

Equality and Human Rights Commission  
Research report 109 | Pay gaps research

# The gender

# pay gap

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# List of abbreviations and acronyms

<b>ASHE</b>	Annual Survey of Household Earnings
<b>BHPS</b>	British Household Panel Survey
<b>HMRC</b>	Her Majesty's Revenue and Customs
<b>LFS</b>	Labour Force Survey
<b>OLS</b>	Ordinary least squares
<b>ONS</b>	Office for National Statistics
<b>PAYE</b>	Pay As You Earn
<b>UKHLS</b>	UK Household Longitudinal Survey

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# Executive summary

## Introduction

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This research report explores the gender pay gap, which is defined as the difference between the average hourly pay of men and women. As well as looking at basic differences in pay, the research identifies the characteristics that explain those differences such as age, occupation and level of education. The report is intended to further debate and highlight areas where intervention may be needed.

## Key findings

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- According to the Annual Survey of Hours and Earnings, the median gender pay gap for full and part-time workers in 2016 was 18.1%. The gap for full-time employees only was smaller at 9.4%. While part-time women tended to earn slightly more than part-time men (6%), part-time women earned 36.5% less than full-time men. Women are much more likely to work part time than men.
- Based on the analysis of Labour Force Survey (LFS) data – the source for all of the analysis in this report - the mean gender pay gap has reduced considerably. As a percentage of male earnings, for full and part-time work, it fell from 27% in 1993 to 10% in 2014.
- The gender pay gap is a longstanding phenomenon and its causes are complex. Social pressures and norms influence gender roles and often shape the types of occupations and career paths which men and women follow, and therefore their level of pay. Women are also more likely than men to work part-time and to take time out from their careers for family reasons.
- The effect of ‘occupational segregation’ – the division of men and women into different occupations – on pay has lessened. However, within occupations, on average women are still paid less than men suggesting they are either being paid less for doing broadly the same work or they have lower level jobs in the same occupations. In 2014, the gender pay gap within occupations (the ‘occupational gender pay gap’) was 15.3% based on the median. This has also declined, from



20.7% in 1993, however less so than the general gap. This disparity of pay within occupations now explains a very large part of the gender pay gap overall.

- Women not only earn less than men overall, they are more likely to be low paid. In 2014, 20.4% of men earned less than £8 per hour while 30.3% of women did so. However, the proportion of women experiencing low pay has declined over time.
- Nearly two-fifths of women in employment are part-time and four times as many women as men work part-time. Male and female part-time workers generally earn less per hour than full-time workers, but women who work part-time generally earn more than men who do so.
- The pay gap widens with age: older women experience a larger pay gap compared with their male peers than younger women with their male peers. This is primarily because women are more likely than men to take time out of the labour market to care for children. This may slow career development. The statistical analysis found that women's shorter job tenure, a likely consequence of starting a family, is a factor driving the pay gap.
- While younger married women earn more than unmarried women, this advantage reverses with age. From their 40s onwards, married women experience a pay disadvantage compared to unmarried women. This is likely to be linked with child-rearing: the analysis found that having a child increases the pay gap considerably for women. Married men, by contrast, earn substantially more than unmarried men in all age groups. The 'wage penalty' for child-rearing, as a proportion of women's pay, has increased slightly over time. However, as with the gender pay gap generally, the pay gap between men and women with children has also declined over time.
- There appears to be a relationship between housework and the pay gap. Across the whole sample, women do more housework than men, and the demands of housework do not affect women and men in the same way. Where women work fewer hours they do more housework but men do not vary their housework hours relative to hours worked – their contribution tends to remain low regardless. Women that do the largest amounts of housework experience a pay gap even when compared with the small number of men who also do a lot of housework.
- Care responsibilities affect men as well as women in terms of pay. Men and women with the most time-consuming care responsibilities tend to have similar salaries. However, the majority of men and women do not have care responsibilities.
- The gender pay gap varies according to where people live and the sector they work in. The difference between central London and the rest of the country is

vast. London has a smaller gender pay gap compared to the UK as a whole. The North of England, particularly North and East Yorkshire and Humberside, followed by the South West, have the largest pay gaps. Scotland and Wales have gender pay gaps that are similar to the UK average, although the gap is slightly smaller in Wales than in Scotland.

- The gender pay gap is larger in the private sector, at £3.11 per hour over the period 1993-2014, than in the public sector where the gap is £2.38 per hour (adjusted for inflation). The pay gap between male and female graduates in the public sector is comparatively small (£1.63 per hour) but higher in the private sector (£2.77 per hour), suggesting that female graduates in the private sector gain less from their education in terms of parity with men.
- In the period 1993–2014 the gender pay gap among graduates declined from 21% to 6%, whereas for women without A-levels the gap declined from 34% to 17%. Twenty-eight per cent of male employees are graduates compared with 33% of female employees. Regression analysis found that female graduates have a higher pay return on their degree than male graduates – that is, controlling for other factors such as age and job tenure – and also benefit more from working in a graduate occupation.
- If a number of variables in the data, such as level of education for example, are controlled for to remove their influence over the pay gap, the remaining ‘residual’ and unexplained pay gap is much smaller. However, the proportion of the gender pay gap which remains unexplained has risen from just over half in the period 1993–1997 to over two-thirds between 2010-2014.
- Analysis of LFS data indicates that part-time work, occupational segregation and the ‘glass ceiling’ are the main drivers of the gender pay gap. Other significant factors include the over-representation of women in low-paid jobs, having children and shorter job tenure (which is linked to child-rearing). As a result women face barriers in their forties and in older age groups when it comes to progressing their careers.

## Background

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In 2015 the Equality and Human Rights Commission (‘the Commission’) commissioned research into the causes of, and potential solutions to, the gender, ethnicity and disability pay gaps. A suite of reports has been produced including a summary of findings from the entire project. These are available on the Commission’s website: [www.equalityhumanrights.com](http://www.equalityhumanrights.com).

The Commission holds the view that pay gaps reflect broader inequalities in society and tackling them is an important way to make Britain fairer. The analysis in this report builds on our previous research on pay gaps and complements our extensive online guidance on equal pay.

## Methodology

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Firstly, a brief literature review was conducted to establish what is already known about the gender pay gap. The statistical analysis, which is based primarily on historical data from the UK LFS covering the period 1993–2014, followed on from this. The LFS is a quarterly household survey of the employment circumstances of the UK population and is administered by the Office for National Statistics (ONS). A small amount of additional analysis is based on the UK Household Longitudinal Study (UKHLS, also known as Understanding Society).

The LFS data were used not only to establish the relative pay of different groups but also to identify the personal characteristics that are associated with differences in pay, such as level of education. These variables are referred to in the report as 'drivers' of pay gaps, although it is only possible to say that these are associated with, rather than the causes of, pay gaps. This analysis reveals, based on the data available, how much of the pay gap can be explained and how much is left unexplained. For a full account of the methodology see Chapter two.

