85	11.52			0.24
1995–97	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	8.00	10.38	0.23		
Part–time employees, <30 hrs a week	6.41	7.52		0.38	
All employees	7.32	10.15			0.29
REGION 5 (East Anglia)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	8.85	12.59	0.30		
Part–time employees, <30 hrs a week	8.21			0.35	
All employees	8.57	12.28			0.32

Table A4.3: The gender pay gap in hourly earnings by region and working–time *(continued)*

1995–97	Female	Male	Full–time pay gap	Part–time pay gap	Overall pay gap
Full–time employees	7.35	10.87	0.32		
Part–time employees, <30 hrs a week	6.20			0.43	
All employees	6.77	10.73			0.38
REGION 6 (East Midlands)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	10.29	11.84	0.13		
Part–time employees, <30 hrs a week	8.83	6.89		0.25	
All employees	9.68	11.47			0.18
1995–97	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	7.76	8.90	0.13		
Part–time employees, <30 hrs a week	6.35			0.29	
All employees	7.25	8.79			0.19
REGION 7 (West Midlands conurbation)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	9.16	10.91	0.16		
Part–time employees, <30 hrs a week	7.92			0.27	
All employees	8.91	10.49			0.18
1995–97	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	7.55	9.50	0.21		
Part–time employees, <30 hrs a week	7.12			0.25	
All employees	7.39	9.36			0.22
REGION 8 (Rest of West Midlands)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	10.69	12.35	0.13		
Part–time employees, <30 hrs a week	9.41	9.03		0.24	
All employees	10.20	11.95			0.17

Table A4.3: The gender pay gap in hourly earnings by region and working–time *(continued)*

1995–1997	Female	Male	Full–time pay gap	Part–time pay gap	Overall pay gap
Full–time employees	8.16	10.36	0.21		
Part–time employees, <30 hrs a week	7.45			0.28	
All employees	7.82	10.31			0.25
REGION 9 (Greater Manchester)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	11.96	11.80	–0.01		
Part–time employees, <30 hrs a week	9.38			0.21	
All employees	11.02	11.50			0.07
1995–97			**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	8.83	10.77	0.18		
Part–time employees, <30 hrs a week	7.16			0.34	
All employees	8.29	11.05			0.23
REGION 10 (Merseyside)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	10.01	12.43	0.19		
Part–time employees, <30 hrs a week	7.33			0.41	
All employees	8.89	11.97			0.28
1995–97			**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	7.45	10.85	0.31		
Part–time employees, <30 hrs a week	6.46			0.40	
All employees	6.84	10.56			0.37
REGION 11 (Rest of North West)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	10.19	11.32	0.10		
Part–time employees, <30 hrs a week	7.56			0.33	
All employees	9.33	11.12			0.18

Table A4.3: The gender pay gap in hourly earnings by region and working–time *(continued)*

1995–97			Full–time pay gap	Part–time pay gap	Overall pay gap
Full–time employees	8.90	11.51	0.23		
Part–time employees, <30 hrs a week	7.09			0.38	
All employees	8.51	11.27			0.26
REGION 12 (South Yorkshire)					
2004–07	**Female**	**Male**	**Full–time pay Gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	9.88	10.95	0.10		
Part–time employees, <30 hrs a week	7.92			0.28	
All employees	8.99	11.01			0.18
1995–97	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	8.70	9.27	0.06		
Part–time employees, <30 hrs a week	6.64			0.28	
All employees	7.87	9.05			0.15
REGION 13 (West Yorkshire)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	10.12	11.90	0.15		
Part–time employees, <30 hrs a week	9.39			0.21	
All employees	9.83	11.76			0.17
1995–97	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	7.73	9.69	0.20		
Part–time employees, <30 hrs a week	6.91			0.29	
All employees	7.43	9.93			0.23
REGION 14 (Yorks and Humber)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	10.57	11.89	0.11		
Part–time employees, <30 hrs a week	8.73			0.27	
All employees	9.76	11.70			0.18

Table A4.3: The gender pay gap in hourly earnings by region and working–time *(continued)*

1995–1997	Female	Male	Full–time pay gap	Part–time pay gap	Overall pay gap
Full–time employees	8.19	9.95	0.18		
Part–time employees, <30 hrs a week	6.82			0.31	
All employees	7.55	9.77			0.24
REGION 15 (Tyne & Wear)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	9.98	9.51	–0.05		
Part–time employees, <30 hrs a week	8.00			0.16	
All employees	9.30	9.71			0.02
1995–97	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	8.59	10.16	0.15		
Part–time employees, <30 hrs a week	6.88			0.32	
All employees	8.03	10.35			0.21
REGION 16 (Rest of North)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	10.34	11.41	0.09		
Part–time employees, <30 hrs a week	8.61			0.25	
All employees	9.77	11.28			0.14
1995–97	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	8.88	10.32	0.14		
Part–time employees, <30 hrs a week	6.09			0.41	
All employees	7.58	10.37			0.27
REGION 17 (Wales)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	9.75	11.69	0.17		
Part–time employees, <30 hrs a week	8.47	8.10		0.28	
All employees	9.24	11.52			0.21

Table A4.3: The gender pay gap in hourly earnings by region and working–time *(continued)*

1995–97	Female	Male	Full–time pay gap	Part–time pay gap	Overall pay gap
Full–time employees	8.27	10.03	0.18		
Part–time employees, <30 hrs a week	6.72			0.33	
All employees	7.70	9.99			0.23
REGION 18 (Scotland)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	10.27	13.07	0.21		
Part–time employees, <30 hrs a week	8.31	10.17		0.36	
All employees	9.62	12.86			0.26
1995–97	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	8.67	10.27	0.16		
Part–time employees, <30 hrs a week	6.69	7.47		0.35	
All employees	7.92	10.10			0.23
REGION 19 (Northern Ireland)					
2004–07	**Female**	**Male**	**Full–time pay gap**	**Part–time pay gap**	**Overall pay gap**
Full–time employees	10.11	11.20	0.10		
Part–time employees, <30 hrs a week	7.76	7.26		0.31	
All employees	9.20	10.89			0.18

Note: Overtime payments and paid overtime hours have been included. The full–time pay gap is defined as the percentage difference between full–time women's and full–time men's hourly earnings. The part–time pay gap is defined as the percentage difference between part–time women's and full–time men's hourly earnings. The overall pay gap is defined as the percentage difference between all women's hourly earnings and full–time men's hourly earnings. Pay gaps for cells with less than 30 cases are not reported. Regional pay gaps are weighted by: xrwght; the pay gap for Northern Ireland is weighted by xrwtuk2 and for the UK by xrwtuk1.

Source: BHPS waves E, F, G, N, O, P, Q.

Base: All individuals, Great Britain, United Kingdom.

Figure A4.1: Regional pay gap and pay levels

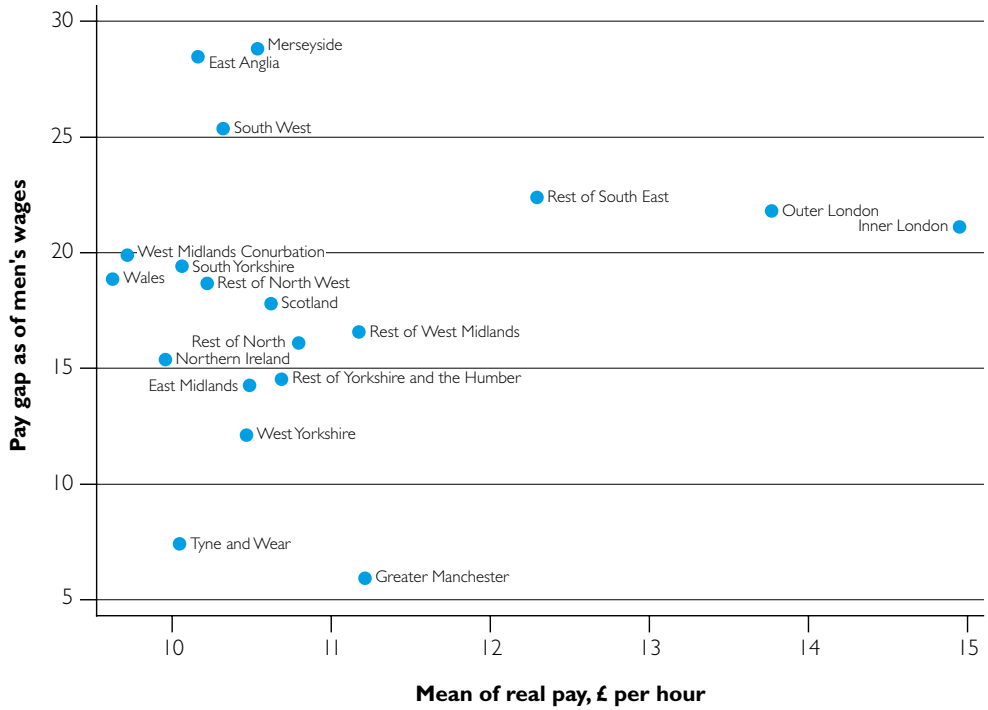
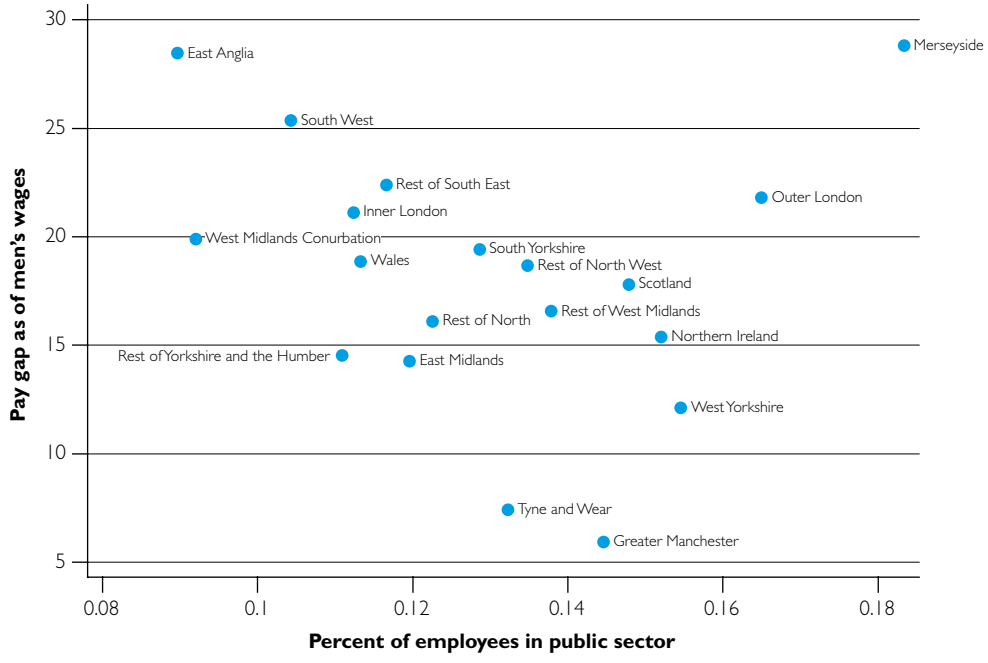