# 1 | Introduction

In 2015 the Equality and Human Rights Commission ('the Commission') commissioned research into pay gaps. Its purpose was to explore the extent of disparities of pay between certain groups, to elucidate their causes and to identify ways to mitigate them. The research focused on pay gaps by gender, ethnicity and disability. As well as statistical analysis of pay data, the project involved a literature review of the causes of pay gaps, as well as governmental and employer interventions that have attempted to address them. Workshop discussions about practical solutions were also held with key stakeholders such as employers and government bodies.

The main aims of the project were to:

- establish the size of pay gaps for women, ethnic minorities and disabled people
- review the evidence base and identify the causes of pay gaps
- analyse the relative impact of different variables on gender, ethnicity and disability pay gaps, and
- review and discuss with stakeholders the effectiveness of certain interventions by government, employers and other organisations to reduce pay gaps.

A suite of reports has been produced: one each for disability, ethnicity and gender, covering literature reviews of the evidence base and statistical analysis, a report on interventions covering a literature review and stakeholder consultation, plus a summary of findings from the entire project. These are available on the Commission website: [www.equalityhumanrights.com](http://www.equalityhumanrights.com).

This report focuses specifically on the gender pay gap, which is the difference between the average hourly pay of men and women. It begins with a brief summary of the evidence from the existing body of literature. This is followed by a statistical analysis of data from the Labour Force Survey (LFS) which looks at the difference in pay and how it has changed over time. It also explores the association with pay levels of certain variables such as education, hours worked, occupation, age and so on.

The Commission holds the view that pay gaps reflect broader inequalities in society and tackling them is an important way to make Britain fairer. The analysis in this report builds on previous Commission research on pay gaps and complements our extensive online guidance on equal pay. It is intended to inform debate and highlight areas where action may be needed.

## 2 | Methodology

### 2.1 Data

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The analysis in this report is mainly based on the UK Labour Force Survey (LFS) from 1993 to 2014, a repeated cross-section survey of individuals which supplies detailed information on employment and has the advantage of a very large sample: 444,865 women and 429,295 men. However, there are some missing data which means effective sample sizes are generally slightly lower.

A small amount of additional analysis is based on the UK Household Longitudinal Study (UKHLS, also known as Understanding Society). This uses information on time spent on household tasks, information which is not available in the LFS. The data are from the first five waves (though pooled and therefore only treated as cross-sectional). Wave 1 took place in 2009/10 and Wave 5 in 2014.

Both data sources rely on respondents providing details of their household income and so provide comparable data. Other data sources provide different figures for the pay gap usually for methodological reasons, for example, the Annual Survey of Household Earnings (ASHE) is based on pay data received by HM Revenue and Customs (HMRC). Thus it is not always possible to compare pay gap findings across different sources.

### 2.2 Definitions

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All the pay analysis is based on hourly wages and excludes extreme values (less than £1 and over £80). Hourly wages are defined as normal gross pay divided by normal hours of work. Those with a marginal commitment to the labour force, for example students and semi-retired people, are not included in the analysis. This is defined as working 10 hours a week or fewer. Except where the analysis is explicitly of full-time or part-time work, the pay gap analysis is based on the entire sample, that is, all people working at least 10 hours a week.

Self-employed people are not included in the analysis as we are primarily concerned with the gender pay gap in salaried employment. There is also the problem of the general unavailability of reliable pay data for the self-employed.

The age range for the data is 17-65. This starting age is one year older than usual in response to legislative changes which distinguish a 'participation age', set at 17, from the school leaving age of 16. Over 70% of 16 year olds are in full-time education.

## 2.3 Analysis

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The analysis uses the time series in a number of different ways. For many analyses the data are pooled so that the results are averages for the entire period. Other analysis compares the first year in the period (1993) with the last (2014) or splits the period into groups of years so that very broad trends can be assessed. A finer view of trends is given in graphical form where the distribution of pay or pay gaps across all years is shown. In the regression analysis, 'year' is included as a control variable to account for change over time. In effect this is limited because wages are deflated (with 2014 as the base), so the trend is in real rather than money terms, showing the rise in wages over and above price inflation.

There is a range of ways that the overall gender pay gap is calculated and expressed in this report:

- (i) The average female wage as a percentage of the average male wage. This is the standard means of indicating the extent of inequality and change in inequality, and is how the gender pay gap is normally expressed.
- (ii) The gap between average female and male pay as a percentage of the average female wage. Decomposition analysis then shows what proportion of the gender pay gap can be 'explained' by the data.
- (iii) The raw wage gap, that is, in terms of money itself, expressed as an hourly rate. This 'real gap' is perhaps more meaningful to most people as we spend pounds and pence, not percentages. It shows the pay gap in practical, everyday terms.

The averages are calculated in two ways, either as the mean or the median. The mean is simply the total divided by the number of observations, which is how most of

us understand 'average'. The median is the wage at the midway point in the wage distribution such that 50% of people earn more than this and 50% earn less.

The median takes account of the skewed distribution of pay better than the mean. A small proportion of employees earn very high pay and this skews the mean upwards, so giving this group undue weight. For this reason the median is often used.

However, the mean is sometimes used as it reflects the fact that men are more likely to earn very high wages and this should not be discounted. The mean is more widely understood and, while the results based on the median will also be given here, the mean will be used in much of the analysis.

It is generally found that the pay gap based on the mean is higher than that based on the median (Perfect, 2013), simply because the high wages of some men skew the distribution. However, in the following analysis this is not generally the case because extreme high and low values have been removed (because these are generally deemed to be unreliable and also describe a very small percentage of the working population). Further, the analysis excludes those working less than 10 hours a week, and these people are likely also to have low hourly earnings.

The report also uses a second measure called the 'occupational pay gap'. It is calculated by collecting data on the pay gap within individual occupations. These pay gaps are then averaged to arrive at a single figure. There are around 80 occupations in this analysis and the sample size, given at the start of this chapter, is large enough to produce reliable estimates when averaged across all occupations.

The difference between the occupational pay gap and the 'general' pay gap depends on the distribution of men and women across the entire economy. For example, if men tended to be concentrated in highly paid occupations and women into poorly paid ones, but within these men and women received the same pay for doing broadly the same work, then the occupational pay gap would be zero. Most of the general pay gap would therefore be the result of occupational segregation rather than inequality within these. On the other hand, if men and women each accounted for half of the workforce in every single occupation, but women were predominantly in lower paid, more junior positions, then both the general and occupational gap would be large – and the occupational pay gap would account for the entire general pay gap.



# 3 | The gender pay gap: what we already know

## 3.1 Theories of the causes of the gender pay gap

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The gender pay gap is a longstanding feature of labour markets across the globe. While it has narrowed in many countries, overall progress has been slow and is far from complete. Several competing theories have been put forward to explain the persistence of the gender pay gap. There is a broad distinction between economic, sociological and psychological theories. The main ones are briefly outlined below.