Figure A4.2: Regional pay gap and role of public sector in employment



Method of decomposition

The decomposition method used here is the same simulation decomposition method used in Olsen and Walby (2004). The method is closely based on Oaxaca and Ransom (1994, 1998 and 1999). The simulation method of decomposition makes more reasonable counterfactual assumptions than they do (see Olsen et al., 2009 [Research Design paper for GEO, to become a CCSR Working Paper]. The simulation method specifically does not allow for a complete closure of the gap in occupational sex segregation, whereas the Oaxaca–Ransom methods do. Furthermore, the Oaxaca–Ransom methods tend to ignore the gender residual, whereas in the simulation method we consider its effect on the pay gap. See Olsen and Walby (2004). The Oaxaca–Ransom terms underlying the pay–gap decomposition, and their simulation components, can be seen explicitly in Annex 4. The simulation effect is [(men's average – women's average)*coefficient] where the overall wage equation coefficients are used. Typically, using this method, around 90 per cent of the whole pay gap is explained. For example, in 2007 when the pay gap was 0.21 in logs, the sum of all simulation components shown here was 0.18. The remaining components are very complexly spread across three types of factor: those advantageous to men in the different slopes of men's versus women's wage equations; those protective of women's pay in these slopes; and the few remaining variables for which the difference of the men's and women's means is a small, negligible component of the pay gap. These are not listed here but would appear in the two– or three–term Oaxaca decomposition. Careful judgement has been used to ensure that most of the pay gap is indeed explained by the factors chosen, which nearly exhaust the main drivers. The remaining controls are typically just age and region. The curved effect of age is, in any case, confusing and potentially misleading.

Decomposition by simulation answers the question, 'What changes in men's and women's circumstances would be able to close the gender pay gap?'. This is a counterfactual question (Flyvbjerg, 2001; Patomaki, 2006*Ref), and we try to use realistic possible changes to calculate a series of simulated pay rates which, in total, would close the pay gap. Traditional methods, as shown above, use a mathematical formula which can be proved to give about 3k–1 terms (for k variables), which sum exactly to the pay gap. The term that is dropped is typically gender itself. Two examples need to be looked at to see how important this issue is: (1) in the Oaxaca two–term method, the gender term cannot have any 'terms' in the Oaxaca decomposition,

because the two–term method uses first a male sample that has no gender term, and then a female sample that has no gender term. For this reason, the two–term method collapses the gender residual into its overall constant term, which in turn is polluted by the need for a general constant and cannot be interpreted as 'explained' variance. Gender variance in wages thus gets pushed into the 'unexplained' component. For an example, see Chevalier (2007); (2) in the Oaxaca and Ransom three–term method, we have a 'female wage disadvantage' equal to the female wage residual, e.g. –0.089 or –9 per cent. However, we are also forced (by the mathematical basis of the decomposition) to have a third term, which Oaxaca and Ransom call the 'productivity differential' which they denote as the wage difference associated with a difference of means – exactly 0.089. The two terms cancel one another out, and gender is ignored again. This forces the attention back to the constant term, which appears in the male advantage and female wage disadvantage terms, and is unexplained and not attributed to gender, and indeed is larger (e.g. 0.148 or 15 per cent in the same example referred to earlier, where the gender coefficient is 9 per cent). Thus gender gets hidden in the crucial interpretation stage of the Oaxaca and Ransom decompositions.

By contrast, our method has fewer terms. In this report we use about k–2 terms, i.e. all terms except the controls for age and region. There are two reasons for dropping these two terms. First, the sex–age distribution is a background factor, which we cannot realistically modify in any way. Studies that use closer measures of work experience will want to include these in the simulations. Specialists in age discrimination may want to look more closely at the age factor. Secondly, regional effects were found to be negligible, i.e. each one <2 per cent of the pay gap and offsetting other effects, giving a total net effect of region of <5 per cent of the pay gap. We do not have slope effect terms that allow for men and women to receive different rewards for their endowments. The slope effect terms in both two- and three-term Oaxaca decompositions are contestable in terms of their normative connotations. For example, how are we to interpret the difference between 'male wage advantage' (sounds good; but could be inequitable) and 'female wage disadvantage' (sounds bad for women, but could be acceptable if it were based on female unobserved heterogeneity)? In the two-term Oaxaca method, there is only one of these terms (male wage advantage), but it is still hard to interpret. Extending the use of this decomposition method to other forms of pay gap, such as ethnic pay gaps, is going to be normatively very awkward, because

we then begin to label each ethnic group's 'advantage' relative to every other ethnic group. Instead, in our method, we consider 'What equality between ethnic groups would be necessary to close a pay gap? This is a constructive question. For protective factors, we can ask 'How does this factor help to close the existing overall gap?'

Critics may question whether the simulation method leaves any important term out of the decomposition, and thus exaggerates the percentage of causality attributed to the chosen endowment terms. The table below shows three comparative measures in order to facilitate a debate about this. On the whole, it shows that the simulation method, when carefully conducted, can approximate the pay gap. In the Great Britain case, it gives a slight overall underestimate of the gap, but then it expresses the percentages relative to each other, not to the whole gap. It thus focuses on possible changes. The main reason it is an underestimate is that we have adjusted the possible segregation change to make it realistic. The unexplained part of the pay gap is also rather large in the Oaxaca and Ransom methods, which omit a gender term.

Table A4.4: Description of net change explained by two decomposition methods					
	Sum of simulation method	**Sum of all endowment terms**	**Oaxaca 2-term method**	**The pay gap in logs**	**Percentage of the pay gap explained**
Column	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Formula	Sum of $(x_m - x_f)\cdot B^*$ except terms for age and region	Sum of $(x_m - x_f)\cdot B^*$	Sum of $(x_m - x_f)\cdot B_m$ and $(B_m - B_f)\cdot x_f$ terms for all variables		=Col. (1)/ Col. (4)
Sums 2007 Great Britain	0.21	0.20	0.25	0.25	84%
Sums 1997 Great Britain	0.22	0.23	0.26	0.26	83%
Sums for 2007 part-time pay gap	0.36	0.35	0.38	0.38	93%
Sums for 2007 full-time pay gap	0.13	0.12	0.15	0.15	83%

Notes: The pay-gap averages reported here have the wage outliers included. There were 66 outliers, of which 30 were reported by individuals who did not have employment on the survey data, and therefore are omitted in all pay-gap figures. The 36 remaining outliers lay either at the upper or lower end of the wage distribution and are included in statistical modelling. The Oaxaca two-term components include terms very similar to the simulation components, and the last column shows the percentage of the pay gap that is not explained by the simulation method as applied here. It would be possible for column 1 to exceed column 4 if some elements in the Oaxaca decomposition were highly protective of women's pay. They would offset the sum of simulation components. We have checked that this is not the case before proceeding with the simulation method. The only difference between column 2 and column 1 is the inclusion of region and age in column 2. Note that the notation in column 2 would arise only in the Oaxaca and Ransom three-term method, as it does not match exactly the notation in the Oaxaca two-term method.

Table A4.5: Decomposition details, 2007

					NOTE: Positive value shows male advantage					
	Xm	Xf	Bm	Bf	(Xm–Xf) *Bm	(Bm–Bf) *Xf				
	Men's avg.	Women's avg.	Men's coeff.	Women's coeff.	Effect of levels (quantities)	Effect of returns (Slopes)	Net effect	Simulation effect	Overall coeff.	Simulation as a percentage of the whole gap
Female	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.00	–0.1232	–0.1232	61.7
Years of education	12.3473	12.1777	0.0748	0.0692	0.0127	0.0687	0.08	–0.0133	0.0783	6.6
Ever unemployed	0.4828	0.3931	–0.0830	–0.1049	–0.0074	0.0086	0.00	0.0082	–0.0919	–4.1
In current job >4 years	0.8726	0.8629	0.1586	0.0661	0.0015	0.0798	0.08	–0.0011	0.1097	0.5
In current job <1 year	0.0116	0.0139	–0.0066	–0.1933	0.0000	0.0026	0.00	–0.0002	–0.0933	0.1
Occupational segregation (male percentage*10)	6.8825	3.3078	–0.0009	0.0436	–0.0032	–0.1472	–0.15	–0.0332	0.0196	16.6
Firm size 25–49	0.1295	0.1428	0.0533	0.0752	–0.0007	–0.0031	0.00	0.0009	0.0650	–0.4
Firm size 50–499	0.3788	0.3086	0.1912	0.1017	0.0134	0.0276	0.04	–0.0106	0.1504	5.3
Firm size 500+	0.1839	0.1695	0.2075	0.1692	0.0030	0.0065	0.01	–0.0028	0.1947	1.4
Public sector employment	0.0833	0.1585	0.0945	0.1114	–0.0071	–0.0027	–0.01	0.0074	0.0987	–3.7
Union membership	0.2554	0.2913	0.0172	0.1786	–0.0006	–0.0470	–0.05	0.0036	0.1003	–1.8
SIC3: Manufacturing	0.2315	0.0606	0.1051	0.0691	0.0180	0.0022	0.02	–0.0150	0.0879	7.5
SIC4: Construction	0.0881	0.0160	0.2154	0.1186	0.0155	0.0016	0.02	–0.0098	0.1359	4.9
SIC5: Hotels and catering	0.0369	0.0730	–0.0527	–0.1833	0.0019	0.0095	0.01	–0.0037	–0.1033	1.9
SIC7: Banking and financial services	0.1856	0.1540	0.2578	0.1681	0.0081	0.0138	0.02	–0.0070	0.2228	3.5

c: BHPS wave Q.

Base: All employees exclusive of the self-employed.

Table A4.6: Decomposition Summary, 2007

	Graph %
Female	61.7
Years of education	6.6
Ever unemployed	–4.1
Occupational segregation	16.6
Institutional factors	1.4
SIC3: Manufacturing	7.5
SIC4: Construction	4.9
SIC5: Hotels and catering	1.9
SIC7: Banking and financial services	3.5
Total	**100**

Note: Institutional factors sum up the effects of job tenure, firm size, public sector employment, and union membership.

Table A4.7: Full details, decomposition regressions, 2007

	Xm	Xf	Bm	Bf
	Men's avg.	Women's avg.	Men's coeff.	Women's coeff.
Female	0.0000	1.0000	0.0000	0
Age	39.8817	39.0220	0.0940	0.0557
Age squared	1,752.6100	1,692.9280	–0.0010	–0.0006
Years of education	12.3473	12.1777	0.0748	0.0688
Ever unemployed	0.4759	0.3856	–0.0830	–0.1151
In current job >4 years	0.8726	0.8629	0.1586	0.0675
In current job <1 year	0.0116	0.0139	–0.0066	–0.1916
Occupational segregation (male percentage*10)	6.8825	3.3078	–0.0009	0.0437
Firm size 25–49	0.1295	0.1428	0.0533	0.0753
Firm size 50–499	0.3788	0.3086	0.1912	0.1022
Firm size 500+	0.1839	0.1695	0.2075	0.1689
Public sector employment	0.0833	0.1585	0.0945	0.1103
Union membership	0.2554	0.2913	0.0172	0.1783
SIC0: Agriculture, forestry and fishing	0.0067	0.0059	–0.1981	0.0010
SIC1: Energy and water supplies	0.0084	0.0035	0.1868	0.2147
SIC2: Primary manufacturing	0.0052	0.0013	–0.0487	0.3695
SIC3: Manufacturing	0.2315	0.0606	0.1051	0.0686
SIC4: Construction	0.0881	0.0160	0.2154	0.1176
SIC5: Hotels and catering	0.0369	0.0730	–0.0527	–0.1831
SIC6: Transport, storage and communication	0.0835	0.0297	–0.0295	–0.0515
SIC7: Banking and financial services	0.1856	0.1540	0.2578	0.1693
Inner London	0.0307	0.0332	0.1649	0.4012
Outer London	0.0541	0.0585	0.2569	0.1912
Rest of South East	0.2122	0.2213	0.1559	0.0524
East Anglia	0.0367	0.0445	0.0854	–0.0608
East Midlands	0.0940	0.0773	0.0553	0.0517
West Midlands conurbation	0.0315	0.0242	–0.1423	0.0127
Rest of West Midlands	0.0545	0.0526	–0.0009	0.0244
Greater Manchester	0.0420	0.0468	–0.0027	0.0385
Merseyside	0.0192	0.0207	0.1322	0.1349
Rest of North West	0.0436	0.0399	–0.0570	–0.0120
South Yorkshire	0.0326	0.0254	0.0210	–0.0458
West Yorkshire	0.0326	0.0348	0.1055	0.0455
Rest of Yorkshire and the Humber	0.0351	0.0339	0.0699	–0.0202

Table A4.7: Full details, decomposition regressions, 2007 *(continued)*

	Xm	Xf	Bm	Bf
	Men's avg.	**Women's avg.**	**Men's coeff.**	**Women's coeff.**
Tyne and Wear	0.0195	0.0191	–0.1206	–0.0737
Rest of North	0.0437	0.0368	–0.0143	–0.0201
Wales	0.0566	0.0580	–0.1386	–0.0468
Scotland	0.0654	0.0812	0.0753	–0.0350
Constant	1.0000	1.0000	–0.8256	–0.1790
Mean logged wages				
Men	2.4187			
Women	2.1726			
Difference	0.2461			

Source: BHPS wave Q.

Base: All employees exclusive of the self-employed.

Table A4.8 Pay gap simulation decomposition, 1997

					Note: Positive value shows male advantage					
	Xm	Xf	Bm	Bf	(Xm–Xf) *Bm	(Bm–Bf) *Xf				
	Men's avg.	Women's avg.	Men's coeff.	Women's coeff.	Effect of levels (quantities)	Effect of returns (slopes)	net effect	Simulation effect	Overall coeff.	Simulation as a percentage of the whole gap
Female	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.00	–0.1727	–0.1727	73.3
Years of education	11.8233	11.5447	0.0719	0.0744	0.0201	–0.0287	–0.01	–0.0218	0.0781	9.2
Ever unemployed	0.4236	0.2998	–0.1394	–0.1150	–0.0173	–0.0073	–0.02	0.0153	–0.1238	–6.5
In current job >4 years	0.8449	0.8496	0.0347	0.1105	–0.0002	–0.0644	–0.06	0.0003	0.0689	–0.1
In current job <1 year	0.0266	0.0274	–0.0328	0.0972	0.0000	–0.0036	0.00	0.0000	0.0348	0.0
Occupational segregation (male percentage*10)	6.8548	3.1025	0.0057	0.0350	0.0214	–0.0909	–0.07	–0.0365	0.0192	15.5
Firm size 25–49	0.1240	0.1385	0.0552	0.0967	–0.0008	–0.0057	–0.01	0.0011	0.0747	–0.5
Firm size 50–499	0.3770	0.2930	0.1569	0.1567	0.0132	0.0001	0.01	–0.0132	0.1567	5.6
Firm size 500+	0.1825	0.1531	0.2446	0.1522	0.0072	0.0141	0.02	–0.0060	0.2044	2.6
Public sector employment	0.0806	0.1444	–0.0384	0.0453	0.0025	–0.0121	–0.01	0.0009	0.0146	–0.4
Union membership	0.2824	0.2902	0.0428	0.1612	–0.0003	–0.0344	–0.03	0.0008	0.1082	–0.4
SIC3: Manufacturing	0.2749	0.1076	–0.0054	–0.0512	–0.0009	0.0049	0.00	0.0032	–0.0191	–1.4
SIC4: Construction	0.0401	0.0051	–0.0170	0.1620	–0.0006	–0.0009	0.00	0.0013	–0.0360	–0.5
SIC5: Hotels and catering	0.1815	0.2432	–0.1447	–0.1718	0.0089	0.0066	0.02	–0.0093	–0.1505	3.9
SIC7: Banking and financial services	0.1250	0.1299	0.1988	0.1395	–0.0010	0.0077	0.01	0.0009	0.1782	–0.4

Source: BHPS wave G.

Base: All employees exclusive of the self-employed.

Table A4.9: Decomposition summary, 1997

	Graph %
Female	73.3
Education	9.2
Ever unemployed	–6.5
Occupational segregation	15.5
Institutional factors	6.8
SIC3: Manufacturing	–1.4
SIC4: Construction	–0.5
SIC5: Hotels and catering	3.9
SIC7: Banking and financial services	–0.4
Total	**100**

Note: Institutional factors sum up the effects of job tenure, firm size, public sector employment, and union membership.

Table A4.10: Full details, decomposition regressions, 1997

	Xm	Xf	Bm	Bf
	Men's avg.	Women's avg.	Men's coeff.	Women's coeff..
Female	0.0000	1.0000	0.0000	0.0000
Age	37.3782	37.7936	0.0907	0.0604
Age squared	1,548.7710	1,581.7240	–0.0010	–0.0007
Years of education	11.8233	11.5447	0.0719	0.0744
Ever unemployed	0.4236	0.2998	–0.1394	–0.1150
In current job >4 years	0.8449	0.8496	0.0347	0.1105
In current job <1 year	0.0266	0.0274	–0.0328	0.0972
Occupational segregation (male percentage*10)	6.8548	3.1025	0.0057	0.0350
Firm size 25–49	0.1240	0.1385	0.0552	0.0967
Firm size 50–499	0.3770	0.2930	0.1569	0.1567
Firm size 500+	0.1825	0.1531	0.2446	0.1522
Public sector employment	0.0806	0.1444	–0.0384	0.0453
Union membership	0.2824	0.2902	0.0428	0.1612
SIC0: Agriculture, forestry and fishing	0.0140	0.0054	–0.2065	–0.0750
SIC1: Energy and water supplies	0.0234	0.0084	0.1123	0.1557
SIC2: Primary manufacturing	0.0471	0.0161	0.0301	–0.0812
SIC3: Manufacturing	0.2749	0.1076	–0.0054	–0.0512
SIC4: Construction	0.0401	0.0051	–0.0170	0.1620
SIC5: Hotels and catering	0.1815	0.2432	–0.1447	–0.1718
SIC6: Transport, storage and communication	0.0908	0.0365	–0.0671	–0.0472
SIC7: Banking and financial services	0.1250	0.1299	0.1988	0.1395
Inner London	0.0343	0.0449	0.2029	0.2900
Outer London	0.0785	0.0821	0.1321	0.1456
Rest of South East	0.2136	0.2251	0.0973	0.0901
East Anglia	0.0385	0.0296	0.0224	–0.1166
East Midlands	0.0831	0.0733	–0.1272	–0.0248
West Midlands conurbation	0.0288	0.0323	–0.0826	–0.0257
Rest of West Midlands	0.0566	0.0538	–0.0628	0.0123
Greater Manchester	0.0406	0.0457	0.0110	–0.0114
Merseyside	0.0187	0.0158	–0.0213	–0.1159
Rest of North West	0.0520	0.0477	0.0702	0.0531
South Yorkshire	0.0255	0.0229	–0.0912	–0.0302
West Yorkshire	0.0329	0.0295	–0.0941	0.0553
Rest of Yorkshire and the Humber	0.0333	0.0307	–0.0400	–0.0072
Tyne and Wear	0.0196	0.0199	–0.0060	–0.0405
Rest of North	0.0406	0.0365	–0.0366	–0.0733

Table A4.10: Full details, decomposition regressions, 1997 *(continued)*

	Xm	Xf	Bm	Bf
	Men's avg.	**Women's avg.**	**Men's coeff.**	**Women's coeff.**
Wales	0.0457	0.0448	–0.1070	–0.0532
Scotland	0.0657	0.0824	–0.0877	–0.0289
Constant	1.0000	1.0000	–0.6428	–0.4054
Mean logged wages				
Men	2.2224			
Women	1.9630			
Difference	0.2594			

Source: BHPS wave G.