### 3.1.1 Gender role theory

Differential gender roles are adopted early on in life and influence much of what happens in the home, school, personal relationships, family life and employment (see, for example: Lips, 2012; Ochsenfeld, 2014; Rubery, 2008). Therefore men and women often follow different paths in education and employment, which lead to overall differences in pay. Segregation into traditional gender roles is often not a conscious 'choice' for either women or men. Rather, these choices are constrained by social pressures and expectations, and are passed on from one generation to the next.

### 3.1.2 Human capital theory

Some claim that the gender pay gap was, historically at least, chiefly the result of women having lower 'human capital' than men – that is, lower knowledge, skills or job experience (Becker, 1991; Polachek, 1981; Manning and Swaffield, 2008). This gave rise to lower productivity and therefore to lower wages for women. Men, on the other hand, had a comparative advantage when it came to investing time and resources in their education and careers, reflecting the wider social context.

However, this male advantage in human capital has weakened over time. The growth in women's education is often cited as a major driver of the decline in the gender pay gap (Goldin, 2008; Weichselbaumer and Winter-Ebmer, 2005). In Britain,

Grimshaw and Rubery (2007) find that gender differences in human capital explain a shrinking proportion of the pay gap. Olsen *et al.* (2010) show that education explains little of the gap, while its impact is also declining. Brynin and Perales (2016) suggest that among the highly qualified at least this might even be moving in women's favour. Manning and Swaffield (2008) show a substantial human capital impact on gender inequality but this is the result of differences in on-the-job training.

Despite this progress, inequality persists. Access to education, as measured by prestige of institution and field of study, remains gendered to the advantage of men (Booth and Kee, 2011). Just as important, career breaks, primarily as a result of having children, continue to reduce women's work experience, and this is in turn likely to reduce women's career prospects over the life course (Goldin, 2008). Although the research is now a little dated, Olsen and Walby (2004) found that 19% of the gender pay gap could be attributed to differential work histories. On the other hand, analysis by Dex *et al.* (2008) suggests that men do not necessarily do better than women in the early stages of their career. Manning and Swaffield (2008) show that the gender pay gap rises over women's careers although the gap itself declines from earlier to later cohorts.

### 3.1.3 Occupational segregation

Occupations that have high proportions of women working in them are often referred to as 'feminised'. It has been found that the higher the proportion of women who work in an occupation the lower the average pay within it (Blau and Kahn, 2003; Bettio and Verashchagina, 2009; Levanon *et al.*, 2009). Both men and women within feminised occupations experience lower pay, although because women obviously outnumber men they are disproportionately affected.

In the UK, Olsen *et al.* (2010) attribute 17% of the pay gap to occupational segregation by gender. Other research on the combined effects of occupational segregation and segregation within the workplace (that is, men and women performing different roles in the same workplace) finds a larger gap (Mumford and Smith, 2009), though in this case segregation is more important for the part-time than for the full-time gender pay gap.

Segregation, however, is difficult to analyse because of different datasets and definitions, while its effects are difficult to interpret because segregation is the result of both supply (men and women tending to gravitate to different types of jobs) and demand (for example, employers' prejudices may act as a barrier). Explanations for occupational segregation often include the gender role argument described above,

but other factors might include family constraints that, for instance, encourage entry into part-time work, which mostly occurs in more routine occupations.

It is also unclear why average pay is lower in more feminised occupations. It might be that women are paid less (for whatever reason), and that when they segregate into specific occupations, average wages in these must by definition be lower. However, both men and women who work in feminised occupations are paid less on average than those in non-feminised ones. It is possible of course that family and social pressures cause women to enter into low-paid occupations as a second-best option. This would mean more women than men ending up in low-paid occupations and could help explain why feminised occupations tend not to pay well.

Insofar as segregation is a problem, desegregation would seem to be the answer. However, research in the United States found that the effect of desegregation on equality is complex and inconclusive (Stainback and Tomaskovic-Devey, 2012). Further evidence from the US shows that occupational gender segregation is in decline (Hegewisch *et al.*, 2010; Olsen *et al.*, 2010, b; American Association of University Women, 2012), as is the gender pay gap, but the relationship between the two may also be weakening (Charles and Grusky, 2004). The effects of segregation are not consistently negative for women. Highly skilled women, for example, are sometimes very well paid in highly feminised occupations. This would mainly seem to be the result of women entering highly professionalised public sector work, often at management level, for instance in social work (Esping-Andersen, 1993; Brynin and Perales, 2016).

Finally, inequality arises partly through 'vertical segregation', that is, men occupying higher positions within an occupation, and partly through 'horizontal segregation' (in other words occupational segregation) men and women working in different occupations). Horizontal segregation suggests that women's work is often undervalued (see 3.1.4 below). Vertical segregation highlights the problem of the 'glass ceiling' as a barrier to women reaching senior positions.

Whatever the exact cause of occupational segregation, it is clear that women tend to be over-represented in the following low-paid jobs (the 'five Cs'): cleaner, caterer, carer, cashier, and clerical worker (Joint Negotiating Committee for Higher Education Staff (JNCHES), 2011; Grimshaw and Rubery, 2007). This concentration of women in jobs which do not require significant, if any, qualifications, and which are often part-time, lowers women's average pay relative to men's.

### 3.1.4 Undervaluation theory

The persistence of the gender pay gap suggests the possibility of a stigma associated with occupational feminisation – that work done by women is socially and economically undervalued. This theory is most prevalent in the United States (see, for example: England, 1992, 2005, 2010) though it is also supported in the UK (for example Perales, 2013). The theory posits that society undervalues certain types of work precisely because women do it.

Pay practices are ‘socially constructed’ and lead to undervaluation of women’s labour in a range of ways – pay is heavily influenced by social pressures and norms, as well as by the actions of employers, governments and trade unions. Pay is often decided based on typically male behaviours such as performing long hours, working continuously for a long time and an aggressive negotiating style. By not conforming to these norms, some women lose out. On the other hand, women are still seen by society as secondary earners, as well as likely to derive more intrinsic reward from their work than men, thereby justifying lower salaries (Grimshaw and Rubery, 2007).

Given the overall trend towards a narrowing of the gender pay gap, however, it could be that undervaluation theory is becoming less relevant (Jackson, 2008). The fact that the gender pay gap varies across different countries suggests devaluation is not universal or uniform (Bettio, 2002; Bettio and Verashchagina, 2009).