Base: All employees exclusive of the self-employed.

Annex 5: Description of work-life history data on career interruptions

The BHPS work histories include several sources of information. There were recall surveys in waves A and B, which extended backwards to cover the whole of the spell which was still the current status when those waves began. For example, for wave A, the recall interviews covered the whole 12-month recall period of that survey (i.e. the 12 months from 1 September 1990 to 31 August 1991 for the 1991 wave A data) and all the dates back to the starting date of the job or other labour force status that one had at the start of the recall period. Thus there is a varying length of recall backwards from the wave A survey. In wave B, a similar recall interview took place, so that there were few omissions from the recall interview. In each year, in addition, an 'annual job history' interview records all changes of job from the period's baseline date (1 September of the start of the recall year) to the interview date. If there is no change, then that person does not have a record in the job-history data file. That implies that the status of the previous year is continuing. In the current year, the BHPS is moving towards a fully computer-supported interview method, in which the interviewer has the previous year's labour force status showing on screen when they ask for any changes or updates. But in previous years this was done from memory. Around 3,500 respondents have a job-history data record each year (varying from 2,000 to 3,500) and there is one record (row) for each spell of work. The sum of all these spells, plus 12 months for all the people who had no change in their status, comprises the set of work-life histories for a given 12-month recall period.

We have carefully updated the 2002 records offered by Brendan Halpin to the Economic and Social Research Council data archive. Our records now cover wave Q (2007/08 interviews covering a 2006/07 job-history recall period).

The usual way of using the work-history files is to append recent years to the long-term recall history, giving a partial life history of varying length. Three problems arise in this kind of data: varying attrition probabilities; varying recall lengths; and unequal treatment of young people and new entrants. It is especially problematic that hundreds of booster-sample cases joined the BHPS in 2000. These are mainly in Northern Ireland, Scotland and Wales. Throughout this report we adjust for them using both weights and cluster-adjusted robust estimates. We also put a regional indicator on each model to control for the shorter average work history in the three affected regions. We have

six main labour force statuses represented: sick leave; family care work; full-time and part-time work; student; retired; self-employment and other. We have collapsed self-employment work into full-time work. Where no data on hours were available, we have assumed full-time working hours. The figures below illustrate the distribution of wages and the lengths of full-time and part-time cumulative work histories in wave Q 2007/08.

The number of cases that have explicit job-history data is rather larger for women than for men. This is probably because women are more likely to change labour-force status than are men. Women have been going through a variety of changes (to/from part-time work; to/from family care; to/from maternity leave) which are not utilised much by men. Many men and full-time workers simply reported staying in one job all year, and figures often vary annually by 12-month shifts because of these simple reports. The panel data on work-life histories were used explicitly in Olsen et al. (2009b) to show that full-time work usually gains 3 per cent higher wages per year recorded (leaving age out of the equation); part-time work experience did not affect current wages; and family years reduce current wages by about 1 per cent per year.

In the BHPS from 2000 onwards, extra respondent households were added to make up Wales, Scotland and Northern Ireland booster samples (see Olsen et al., 2009a). An additional low-income booster sample was added to BHPS in 2000, too. For booster-sample households, no long-term recall work histories were ever obtained. Figures presented separately show that the large numbers of booster-sample households that have shorter work-histories of about eight years maximum length are mainly in just the three regions of Wales, Scotland and Northern Ireland. Weights ensure that the impact of booster-sample households is not exaggerated. We have checked all the work-life histories. One category of spending time ('other, retired, and student') becomes the base category for the set of work-career length variables in the wage equation.

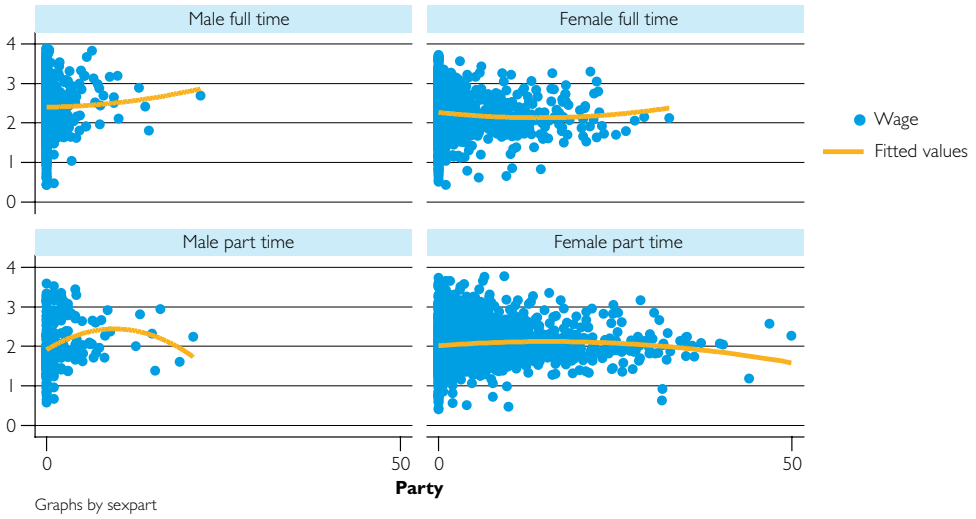
Figure A5.1: Relationship of log wage rates with years of full-time work

Note: Each curve is a quadratic fit of the Y variable (logged wages per hour) to the X variable.

Source: BHPS wave Q.

Base: All employed individuals.

Figure A5.2: Relationship of log wage rates with years of part-time work



Note: The curve is a quadratic fit of the Y variable (logged wages per hour) to the X variable.

Source: BHPS wave Q.

Base: All employed individuals.

Table A5.1: Impact of work-life history variables on wages, 2007

Dependent variable is the log wage among employees

	2007	
	Coefficient	**Significance**
Female	–0.0825	***
Full-time years	0.0318	***
Years of education	0.0787	***
Insider: In current job >4 years	0.1475	***
Outsider: In current job <1year	–0.0961	
Occupational segregation (male percentage*10)	0.0131	***
Firm size 24–49	0.0749	**
Firm size 50–499	0.1303	***
Firm size 500+	0.1976	***
Public sector employment	0.0783	***
Union membership	0.1197	***
SIC0: Agriculture, forestry and fishing	–0.1520	*
SIC1: Energy and water supplies	0.1173	
SIC2: Primary manufacturing	0.0896	
SIC3: Manufacturing	0.0776	**
SIC4: Construction	0.0968	**
SIC5: Hotels and catering	–0.1426	***
SIC6: Transport, storage and communication	–0.0829	*
SIC7: Banking and financial services	0.2134	***
Inner London	0.3135	***
Outer London	0.1725	***
South East	0.0703	*
East Anglia	–0.0134	
East Midlands	0.0138	
West Midlands conurbation	–0.0317	
West Midlands	–0.0034	
Greater Manchester	–0.0274	
Merseyside	0.1269	*
North West	–0.0645	
South Yorkshire	–0.0436	
West Yorkshire	0.0546	
Yorkshire and the Humber	–0.0149	
Tyne and Wear	–0.1248	*
North	–0.0071	
Scotland	–0.0500	
Wales	0.0015	
Northern Ireland	0.0177	

Table A5.1: Impact of work-life history variables on wages, 2007 *(continued)*

Dependent variable is the log wage among employees

	2007	
	Coefficient	**Significance**
Work-life history variables		
Months unemployed	–0.0030	***
Part-time years	–0.0048	
Family care years	–0.0097	***
Months sick	–0.0037	*
Months on maternity leave	–0.0005	
Full-time years squared	–0.0005	***
Part-time years squared	0.0001	
Constant	0.7528	***

* p<0.05 **p<0.01 ***p<0.001.

N=6,979

R-squared=0.4130.

Source: BHPS wave Q.

Base: Employed individuals aged 16–65 inclusive.

Note: Base categories are SIC8 (other services); South West; and firms with under 25 employees.

Table A5.2: Pay gap simulation decomposition, with work history, 2007

Note: Positive value shows male advantage

	Xm	Xf	Bm	Bf	(Xm–Xf) *Bm	(Bm–Bf) *Xf						
	Men's avg.	Women's avg.	Men's coeff.	Women's coeff.	Effect of levels (Quantities)	Effect of returns (Slopes)	Net effect	Simulation Effect	Overall Coeff.	Simulation as a percentage of the reduced gap	Graphed Figures	as a percentage of the reduced gap
Female	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.00	–0.0825	–0.0825	36.0%	Female	36.0
Full-time years	19.2413	11.8309	0.0327	0.0307	0.2425	0.0242	0.27	–0.2353	0.0318	102.8%	Full years	20.9
Full-time years squared	626.4240	254.0736	–0.0005	–0.0005	–0.1917	–0.0053	–0.20	0.1876	–0.0005	–81.9%	Educ. years	5.3
Years of education	12.3371	12.1830	0.0767	0.0726	0.0118	0.0500	0.06	–0.0121	0.0787	5.3%	Institutions	0.0
Insider: In current job >4 years	0.8754	0.8692	0.1913	0.1083	0.0012	0.0722	0.07	–0.0009	0.1475	0.4%	Segregation	10.1
Outsider: In current job <1 year	0.0122	0.0117	0.0738	–0.2734	0.0000	0.0041	0.00	0.0000	–0.0961	0.0%	SIC3+SIC4	8.9
Occupational segregation (male percentage*10)	6.8001	3.2360	0.0032	0.0283	0.0113	–0.0814	–0.07	–0.0232	0.0131	10.1%	SIC7	2.9
Firm size 25–49	0.1240	0.1408	0.0753	0.0695	–0.0013	0.0008	0.00	0.0013	0.0749	–0.5%	Part years	5.4
Firm size 50–499	0.3759	0.3058	0.1691	0.0897	0.0118	0.0243	0.04	–0.0091	0.1303	4.0%	Family years	10.5
Firm size 500+	0.1885	0.1716	0.2020	0.1904	0.0034	0.0020	0.01	–0.0034	0.1976	1.5%		
Public sector employment	0.0821	0.1703	0.0786	0.0799	–0.0069	–0.0002	–0.01	0.0069	0.0783	–3.0%		
Union membership	0.2581	0.3009	0.0509	0.1838	–0.0022	–0.0400	–0.04	0.0051	0.1197	–2.2%		
SIC3: Manufacturing	0.2277	0.0601	0.1078	0.0334	0.0181	0.0045	0.02	–0.0130	0.0776	5.7%		
SIC4: Construction	0.0917	0.0167	0.1361	0.1465	0.0102	–0.0002	0.01	–0.0073	0.0968	3.2%		
SIC7: Banking and financial services	0.1793	0.1477	0.2874	0.1334	0.0091	0.0227	0.03	–0.0067	0.2134	2.9%		
Part-time years	0.3443	4.5232	–0.0049	–0.0050	0.0204	0.0006	0.02	–0.0203	–0.0048	8.8%		
Part-time years squared	2.0854	70.0942	0.0006	0.0001	–0.0390	0.0328	–0.01	0.0080	0.0001	–3.5%		
Family care years	0.0160	2.5019	–0.0142	–0.0095	0.0353	–0.0118	0.02	–0.0241	–0.0097	10.5%		
												Total = 100

Source: BHPS wave Q.