Further, many jobs in which women predominate are not stereotypically ‘feminine’ – for instance, clerical work (Hakim, 1998) – and gender-integrated occupations are generally better paid than both female-dominated and male-dominated occupations (Hakim, 1998; Cotter *et al.*, 2004; Magnusson, 2013). It also seems to be the case that women have gained in wage terms from working in skilled occupations and that there is an underlying trend in productivity in favour of women who are benefitting from the shift to a skills-based, non-manual economy (Brynin and Perales, 2016). This also undermines the theory in general but it remains possible, Brynin and Perales argue, that the work of less qualified women is undervalued. In sum, proving the empirical validity of undervaluation (or devaluation) theory has not been easy. Insofar as the theory is correct, however, the solution is to assess the comparative worth of feminised against less feminised occupations.

Finally, the pursuit of parity in gender pay has proven to be highly complex and has been described as a ‘case of constantly moving goalposts’ (Rubery and Grimshaw, 2014). The authors argue that pay setting is linked with wider societal and economic trends, such as the growing disparity in wealth and the waning influence of trade unions. ‘Levelling down,’ whereby men’s pay is reduced by employers to the same level as women’s, may reduce gender pay inequality but polarise incomes as a

whole. In this scenario, those on low and middle incomes experience wage stagnation while those on high incomes have much faster wage growth.

## 3.2 Measuring and explaining the gender pay gap

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### 3.2.1 The size of the pay gap and trends

The differences between the pay of men and women in employment have been examined in detail in many countries for a number of years. A general consensus exists as to the size of the UK gender pay gap, the direction of travel and the main factors contributing to it.

The Annual Survey of Household Earnings (ASHE) is a key source of data on the gender pay gap. Its findings are based on a 1% sample of employee jobs taken from HM Revenue and Customs (HMRC) and Pay As You Earn (PAYE) records; it does not cover the self-employed. The median, full-time gender pay gap decreased from 9.6% in 2014 to 9.4% in April 2015. This is the lowest since the survey began in 1997, although the gap has not changed very much in recent years. Including part-time employees in the overall analysis, the pay gap in 2015 stood at 19.2%, the same as in 2014. Comparing the pay of part-time men with part-time women, women have a pay advantage of 6.5% in 2015, up from 5.5% the year before (ONS, 2015).

A previous Commission report (Perfect, 2013) found that, based on ASHE data, the median, full-time gender pay gap had fallen from 17% in 1997 to 10% in 2010.<sup>1</sup>

An earlier Commission report (Metcalf, 2009) reviewed various studies based on different datasets covering the late 1990s to the early 2000s. These gave an unadjusted pay gap of around 20%-25%, but in one instance this was as low as 14% and in another as high as 42%. This raw pay gap is the simple difference between average male and female wages and does not therefore control for other factors. When controlling for factors such as the average education of men and women or the proportion in part-time work, the gap falls to around 10% in most cases. This residual gap could be due to discrimination but also arises out of unexplained factors (information not available in the data).

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<sup>1</sup> The ASHE is not used in the statistical analysis for this report because, unlike the Labour Force Survey (LFS), it does not include other variables that may affect pay, such as level of education and family circumstances.

### 3.2.2 Factors linked with the gender pay gap

There is a consensus that two main factors associated with the pay gap are segregation and work patterns, in particular, the distribution of part-time work (Metcalf, 2009). There are two aspects here: the gap within the dimensions examined and the distribution of women across the dimensions. When it comes to graduates, for example, we must consider not only the differences in pay between men and women but also the proportions of male and female graduates in employment.

The gap varies considerably along various dimensions such as part-time work as against full-time work (Metcalf, 2009). This can be interpreted causally, if only loosely. If women who work part-time are paid less per hour than those who work full-time, who are in turn paid less than men who work full-time, then female part-time work contributes to the pay gap, even more so as part-time work forms a substantial part of female employment. The women's part-time pay gap (comparing the female part-time to the male full-time rate) is consistently very high, if falling. Based on the British Household Panel Survey (BHPS) it declined from 36% in 1995-97 to 31% in 2004-07 (Olsen *et al.*, 2010). According to Perfect (2013), whose analysis was based on ASHE data and therefore arrived at different figures, the gap reduced from 43% in 1997 to 39% in 2012.

Age is another important factor, with the gap clearly narrower for younger age groups (Harkness, 2005), reaching its widest point for women in their forties and then declining slightly (JNCHES, 2011). This could be for a range of reasons. Firstly, women's educational achievement historically lagged behind that of men. Secondly, motherhood in general greatly adds to the pay gap (Harkness, 2005; Rubery, 2008). As a result it could be that women are less likely than men to be promoted late in their careers.

Rising female educational attainment is eroding the pay gap. Compared to men, women now have higher levels of education, and with the rise of female graduates in employment the gender pay gap has declined. In the 2013-14 academic year, 56.1% of university students in the UK were female (Universities UK, 2015).

Goldin (2008) has argued that, for the US, education is a key way to address inequality because it effectively reverses the human capital deficit theory discussed above. While some evidence suggests the possibility of a growing pay gap for graduates in the UK (Joshi *et al.*, 2007), this seems to vary considerably across countries, with some exhibiting a greater gap at high levels of education, some the reverse, and with the UK broadly speaking in the middle (Dolton *et al.*, 2009). Other

evidence suggests strongly that rising levels of female education are reducing the wage gap (Brynin and Perales, 2016).

There is also evidence in the literature of sex discrimination. A study of the financial services sector (Metcalf and Rolfe, 2009) found evidence of gender bias in the distribution of bonuses and performance-related pay such that in more than half the cases the gap for discretionary performance-related pay was 45% or more rising to 80% in the 42 cases providing complete data .

Joint research in 2015 by the department for Business, Innovation and Skills (BIS) and the Commission into pregnancy and maternity found evidence of poor treatment of women: higher earners (mothers paid over £30,000 a year) were most likely to report less favourable experiences in relation to career progression or financial reward while on maternity leave, For example:

- 6% said they failed to gain a promotion they felt they deserved
- 6% said they received a pay rise or bonus that was less than their peers
- 5% said they had a reduction in their salary or bonus.

A large research review across multiple organisations found that the sex differences in rewards including salary, bonuses, and promotions were 14 times larger than the sex differences in performance evaluations. The review also found that differences in performance evaluations did not explain reward differences between men and women (Joshi *et al.*, 2015).

Other factors which are important include occupational segregation, reviewed above, but also regional differences. There is little evidence on the latter; we contribute new findings later on in the report.

Some factors, such as public sector employment, reduce the gap. However, it is not clear whether this is a direct effect (resulting perhaps from a greater emphasis on rigorous recruitment and promotion criteria and procedures in the public sector, but also greater union representation), or an indirect effect stemming from the higher proportion of graduates (at least half female) in the sector. Even here equality is far from perfect, with women contributing 53% of all employment in the sector but having only 33% of senior roles (JNCHES, 2011).

Further, it seems that while the pay gap in the private sector (for full-time workers) was about 22% in 2009 compared to about 15% in the public sector, the public sector gap has been rising while the private sector gap has been falling (JNCHES, 2011). This last report also shows that the gender pay gap for academic staff in a

sample of older universities in 2005-06 ranges from about 15% to 18%, but it is less than half that in newer universities.

There are important occupational differences in the pay gap, and this makes clear again that the distribution of women's employment across occupations is an important factor. For instance, for full-time work the gap in 2012 was only 4.9% in sales and customer service occupations, which are low-paid. There is greater equality in pay among those who are paid poorly. The highest gap, at 21.9%, was among process and plant operatives, although in this occupation female employment was only 18.2% for managers and senior officials and 9.3% for professionals. It was somewhat higher (12.4%) for associate professional and technical employees (Perfect, 2013).

There is consensus in the literature as to the persistence of the gender pay gap as well as the fact that it seems to be declining over time. There is also a consensus in respect of the main drivers of the gap, in particular the concentration of women in relatively low-paid jobs and female reliance on part-time work (which lowers earnings because part-time positions tend to pay less than full-time ones). These key facts highlight the issue that many women are concentrated in poorly-paid jobs, even if the pay gap among low-paid men and women is quite small. These themes emerge in the analysis of the drivers of the pay gap, presented in the following chapters.



## 4 | Research findings: features of the gender pay gap

We first look at the gender pay gap across time based on our analysis of the Labour Force Survey (LFS) between 1993 and 2004. We then compare the gaps across different geographical, social and employment categories described above.

### 4.1 Patterns and trends in the gender pay gap

The pay gap is generally expressed in the form of female pay as a percentage of male pay, often, as here, for hourly pay. The data used in this research show that female hourly pay as a percentage of male hourly pay has increased steadily over time, and so, in common with the findings discussed above, the pay gap has been shrinking. As explained in the methodology, the findings here are based on all employees in the sample working at least 10 hours per week.

**Table 4.1: Female mean and median hourly pay as a percentage of male hourly pay**

	Difference in means	Difference in medians
1993	73.0	70.6
2000	78.8	75.5
2006	85.0	80.6
2014	90.7	84.7

This narrowing of the gender pay gap has occurred concurrently with a decline in male employment over the last 30 years. The decline began to level off after 1990, while the employment rate for women has risen steadily (but less since 1990). In the data used here, 47.9% of employees (therefore excluding the self-employed) were female in 1993 and this had risen to 52.8% by 2014. In April to June 2013, around

67% of women aged 16 to 64 were in work, an increase from 53% in 1971. For men the percentage fell to 76% in 2013 from 92% in 1971 (ONS, 2013).

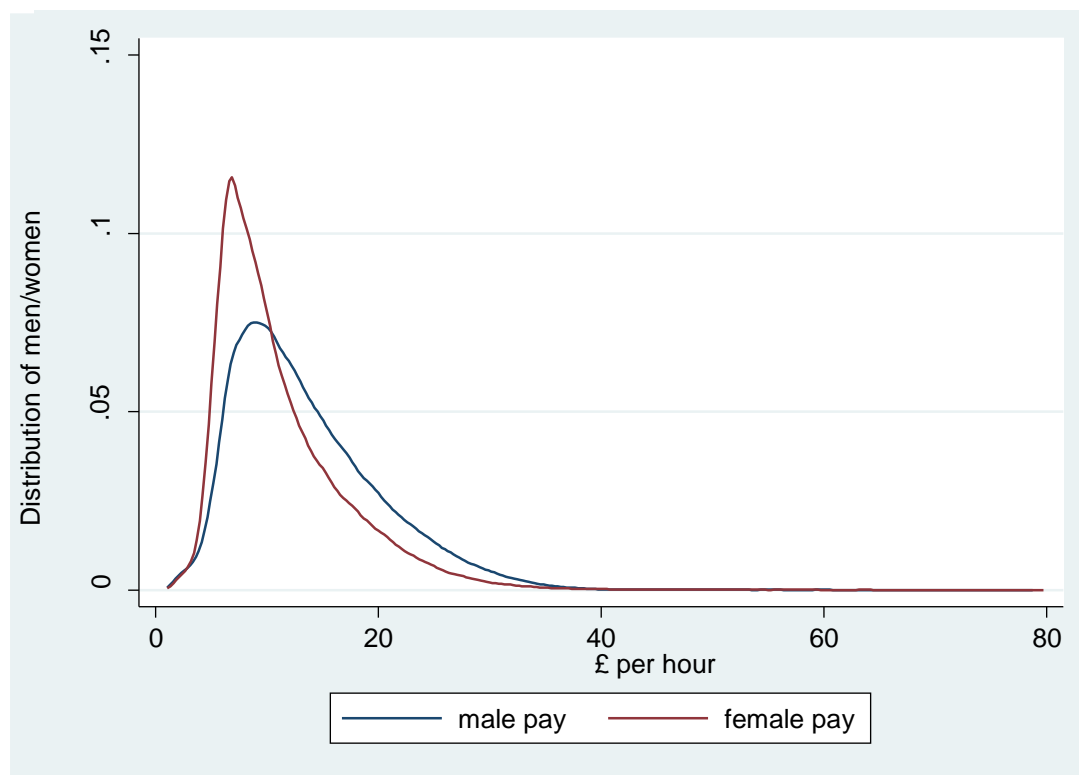
Therefore the fall in the pay gap has accompanied a fall in the employment gap. Based on the mean, the current pay gap between men and women is less than 10 percentage points whereas it was 27 percentage points in 1993. However, the use of the median tells a different story. Not only is the improvement slightly less than in the case of the mean but the pay gap is always larger. Women earn on this basis on average not around 91% of the male wage but around 85%.

This is in part because, as stated above, the median better reflects the skewed distribution of wages and women predominate at the lower end. Given this, and the fact that the gap is consistently declining, a key issue is the problem of low pay. In principle no-one should be paid less than the minimum wage and the published 'Living Wage'<sup>2</sup> was only in place for part of this period. In addition, there are age and regional variants in these wage controls. Consequently, for simplicity, low pay is defined arbitrarily here as below £8 an hour (please note this is not an official figure of any kind). The amounts are deflated, so it is reasonable to use this yardstick for the entire period. In 1993, 25.9% of men were earning below £8 per hour compared with 51.0% of women. By 2014 both had fallen, to 20.4% and 30.3% respectively. Yet the female rate was 50% higher than the male rate. We will return to this issue later.

This outcome is demonstrated differently in Figure 4.1. This graph shows the distribution of hourly pay (ranging from £2 to £80) for men and women separately, and pools all the years of the survey covered here. The female wage is very much skewed to the left, with a large proportion of women earning a few pounds per hour to no more than £10, while far more men than women earn between £10 and £40. This result is much the same as shown by Olsen *et al.* (2010). A major cause of the pay gap is therefore the fact that far more women than men are low paid.