Base: All individuals aged 16–65 inclusive.

Annex 6: Variation over time and by region

In this annex, two additional results are given. First, we analyse the impact that selectivity adjustment has on the wage regression model. Secondly, we look at the results of panel data regression. Thirdly, we discuss the regional variation in the pay gap, which is much less than the regional variation in the wage level.

Table A6.1: Decomposition details for the part-time gender pay gap, 1997 and 2007

Note: Positive value shows male advantage

	Xm	Xf	Bm	Bf	(Xm–Xf) *Bm	(Bm–Bf) *Xf				
	Men's avg.	Women's avg.	Men's coeff.	Women's coeff.	Effect of levels (quantities)	Effect of returns (slopes)	Net effect	Simulation effect	Overall coeff.	Simulation as a percentage of the whole gap
Female	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.00	–0.2206	–0.2206	65.1
Years of education	12.3473	11.8633	0.0748	0.0665	0.0362	0.0979	0.13	–0.0370	0.0764	10.9
Ever unemployed	0.4759	0.3645	–0.0900	–0.0724	–0.0100	–0.0064	–0.02	0.0099	–0.0890	–2.9
Insider: in current job >4 years	0.8726	0.8428	0.1581	0.0733	0.0047	0.0714	0.08	–0.0038	0.1279	1.1
Outsider: in current job <1 year	0.0116	0.0182	–0.0101	–0.2126	0.0001	0.0037	0.00	–0.0004	–0.0539	0.1
Occupational segregation (male percentage*10)	6.8825	2.6686	–0.0009	0.0355	–0.0040	–0.0973	–0.10	–0.0187	0.0080	5.5
Firm size 25–49	0.1295	0.1486	0.0538	0.0523	–0.0010	0.0002	0.00	0.0011	0.0559	–0.3
Firm size 50–499	0.3788	0.2534	0.1907	0.0627	0.0239	0.0324	0.06	–0.0197	0.1574	5.8
Firm size 500+	0.1839	0.1141	0.2066	0.1652	0.0144	0.0047	0.02	–0.0138	0.1977	4.1
Public sector employment	0.0833	0.1385	0.0937	0.2505	–0.0052	–0.0217	–0.03	0.0082	0.1479	–2.4
Union membership	0.2554	0.2543	0.0174	0.2040	0.0000	–0.0475	–0.05	–0.0001	0.0788	0.0
SIC3: Manufacturing	0.2315	0.0331	0.1059	0.2379	0.0210	–0.0044	0.02	–0.0236	0.1189	7.0
SIC5: Hotels and catering	0.0369	0.0940	–0.0527	–0.1862	0.0030	0.0125	0.02	–0.0035	–0.0614	1.0
SIC7: Banking and financial services	0.1856	0.1200	0.2580	0.1891	0.0169	0.0083	0.03	–0.0168	0.2559	5.0%

Source: BHPS waves G, Q.

Base: All employed individuals aged 16–65 inclusive; Great Britain.

Table A6.2: Detailed components of the part-time gender pay gap causality, 1997 and 2007

	1997				
	Men's avg.	Women's avg.	Simulation effect	Overall coeff.	Simulation as a percentage of the whole gap
Female	0.0000	1.0000	–0.2413	–0.2413	63.2
Years of education	11.8233	10.9489	–0.0680	0.0778	17.8
Occupational segregation (male percentage*10)	6.8548	2.6134	–0.0238	0.0100	6.2
Insider: in current job >4 years	0.8449	0.8509	0.0003	0.0526	–0.1
Outsider: in current job <1 year	0.0266	0.0285	0.0000	0.0063	0.0
Firm size 25–49	0.1240	0.1446	0.0013	0.0641	–0.3
Firm size 50–499	0.3770	0.2199	–0.0245	0.1557	6.4
Firm size 500+	0.1825	0.0837	–0.0226	0.2284	5.9
Public sector employment	0.0806	0.1221	–0.0003	–0.0064	0.1
Union membership	0.2824	0.2199	–0.0066	0.1048	1.7
Age	37.3782	39.8679	0.1772	0.0712	–46.4
Age squared	1,548.7710	1,756.1900	–0.1570	–0.0008	41.1
Ever unemployed	0.4236	0.2821	0.0177	–0.1250	–4.6
SIC0: Agriculture, forestry and fishing	0.0140	0.0086	0.0008	–0.1471	–0.2
SIC1: Energy and water supplies	0.0234	0.0036	–0.0022	0.1137	0.6
SIC2: Primary manufacturing	0.0471	0.0057	–0.0013	0.0320	0.3
SIC3: Manufacturing	0.2749	0.0686	–0.0020	0.0096	0.5
SIC4: Construction	0.0401	0.0085	0.0003	–0.0082	–0.1
SIC5: Hotels and catering	0.1815	0.3392	–0.0227	–0.1442	6.0
SIC6: Transport, storage and communication	0.0908	0.0247	0.0037	–0.0563	–1.0
SIC7: Banking and financial services	0.1250	0.0782	–0.0092	0.1960	2.4
Inner London	0.0343	0.0312	–0.0007	0.2173	0.2
Outer London	0.0785	0.0753	–0.0004	0.1201	0.1
Rest of South East	0.2136	0.2265	0.0010	0.0761	–0.3
East Anglia	0.0385	0.0327	0.0001	–0.0117	0.0
East Midlands	0.0831	0.0746	0.0010	–0.1188	–0.3
West Midlands conurbation	0.0288	0.0288	0.0000	–0.0256	0.0
West Midlands	0.0566	0.0631	–0.0002	–0.0378	0.1
Greater Manchester	0.0406	0.0403	0.0000	0.0063	0.0
Merseyside	0.0187	0.0211	–0.0001	–0.0513	0.0
North West	0.0520	0.0403	–0.0006	0.0524	0.2
South Yorkshire	0.0255	0.0234	0.0002	–0.0933	–0.1

Table A6.2: Detailed components of the part-time gender pay gap causality, 1997 and 2007 *(continued)*

	1997				
	Men's avg.	**Women's avg.**	**Simulation effect**	**Overall coeff.**	**Simulation as a percentage of the whole gap**
West Yorkshire	0.0329	0.0294	0.0001	–0.0203	0.0
Rest of Yorkshire and the Humber	0.0333	0.0353	–0.0001	–0.0312	0.0
Tyne and Wear	0.0196	0.0156	0.0001	–0.0207	0.0
Rest of the Northern region	0.0406	0.0428	–0.0001	–0.0494	0.0
Scotland	0.0457	0.0480	–0.0002	–0.0907	0.1
Wales	0.0657	0.0870	–0.0016	–0.0766	0.4
Constant	1.0000	1.0000	0.0000	–0.3870	0.0

Source: See Annex 3. Uses BHPS data for 1997, excluding the self-employed. The simulation effect is [(men's average – women's average)*coefficient] with the exception of the segregation component, which is [(5 – women's average)*coefficient].

Table A6.2: Detailed components of the part-time gender pay gap causality, 1997 and 2007 *(continued)*