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<sup>2</sup> The Living Wage is set independently by the Living Wage Foundation and is based on the cost of living in the UK. Paying the Living Wage is voluntary. It is higher than the National Minimum Wage, which is a legal requirement for employers and is set by Government.

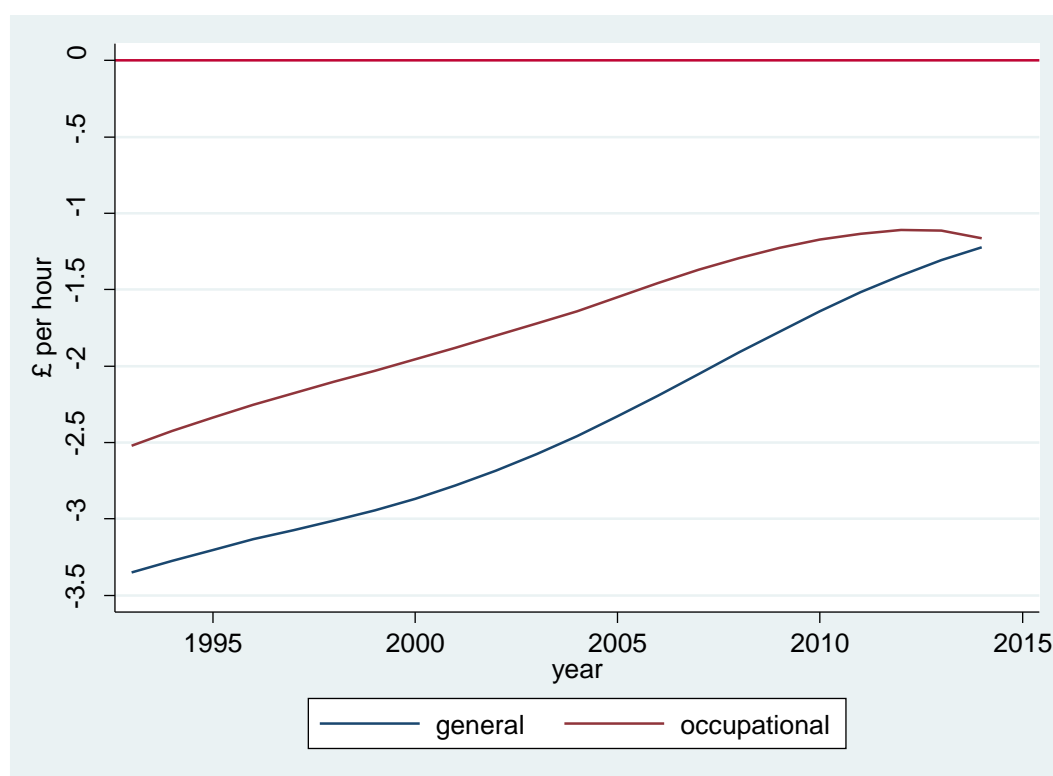
**Figure 4.1: The distribution of male and female pay (£ per hour)**

If we look at the pay gap at different points in the pay distribution, this is higher at higher levels of pay (because the range of pay is higher), but it is highest in relative terms (that is, as a percentage of the female wage) at middle levels of pay (defined arbitrarily as over £8 per hour and less than £15 per hour). Here it is 3.7% of female pay (pooled over the period). Below that it is close to zero, and above that it is 2.6%. These low figures compare with 21.5%, which is the pay gap as a percentage of the average female wage for the whole female sample. By splitting wages into three levels we are effectively controlling for the effects of the distribution and it is the latter that is the central problem. Roughly equal proportions of men and women are in the middle wage category over the period, but about 20% of men are in the lowest category compared to 36% of women. To put it another way, women form 65% of the lowest income bracket but only 38% of the highest.

Figure 4.2 describes the pay gap over the entire period. These are based on the median. All of the graphs are smoothed, that is, they remove fluctuations in the data to show trend lines. We construct the pay gaps here such that a negative amount means that women earn less than men. Four outcomes are of note from Figure 4.2. First, it can readily be seen that the gap is negative over the entire period on both measures: women are on average always paid less than men both overall (the

general gender pay gap) and within occupations (the occupational pay gap). Second, inequality on both measures has declined over time. Third, the occupational gap is smaller than the general gap though it nevertheless remains quite large. Broadly speaking, this means that inequality for women has two constituent elements. Women are paid less than men for doing roughly the same type of work (though possibly at a lower level of seniority), while they also tend to be concentrated in lower paid occupations. The occupational gap therefore explains a part of the general gap. Fourth, these two types of gap are converging, which implies that inequality within occupations is of decreasing importance as an explanation of the general pay gap.

**Figure 4.2: The general and occupational gender median pay gaps over time (£ per hour)**



## 4.2 How the pay gap varies by characteristics

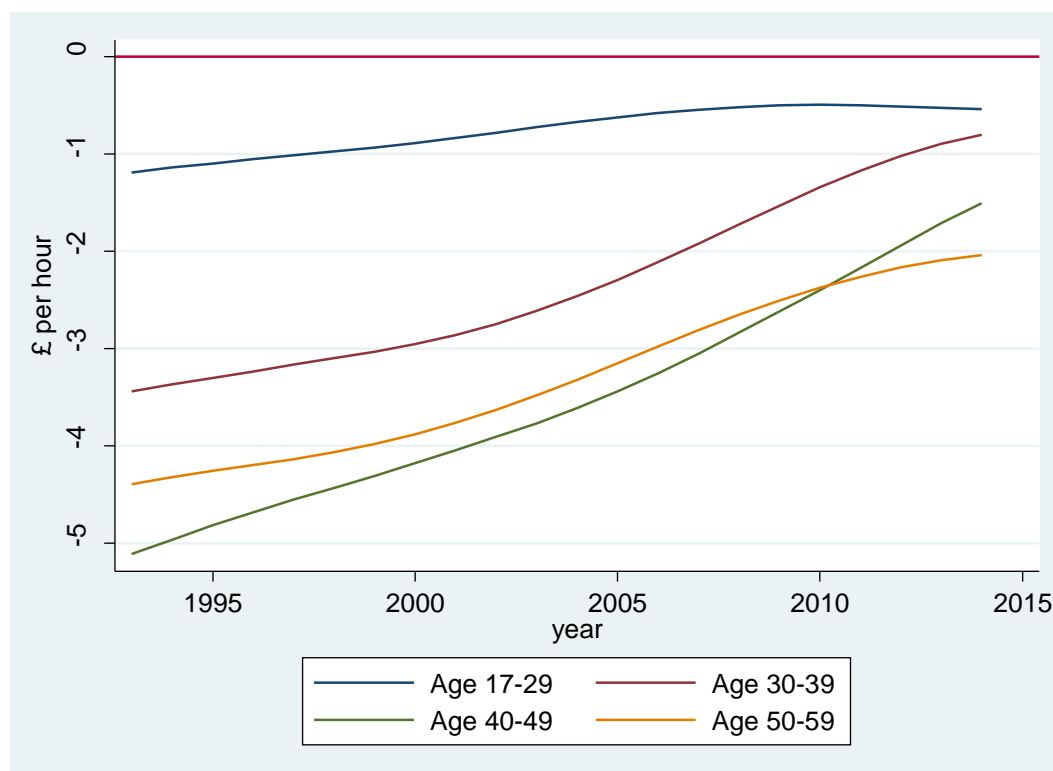
### 4.2.1 The pay gap and age

A central feature of women's employment relative to men's is that the pay gap grows with age. Wages rise for most people as their careers develop, although the extent of wage growth varies by profession. It is likely that women benefit less than men from older age, and therefore experience, as they are more likely to have interrupted

careers. The age profile is also influenced by the fact that women were, in the earlier period of our analysis, less likely than men to have degrees. Women might also face a 'glass ceiling' based in part on a lower probability of promotion than men. On balance we would therefore expect the pay gap to rise over the life course.

Figure 4.3 compares four age groups (17-29, 30-39, 40-49 and 50-59) over the period we examine (1993-2014). This analysis is not of the same women over time. That is, we cannot tell from these data how women actually fare over their careers. Instead, we interpret each successive cohort as experiencing the same conditions the earlier cohort would probably experience if individuals within this were now 10 years older.

**Figure 4.3: The general gender median pay gap over time and by age (£ per hour)**

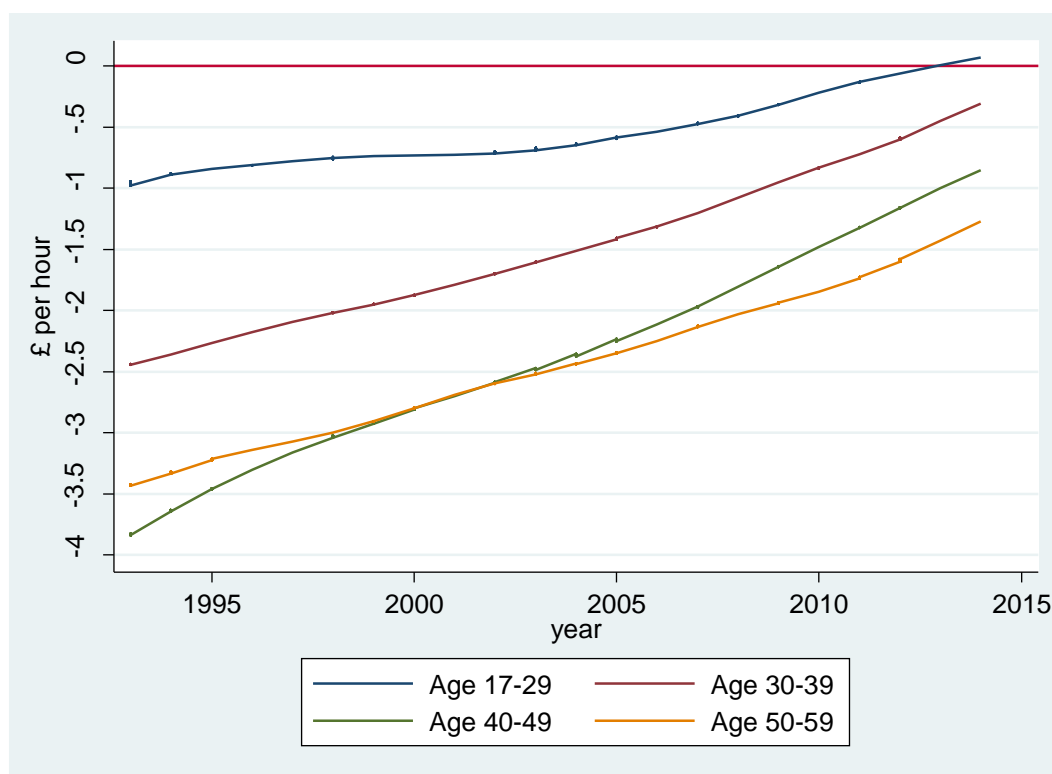


The pay gap is higher with age (the lines of the older cohorts are below those of the younger cohorts) but all age groups have seen a drop in the pay gap over time. At the start of the period we can see, first, that the pay gap is high for all groups except the youngest (who, as mentioned above, receive relatively low wages). The older the group the greater the pay gap for three of the cohorts, but for those women in their forties it would seem the pay gap is highest for most of the period – that is until around 2010. As mentioned, in all cases there is a decline in the pay gap over time.

We can also see that the lines are far closer together at the end of the period than at the start. Thus, it seems that while women's career development does not yet match men's, the difference is declining over time.

Figure 4.4 depicts the occupational gender pay gap. The trend is broadly the same but there are some differences. While the youngest group had a fairly flat profile over time in terms of the general gap, within occupations this group's pay improves more noticeably. At the end of the period, on average young women (aged 17-29) do not face an occupational pay gap. This is possibly the result of general progress towards greater equality of the sexes, driven in part by the fact that young women are likely to have an education at least equal to that of young men. As shown in Figure 4.3, women in their forties (historically the age group experiencing the biggest pay gap) 'overtake' women in their fifties, albeit earlier in the period.

**Figure 4.4: The occupational gender pay gap over time and by age (£ per hour)**



These trends are highlighted again in Table 4.2 below. In the above figures the gap was shown as a female deficit, that is, with minus signs, as this is visually clearer. They show the gap rising towards zero (equality). In the subsequent tables the gap is expressed as the male minus the female wage, that is, as a male surplus. Therefore the figures in the tables do not generally have minus signs, unless there is a female advantage in pay.

The upper half of Table 4.2 shows the pay gap (the average female wage subtracted from the average male wage) at three points in time, each 10 years apart. The lower half of the table shows the pay gap as a percentage of the average female wage for that year and that age group. In 1994, the gap for women in their forties was very high, 48% of the average wage for women in that group. Further, while there has been a big decline in the pay gap over time, for older women it is still 17% of their average wage.

**Table 4.2: The gender pay gap for four age groups in 1994, 2004 and 2014**

	Age			
	17-29	30-39	40-49	50-59
Pay gap (£) in:				
1994	1.06	3.17	4.79	4.20
2004	0.59	2.72	3.73	3.46
2014	0.43	0.97	1.54	1.99
As % of female wage				
1994	12.8	30.9	48.5	46.1
2004	5.8	21.0	30.1	29.2
2014	4.5	7.7	12.1	16.8

If we use the median pay gap rather than the mean, the results are similar but the gaps are larger – though with the consistent exception of the youngest age group. The biggest gap is again for women in their forties, which was £5.09 in 1994, £4.34 in 2004, and £2.37 in 2014.