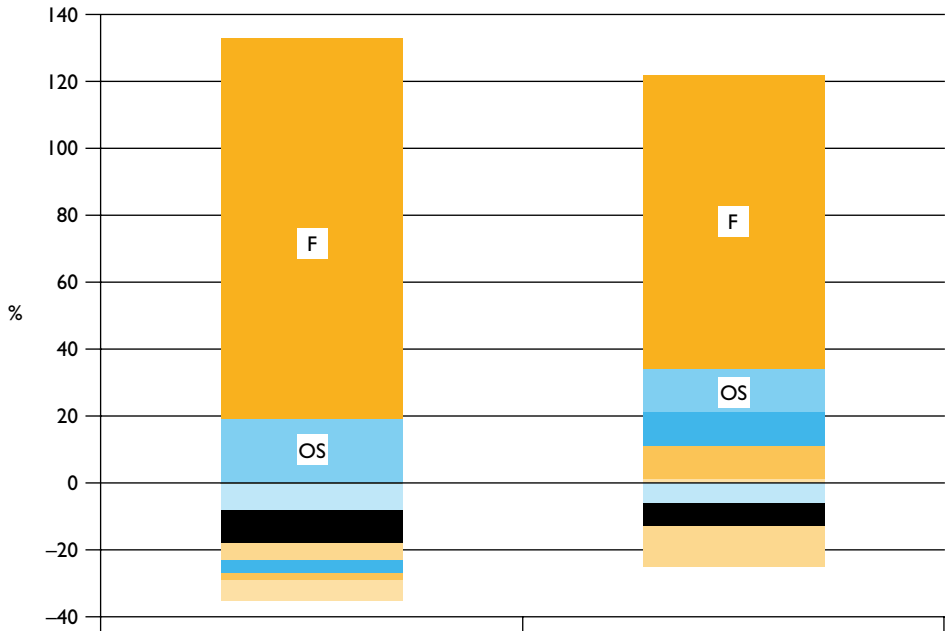
	2007				
	Men's avg.	**Women's avg.**	**Simulation effect**	**Overall coeff.**	**Simulation as a percentage of the whole gap**
Female	0.0000	1.0000	–0.2206	–0.2206	61.2
Years of education	12.3473	11.8633	–0.0370	0.0764	10.3
Occupational segregation (percentage male* 10)	6.8825	2.6686	–0.0187	0.0080	5.2
Insider: in current job > 4 years	0.8726	0.8428	–0.0038	0.1279	1.1
Outsider: in current job < 1 year	0.0116	0.0182	–0.0004	–0.0539	0.1
Firm size 25–49	0.1295	0.1486	0.0011	0.0559	–0.3
Firm size 50–499	0.3788	0.2534	–0.0197	0.1574	5.5
Firm size 500+	0.1839	0.1141	–0.0138	0.1977	3.8
Public sector employment	0.0833	0.1385	0.0082	0.1479	–2.3
Union membership	0.2554	0.2543	–0.0001	0.0788	0.0
Age	39.8817	40.6706	0.0592	0.0751	–16.4
Age squared	1,752.6100	1,840.0170	–0.0713	–0.0008	19.8
Ever unemployed	0.4759	0.3645	0.0099	–0.0890	–2.8
SIC0: Agriculture, forestry and fishing	0.0067	0.0063	0.0001	–0.1356	0.0
SIC1: Energy and water supplies	0.0084	0.0014	–0.0010	0.1483	0.3
SIC2: Primary manufacturing	0.0052	0.0000	0.0003	–0.0534	–0.1
SIC3: Manufacturing	0.2315	0.0331	–0.0236	0.1189	6.5
SIC4: Construction	0.0881	0.0183	–0.0127	0.1814	3.5
SIC5: Hotels and catering	0.0369	0.0940	–0.0035	–0.0614	1.0
SIC6: Transport, storage and communication	0.0835	0.0171	0.0039	–0.0591	–1.1
SIC7: Banking and financial services	0.1856	0.1200	–0.0168	0.2559	4.7
Inner London	0.0307	0.0230	–0.0020	0.2574	0.6
Outer London	0.0541	0.0488	–0.0011	0.2108	0.3
Rest of South East	0.2122	0.2217	0.0009	0.0907	–0.2
East Anglia	0.0367	0.0462	0.0004	0.0412	–0.1
East Midlands	0.0940	0.0835	–0.0004	0.0423	0.1
West Midlands conurbation	0.0315	0.0270	0.0004	–0.0888	–0.1
West Midlands	0.0545	0.0524	0.0000	0.0081	0.0
Greater Manchester	0.0420	0.0448	0.0000	–0.0063	0.0
Merseyside	0.0192	0.0276	0.0009	0.1031	–0.2
North West	0.0436	0.0374	0.0007	–0.1110	–0.2
South Yorkshire	0.0326	0.0328	0.0000	–0.0001	0.0

Table A6.2: Detailed components of the part-time gender pay gap causality, 1997 and 2007 *(continued)*

	2007				
	Men's avg.	**Women's avg.**	**Simulation effect**	**Overall coeff.**	**Simulation as a percentage of the whole gap**
West Yorkshire	0.0326	0.0309	–0.0002	0.1128	0.1
Rest of Yorkshire and the Humber	0.0351	0.0355	0.0000	0.0055	0.0
Tyne and Wear	0.0195	0.0183	0.0002	–0.1477	0.0
Rest of the Northern region	0.0437	0.0315	0.0000	0.0036	0.0
Scotland	0.0566	0.0576	–0.0001	–0.0824	0.0
Wales	0.0654	0.0774	0.0001	0.0095	0.0
Constant	1.0000	1.0000	0.0000	–0.4696	0.0

Source: See Annex 3. Uses BHPS data for 2007, excluding the self-employed. The simulation effect is [(men's average – women's average)*coefficient] with the exception of the segregation component which is [(5 – women's average)*coefficient].

Figure A6.1: The full-time gender pay gap in Great Britain, 1997 and 2007



	1997 (%)	2007 (%)
Female (F)	114	88
Occupational segregation (OS)	19	13
Formal education	–8	–5
Ever unemployed	–10	–6
Institutional factors	–4	–11
SIC3: Manufacturing	–3	10
SIC4: Construction	–1	10
SIC7: Banking and financial services	–5	1

Note: The figures in the data table are based on the decomposition method used in Table A6.1 above.

Source: BHPS waves G and Q.

Base: All employees aged 16–65 inclusive.

Table A6.3: Detailed components of the full-time gender pay gap causality, 1997 and 2007

	1997				
	Men's avg.	Women's avg.	Simulation effect	Overall coeff.	Simulation as a percentage of the whole gap
Female	0.0000	1.0000	–0.1585	–0.1585	124.9
Years of education	11.8233	11.9786	0.0117	0.0751	–9.2
Occupational Segregation (male percentage* 10)	6.8548	3.4590	–0.0268	0.0174	21.1
Insider: in current job >4 years	0.8449	0.8521	0.0004	0.0593	–0.3
Outsider: in current job <1 year	0.0266	0.0247	–0.0001	0.0261	0.0
Firm size 25–49	0.1240	0.1350	0.0008	0.0700	–0.6
Firm size 50–499	0.3770	0.3495	–0.0042	0.1521	3.3
Firm size 500+	0.1825	0.2047	–0.0042	0.1521	3.3
Public sector employment	0.0806	0.1627	0.0002	0.0030	–0.2
Union membership	0.2824	0.3455	0.0044	0.0703	–3.5
Age	37.3782	36.4115	–0.0862	0.0891	67.9
Age squared	1,548.7710	1,463.2070	0.0837	–0.0010	–66.0
Ever unemployed	0.4236	0.3161	0.0141	–0.1314	–11.1
SIC0: Agriculture, forestry and fishing	0.0140	0.0031	0.0022	–0.2034	–1.7
SIC1: Energy and water supplies	0.0234	0.0120	–0.0012	0.1102	1.0
SIC2: Primary manufacturing	0.0471	0.0239	0.0000	0.0009	0.0
SIC3: Manufacturing	0.2749	0.1373	0.0049	–0.0353	–3.8
SIC4: Construction	0.0401	0.0028	0.0020	–0.0537	–1.6
SIC5: Hotels and catering	0.1815	0.1705	0.0017	–0.1510	–1.3
SIC6: Transport, storage and communication	0.0908	0.0456	0.0032	–0.0720	–2.6
SIC7: Banking and financial services	0.1250	0.1678	0.0073	0.1708	–5.8
Inner London	0.0343	0.0556	0.0054	0.2530	–4.3
Outer London	0.0785	0.0877	0.0013	0.1457	–1.1
Rest of South East	0.2136	0.2203	0.0007	0.1031	–0.5
East Anglia	0.0385	0.0280	0.0001	–0.0104	–0.1
East Midlands	0.0831	0.0702	0.0011	–0.0873	–0.9
West Midlands conurbation	0.0288	0.0355	–0.0006	–0.0891	0.5
West Midlands	0.0566	0.0475	0.0003	–0.0288	–0.2
Greater Manchester	0.0406	0.0504	–0.0002	–0.0171	0.1
Merseyside	0.0187	0.0112	0.0003	–0.0414	–0.2

Table A6.3: Detailed components of the full-time gender pay gap causality, 1997 and 2007 *(continued)*

	1997				
	Men's avg.	**Women's avg.**	**Simulation effect**	**Overall coeff.**	**Simulation as a percentage of the whole gap**
North West	0.0520	0.0530	0.0001	0.0573	0.0
South Yorkshire	0.0255	0.0230	0.0001	–0.0597	–0.1
West Yorkshire	0.0329	0.0296	0.0002	–0.0729	–0.2
Rest of Yorkshire and the Humber	0.0333	0.0281	0.0001	–0.0274	–0.1
Tyne and Wear	0.0196	0.0234	–0.0001	–0.0150	0.0
Rest of North	0.0406	0.0321	0.0003	–0.0388	–0.3
Scotland	0.0457	0.0428	0.0002	–0.0824	–0.2
Wales	0.0657	0.0805	–0.0007	–0.0500	0.6
Constant	1.0000	1.0000	0.0000	–0.7124	0.0

Note: See Annex 3. Uses BHPS data for 1997, excluding the self-employed. The simulation effect is [(men's average – women's average)*coefficient] with the exception of the segregation component which is [(5 – women's average)*coefficient].

Source: BHPS wave G.

Base: Employed individuals aged 16–65 inclusive; excluding the self-employed; Great Britain.

Base categories are: SIC8 (other services); the South West; and firms with under 25 employees.

Table A6.3: Detailed components of the full-time gender pay gap causality, 1997 and 2007 *(continued)*

	2007				
	Men's avg.	**Women's avg.**	**Simulation effect**	**Overall coeff.**	**Simulation as a percentage of the whole gap**
Female	0.0000	1.0000	–0.1011	–0.1011	79.6
Years of education	12.3473	12.4201	0.0058	0.0791	–4.5
Occupational segregation (male percentage* 10)	6.8825	3.7834	–0.0150	0.0124	11.8
Insider: in current job >4 years	0.8726	0.8813	0.0011	0.1263	–0.9
Outsider: in current job <1 year	0.0116	0.0101	0.0002	–0.1026	–0.1
Firm size 25–49	0.1295	0.1402	0.0007	0.0637	–0.5
Firm size 50–499	0.3788	0.3522	–0.0043	0.1613	3.4
Firm size 500+	0.1839	0.2125	0.0055	0.1926	–4.3
Public sector employment	0.0833	0.1752	0.0045	0.0484	–3.5
Union membership	0.2554	0.3221	0.0045	0.0673	–3.5
Age	39.8817	37.8974	–0.1646	0.0830	129.7
Age squared	1,752.6100	1,590.4080	0.1459	–0.0009	–115.0
Ever unemployed	0.4759	0.4025	0.0073	–0.1000	–5.8
SIC0: Agriculture, forestry and fishing	0.0067	0.0056	0.0002	–0.1425	–0.1
SIC1: Energy and water supplies	0.0084	0.0052	–0.0005	0.1591	0.4
SIC2: Primary manufacturing	0.0052	0.0023	0.0000	0.0083	0.0
SIC3: Manufacturing	0.2315	0.0816	–0.0114	0.0759	9.0
SIC4: Construction	0.0881	0.0146	–0.0115	0.1561	9.0
SIC5: Hotels and catering	0.0369	0.0574	–0.0021	–0.1011	1.6
SIC6: Transport, storage and communication	0.0835	0.0393	0.0017	–0.0383	–1.3
SIC7: Banking and financial services	0.1856	0.1795	–0.0013	0.2138	1.0
Inner London	0.0307	0.0411	0.0026	0.2497	–2.0
Outer London	0.0541	0.0653	0.0029	0.2582	–2.3
Rest of South East	0.2122	0.2211	0.0013	0.1483	–1.0
East Anglia	0.0367	0.0437	0.0002	0.0324	–0.2
East Midlands	0.0940	0.0725	–0.0010	0.0456	0.8
West Midlands conurbation	0.0315	0.0223	0.0010	–0.1041	–0.8
West Midlands	0.0545	0.0528	0.0000	0.0129	0.0
Greater Manchester	0.0420	0.0488	0.0002	0.0341	–0.2
Merseyside	0.0192	0.0150	–0.0005	0.1226	0.4

Table A6.3: Detailed components of the full-time gender pay gap causality, 1997 and 2007 *(continued)*

	2007				
	Men's avg.	**Women's avg.**	**Simulation effect**	**Overall coeff.**	**Simulation as a percentage of the whole gap**
North West	0.0436	0.0417	0.0000	0.0051	0.0
South Yorkshire	0.0326	0.0202	–0.0001	0.0048	0.0
West Yorkshire	0.0326	0.0381	0.0003	0.0583	–0.3
Rest of Yorkshire and the Humber	0.0351	0.0325	–0.0001	0.0344	0.1
Tyne and Wear	0.0195	0.0199	–0.0001	–0.1130	0.0
Rest of the Northern region	0.0437	0.0402	0.0002	–0.0504	–0.1
Scotland	0.0566	0.0579	–0.0002	–0.1217	0.1
Wales	0.0654	0.0850	0.0008	0.0400	–0.6
Constant	1.0000	1.0000	0.0000	–0.6810	0.0

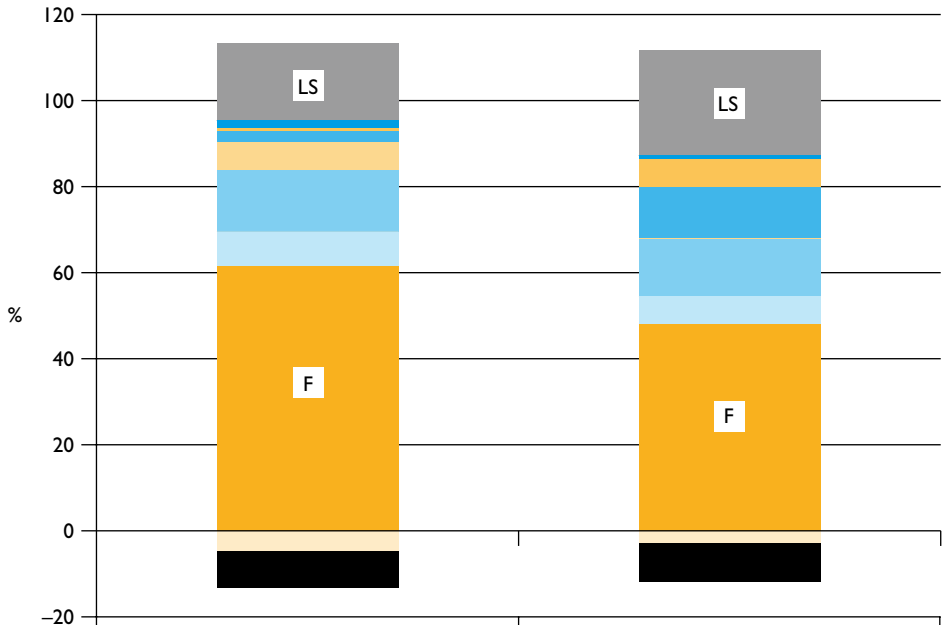
Note: See Annex 3. Uses BHPS data for 1997, excluding the self-employed. The simulation effect is [(men's average – women's average)*coefficient] with the exception of the segregation component, which is [(5 – women's average)*coefficient].

Source: BHPS wave G.

Base: Employed individuals aged 16–65 inclusive; excluding the self-employed; Great Britain.

Base categories are: SIC8 (other services); the South West; and firms with under 25 employees.

Figure A6.2: The gender pay gap in Great Britain with selectivity issues included, 1997 and 2007



	1997 (%)	2007 (%)
Labour supply factors (LS)	18.0	24.5
SIC7: Banking and financial services	–8.6	–8.9
SIC5: Hotels and catering	1.9	0.9
SIC4: Construction	0.5	6.5
SIC3: Manufacturing	2.7	11.8
Institutional factors	6.6	0.4
Occupational segregation	14.2	13.2
Ever unemployed	–4.8	–3.0
Formal education	8.0	6.4
Female (F)	61.5	48.1

Note: The figures in the data table are based on the decomposition method used in Table A6.1 above.

Source: BHPS waves G and Q.

Base: All employees aged 16–65 inclusive, excluding the self-employed, Great Britain.

Table A6.4: The impact of selectivity into labour market on wages – detailed components, 1997 and 2007

	1997				
	Men's avg.	Women's avg.	Simulation effect	Overall coeff.	Simulation as a percentage of the whole gap
Female	0.0000	1.0000	–0.1442	–0.1442	63.6
Years of education	11.8233	11.5447	–0.0188	0.0676	8.3
Occupational segregation (male percentage* 10)	6.8548	3.1025	–0.0333	0.0176	14.7
Insider: in current job >4 years	0.8449	0.8496	0.0003	0.0716	–0.1
Outsider: in current job <1 year	0.0266	0.0274	0.0000	0.0491	0.0
Firm size 25–49	0.1240	0.1385	0.0010	0.0691	–0.4
Firm size 50–499	0.3770	0.2930	–0.0118	0.1402	5.2
Firm size 500+	0.1825	0.1531	–0.0055	0.1875	2.4
Public sector employment	0.0806	0.1444	–0.0002	–0.0030	0.1
Union membership	0.2824	0.2902	0.0007	0.0920	–0.3
Hazard of non-selection	0.4709	0.5482	–0.0422	–0.5465	18.6
Age	37.3782	37.7936	0.0202	0.0487	–8.9
Age squared	1,548.7710	1,581.7240	–0.0142	–0.0004	6.3
Ever unemployed	0.4236	0.2998	0.0114	–0.0917	–5.0
SIC0: Agriculture, forestry and fishing	0.0140	0.0054	0.0003	–0.0330	–0.1
SIC1: Energy and water supplies	0.0234	0.0084	–0.0024	0.1586	1.0
SIC2: Primary manufacturing	0.0471	0.0161	–0.0016	0.0518	0.7
SIC3: Manufacturing	0.2749	0.1076	–0.0064	0.0384	2.8
SIC4: Construction	0.0401	0.0051	–0.0012	0.0335	0.5
SIC5: Hotels and catering	0.1815	0.2432	–0.0045	–0.0732	2.0
SIC6: Transport, storage and communication	0.1250	0.1299	0.0011	0.2260	–0.5
SIC7: Banking and financial services	0.2032	0.4468	0.0201	0.0827	–8.9
Inner London	0.0343	0.0449	0.0025	0.2382	–1.1
Outer London	0.0785	0.0821	0.0003	0.0849	–0.1
Rest of South East	0.2136	0.2251	0.0008	0.0667	–0.3
East Anglia	0.0385	0.0296	0.0003	–0.0306	–0.1
East Midlands	0.0831	0.0733	0.0007	–0.0746	–0.3
West Midlands conurbation	0.0288	0.0323	–0.0001	–0.0220	0.0
West Midlands	0.0566	0.0538	0.0001	–0.0305	0.0

Table A6.4: The impact of selectivity into labour market on wages – detailed components, 1997 and 2007 *(continued)*

	1997				
	Men's avg.	**Women's avg.**	**Simulation effect**	**Overall coeff.**	**Simulation as a percentage of the whole gap**
Greater Manchester	0.0406	0.0457	–0.0001	–0.0229	0.1
Merseyside	0.0187	0.0158	0.0002	–0.0840	–0.1
North West	0.0520	0.0477	–0.0002	0.0436	0.1
South Yorkshire	0.0255	0.0229	0.0002	–0.0616	–0.1
West Yorkshire	0.0329	0.0295	0.0001	–0.0183	0.0
Rest of Yorkshire and the Humber	0.0333	0.0307	0.0000	–0.0021	0.0
Tyne and Wear	0.0196	0.0199	0.0000	0.0124	0.0
Rest of the Northern region	0.0406	0.0365	0.0002	–0.0469	–0.1
Scotland	0.0457	0.0448	0.0001	–0.0595	0.0
Wales	0.0657	0.0824	–0.0007	–0.0415	0.3
Constant	1.0000	1.0000	0.0000	0.2069	0.0

Note: See Annex 3. The simulation effect is [(men's average – women's average)*coefficient] with the exception of the segregation component, which is [(5 – women's average)*coefficient].

Source: BHPS waves G, Q.

Base: Employed individuals aged 16–65 inclusive, excluding the self-employed; Great Britain.

Base categories are: SIC8 (other services); the South West; and firms with under 25 employees.

Table A6.4: The impact of selectivity into labour market on wages – detailed components, 1997 and 2007 *(continued)*

	2007				
	Men's avg.	**Women's avg.**	**Simulation effect**	**Overall coeff.**	**Simulation as a percentage of the whole gap**
Female	0.0000	1.0000	–0.0962	–0.0962	44.3
Years of education	12.3473	12.1777	–0.0117	0.0687	5.4
Occupational Segregation (male percentage* 10)	6.8825	3.3078	–0.0261	0.0154	12.0
Insider: in current job >4 years	0.8726	0.8629	–0.0010	0.1016	0.5
Outsider: in current job <1 year	0.0116	0.0139	–0.0002	–0.0890	0.1
Firm size 25–49	0.1295	0.1428	0.0009	0.0670	–0.4
Firm size 50–499	0.3788	0.3086	–0.0093	0.1323	4.3
Firm size 500+	0.1839	0.1695	–0.0024	0.1647	1.1
Public sector employment	0.0833	0.1585	0.0079	0.1052	–3.6
Union membership	0.2554	0.2913	0.0031	0.0877	–1.4
Hazard of non-selection	0.4636	0.5385	–0.0488	–0.6509	22.5
Age	39.8817	39.0220	–0.0291	0.0338	13.4
Age squared	1,752.6100	1,692.9280	0.0158	–0.0003	–7.3
Ever unemployed	0.4759	0.3856	0.0064	–0.0708	–2.9
SIC0: Agriculture, forestry and fishing	0.0067	0.0059	0.0001	–0.0923	0.0
SIC1: Energy and water supplies	0.0084	0.0035	–0.0006	0.1240	0.3
SIC2: Primary manufacturing	0.0052	0.0013	0.0000	0.0063	0.0
SIC3: Manufacturing	0.2315	0.0606	–0.0131	0.0767	6.0
SIC4: Construction	0.0881	0.0160	–0.0084	0.1162	3.9
SIC5: Hotels and catering	0.0369	0.0730	–0.0040	–0.1096	1.8
SIC6: Transport, storage and communication	0.0835	0.0297	0.0034	–0.0640	–1.6
SIC7: Banking and financial services	0.1856	0.1540	–0.0063	0.1990	2.9
Inner London	0.0307	0.0332	0.0006	0.2480	–0.3
Outer London	0.0541	0.0585	0.0009	0.2095	–0.4
Rest of South East	0.2122	0.2213	0.0007	0.0776	–0.3
East Anglia	0.0367	0.0445	0.0002	0.0300	–0.1
East Midlands	0.0940	0.0773	–0.0012	0.0719	0.6
West Midlands conurbation	0.0315	0.0242	0.0003	–0.0398	–0.1

Table A6.4: The impact of selectivity into labour market on wages – detailed components, 1997 and 2007 *(continued)*

	2007				
	Men's avg.	**Women's avg.**	**Simulation effect**	**Overall coeff.**	**Simulation as a percentage of the whole gap**
West Midlands	0.0545	0.0526	–0.0001	0.0270	0.0
Greater Manchester	0.0420	0.0468	0.0001	0.0282	–0.1
Merseyside	0.0192	0.0207	0.0002	0.1447	–0.1
North West	0.0436	0.0399	0.0000	–0.0130	0.0
South Yorkshire	0.0326	0.0254	–0.0003	0.0360	0.1
West Yorkshire	0.0326	0.0348	0.0002	0.0861	–0.1
Rest of Yorkshire and the Humber	0.0351	0.0339	0.0000	0.0040	0.0
Tyne and Wear	0.0195	0.0191	0.0000	–0.0876	0.0
Rest of the Northern region	0.0437	0.0368	0.0000	–0.0007	0.0
Scotland	0.0566	0.0580	–0.0001	–0.0629	0.0
Wales	0.0654	0.0812	0.0004	0.0228	–0.2
Constant	1.0000	1.0000	0.0000	0.6033	0.0

Note: See Annex 3. The simulation effect is [(men's average – women's average)*coefficient] with the exception of the segregation component, which is [(5 – women's average)*coefficient].

Source: BHPS wave G Q.

Base: Employed individuals aged 16–65 inclusive, excluding the self-employed; Great Britain.

Base categories are: SIC8 (other services); the South West; and firms with under 25 employees.

Table A6.5: Heckman panel regression results, longitudinal, 2000s data and 1990s data, Great Britain

Dependent variable is the log wage among employees – 2000s

	Fixed effects model on dependent variable *ln hourly real pay*		Grand means regression model on dependent variable *Ui*	
	Coefficient	**Significance**	**Coefficient**	**Significance**
Female	(dropped)		–0.0687	***
Age	0.0974	***	–0.0693	***
Age squared	–0.0009	***	0.0007	***
Years of education	0.0248		0.0403	***
Ever unemployed	–0.0544		–0.0050	
Insider: in current job >4 years	–0.0004		0.0241	
Outsider: in current job <1 year	–0.0119		–0.1609	*
Occupational segregation (male percentage* 10)	0.0060	*	0.0209	***
Firm size 25–49	0.0050		0.0811	***
Firm size 50–499	0.0234		0.1074	***
Firm size 500+	0.0393		0.1503	***
Public sector employment	0.0331		0.0164	
Union membership	0.0602	***	0.0626	***
SIC0: Agriculture, forestry and fishing	–0.0512		–0.1416	**
SIC1: Energy and water supplies	0.1714	**	–0.0217	
SIC2: Primary manufacturing	0.0033		–0.0390	
SIC3: Manufacturing	0.0536	*	–0.0071	
SIC4: Construction	0.0386		–0.0038	
SIC5: Hotels and catering	–0.0635		–0.0763	***
SIC6: Transport, storage and communication	0.0403		–0.0851	***
SIC7: Banking and financial services	0.0389		0.1055	***
Inner London	–0.0025		0.2277	***
Outer London	0.0475		0.1519	***
Rest of South East	0.0255		0.0747	***
East Anglia	–0.4761	*	0.4778	***
East Midlands	–0.0873		0.1281	***
West Midlands conurbation	0.1401		–0.1002	**
West Midlands	0.2013		–0.1586	***
Greater Manchester	–0.0945		0.1272	***
Merseyside	0.0599		–0.0257	

Table A6.5: Heckman panel regression results, longitudinal, 2000s data and 1990s data, Great Britain *(Continued)*

Dependent variable is the log wage among employees – 2000s	Fixed effects model on dependent variable *ln hourly real pay*		Grand means regression model on dependent variable *Ui*	
	Coefficient	**Significance**	**Coefficient**	**Significance**
North West	–0.0425		0.0582	
South Yorkshire	–0.1427		0.1382	***
West Yorkshire	0.0228		–0.0343	
Rest of Yorkshire and the Humber	0.0371		–0.0134	
Tyne and Wear	0.7557		–0.7296	***
Rest of the Northern region	0.1525		–0.1539	***
Scotland	0.0302		–0.0423	
Wales	0.2024		–0.1775	***
Hazard of non-selection	–0.2633	***	–0.2993	***
Constant	–0.4094		1.0173	***

R-squared (within) = 0.04

R-squared (between) = 0.21

Note: Base categories are: SIC8 (other services); the South West; and firms with under 25 employees.

Source: BHPS waves N, O, P, Q.

Base: All individuals aged 16–65 inclusive; United Kingdom.

Table A6.5: Heckman panel regression results, longitudinal, 2000s data and 1990s data, Great Britain *(continued)*

Dependent variable is the log wage among employees – 1990s

	Fixed effects model on dependent variable *ln hourly real pay*		Grand means regression model on dependent variable *Ui*	
	Coefficient	**Significance**	**Coefficient**	**Significance**
Female	(dropped)		–0.1383	***
Age	0.0401		–0.0143	***
Age squared	–0.0004	*	0.0002	***
Years of education	0.0006		0.0643	***
Ever unemployed	–0.0752		–0.0127	
Insider: in current job >4 years	0.0050		0.0079	
Outsider: in current job <1 year	–0.0746	*	0.0285	
Occupational segregation (male percentage* 10)	0.0044		0.0179	***
Firm size 25–49	0.0130		0.0510	*
Firm size 50–499	0.0269		0.1260	***
Firm size 500+	0.0357	*	0.1824	***
Public sector employment	–0.0147		0.0056	
Union membership	0.0404	*	0.0621	***
SIC0: Agriculture, forestry and fishing	–0.0227		–0.1299	**
SIC1: Energy and water supplies	0.1166	**	–0.0251	
SIC2: Primary manufacturing	0.0347		–0.0379	
SIC3: Manufacturing	0.0231		–0.0920	***
SIC4: Construction	0.0601		–0.0691	**
SIC5: Hotels and catering	–0.0383		–0.1397	***
SIC6: Transport, storage and communication	–0.0067		–0.0616	**
SIC7: Banking and financial services	–0.0099		0.1184	***
Inner London	0.1421		0.1665	***
Outer London	0.1764		–0.0061	
Rest of South East	0.1942	**	–0.0617	**
East Anglia	0.1833		–0.1285	***
East Midlands	0.2480	*	–0.2272	***
West Midlands conurbation	0.1013		–0.0909	**
West Midlands	0.1492		–0.1106	***
Greater Manchester	0.3824	**	–0.3019	***
Merseyside	0.0888		–0.0566	
North West	0.0782		–0.0027	
South Yorkshire	0.2052		–0.1436	***
West Yorkshire	0.5175		–0.4804	***

Table A6.5: Heckman panel regression results, longitudinal, 2000s data and 1990s data, Great Britain *(continued)*

Dependent variable is the log wage among employees – 1990s

	Fixed effects model on dependent variable *ln hourly real pay*		Grand means regression model on dependent variable *Ui*	
	Coefficient	**Significance**	**Coefficient**	**Significance**
Rest of Yorkshire and the Humber	0.3262		–0.2718	***
Tyne and Wear	0.2246		–0.1758	***
Rest of the Northern region	0.0690		–0.0918	**
Scotland	0.2810		–0.2500	***
Wales	–0.0072		0.0695	**
Hazard of non-selection	–0.2508	***	–0.3069	***
Constant	–30.9374		–0.3342	***

R-squared (within) = 0.04

R-squared (between) = 0.21

Note: Base categories are: SIC8 (other services); the South West; and firms with under 25 employees.

Source: BHPS waves E, F, G.

Base: All individuals aged 16–65 inclusive; United Kingdom.

NOTE: In both periods, the 1990s and 2004–07, we have conducted the Heckman panel estimate as follows. First, for each year 1994/05, 1995/06, 1996/07, 2004/05, 2005/06, 2006/07 and 2007/08, calculate the Inverse Mills Ratio (IMR) using the probit as shown in the main text section 5. The IMR is the overall scaled risk that an individual would not be employed that year. These annual IMR values vary for each person, and therefore show a small annual change upwards or downwards, which is used in the fixed-effects model in the table to give an estimate of the impact on the change in wage of a unit change in IMR. The implication of the strong negative coefficient is that the workers with lower risks of not being employed are forecast to have lower wages. If they are not employed, this does not affect the pay gap. But if they are employed, then it causes them to have lower pay. In this sense, caring duties (which increase the odds of non-employment) are an indirect cause of the pay gap in both periods. There is no change in the impact of the IMR as shown in the panel results in the table. The impact in the fixed-effects model is the same, and the negative impact in the grand means model is also the same, i.e. not statistically significantly different.

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