If we were to express this in terms of relative wages using the mean, in 1994 women in their forties earned 67.3% of the wages of men in the same age group, rising to 76.9% in 2004 and 89.2% in 2014. The median, as before, worsens this picture to 61.6%, 71.0%, and 82.5% respectively. On this basis women in their forties were earning only just over four-fifths of the equivalent male wage in the most recent year.

#### 4.2.2 Part-time and full-time work

As mentioned above, the sample excludes those with only marginal hours (working 10 hours or less per week). Taking 'usual working hours' rather than actual hours worked and defining part-time work as less than 30 hours a week, this produces an average working week for full-time men of 39.4 hours and for full-time women of 37.1 hours over the period. In the case of part-time work, the figures are 19.9 in both cases. However, 36.3% of women work part-time over the period compared to only 6.3% of men, though this figure has risen for both women and men. In 1993, the figures were 35.7% for women and 4.3% for men, while in 2014 the figures were 37.2% and 8.8% respectively. Clearly, different cut-off points for defining part-time work would produce different percentages.

Table 4.3 compares the pay of women and men working full-time and part-time for two five-year periods. The gap between male full-time and female part-time workers is given in the bottom row of the table. This has declined but remains large, more so when calculated on the basis of the median. However, this is only part of the story.

**Table 4.3: Pay gaps (£ per hour) by part-time and full-time work over time**

	Difference in means		Difference in medians	
	1993-1997	2010-2014	1993-1997	2010-2014
Men/women full-time	2.77	1.04	2.57	1.29
Men/women part-time	2.13	-0.63	0.35	-0.97
Men full-time/men part-time	2.01	3.38	4.09	4.86
Women full-time/women part-time	1.37	1.71	1.87	2.60
Men full-time/women part-time	4.14	2.75	4.44	3.89

Using the mean figures, men earn more than women in both full-time and part-time work in 1993-1997, but there is little difference between these amounts (£2.77 against £2.13). However, male full-time workers have a bigger advantage over male part-time workers (£2.01) than female full-time workers have over female part-time workers (£1.37). Things are very different in 2010-2014. The gender differential for full-time workers has reduced and it is actually in favour of women by 63p in the case of part-time work. Part-time work has become more prevalent but it has also become more poorly paid compared with full-time work, and this is affecting both men and women. The gap between female part-time and full-time work has grown from £1.37



to £1.71, but the equivalent gap for men has seen a bigger increase from £2.01 to £3.38.

When we use the median these outcomes are even starker. The current gap between male full-time and part-time workers is very large at £4.86 per hour. The situation for men in part-time work has become increasingly precarious. The problem for male part-time workers is low pay. The problem for women is that a very high proportion of women in employment (nearly two-fifths) are part-time.

Expressing the wage of female part-time workers as a percentage of the male full-time wage produces a figure of 67.2% based on the mean for the earlier periods, rising to 79.8% in the later period. The figures based on the median are 60.6% and 69.3% respectively. So, on the worst count, over 30 percentage points still separates part-time women and full-time men in recent years.

#### **4.2.3 The pay gap and family**

In this section we see how the gender pay gap, based on the mean, varies by whether people are married and by the number of children they have.

The highest pay gap is between married men and married women, at £3.30 per hour (averaged over the entire period). In the case of cohabiting men and women it is £1.94, while for those who are single it is only 40p. Single people tend to be younger – their average age is 29 as opposed to 44 for married people. So pay is on average lower for single men and women. For those who are separated, divorced or widowed – only 9% of the sample – the pay gap is again high at £2.65.

As the gap is highest for married people and these form 58% of the sample, the analysis of marital status now focuses only on married and unmarried people (whether single, cohabiting, separated and so on). Table 4.4 shows pay gaps by marital status between men and women but also between married and unmarried men and similarly for women. It also shows the same distinctions comparing full-time to part-time workers, as engagement in part-time work is in large measure the result of family responsibilities.

Looking at men compared to women (the first two rows), the gap is higher for married women whether they work full-time or part-time, but especially high for those working full-time. That the gap is higher for married people clearly has a lot to do with age – that is, married people tend to be older and men, who are generally less likely to have family or caring responsibilities, are more advanced in their careers. It is unclear, therefore, what effect marriage actually has – an issue that will be examined further in the subsequent table.

**Table 4.4: The gender pay gap comparing married to unmarried people (£ per hour)**

	All	Full-time	Part-time
Unmarried men/women	1.10	0.72	0.51
Married men/women	3.30	2.51	0.79
Married/unmarried men	2.91	2.78	2.74
Married/unmarried women	0.71	0.99	1.44

Table 4.4 shows that the largest pay gap is between married and unmarried men.

The 'marriage premium', the fact that married men earn more than unmarried ones, is a well-documented phenomenon, although there are competing theories which attempt to explain it (this report does not elaborate on these as they are out of scope of the research).

Table 4.5 breaks down the marital analysis by age, which, as pointed out above, might be a confounding factor. Reflecting the earlier results, the first two rows show that the pay gap is highest for women in their forties (remembering, though, that this result is averaged over a 20-year period). This applies to both married and unmarried women, however the former experience a larger pay gap (£4.02 per hour).

The pay gap between married and unmarried people, which is considerable, is not solely a function of age. Indeed, when we look at the gap between the wages of married and unmarried men, this is highest for those aged under 30. Over time, therefore, increasing age reduces the pay advantage of married men over unmarried men, but they maintain an advantage nevertheless. For women the effect of age leads to unmarried women earning slightly more than married ones, as they advance in years. The pay gap therefore becomes increasingly in favour of unmarried women with age.

**Table 4.5: The gender pay gap by marital status and age (£ per hour)**

	Age <30	Age 30-39	Age 40-49	Age 50+
Unmarried men/women	0.58	1.65	2.24	1.81
Married men/women	1.88	2.90	4.02	3.27
Married/unmarried men	2.57	1.23	1.46	1.01
Married/unmarried women	1.27	-0.02	-0.21	-0.44

Age plays a role in this, as does having children. Table 4.6 shows the latter outcome. The figures do not show the effect on women's pay of having children but rather whether women with children (0, 1, 2 or 3+) experience greater pay gaps than men with equivalent responsibilities. In fact, the number of children makes little difference to women's pay, which is £11.20 an hour where there are no children, £10.90 where there is one child, £11.40 for two and £10.60 for three or more. The data suggests that having children has a disproportionate impact on women's pay, compared to men's. The results are shown for two widely separated five-year periods.

**Table 4.6: The gender pay gap by presence of dependent children in household**

Number of children	1993-1997	2010-2014
0	2.43	1.08
1	3.40	1.63
2	4.66	2.03
3+	4.63	1.79

In the earlier period it is clear that where women manage to remain at work, the pay gap increases significantly when there are children in the family and further when there is more than one child. While in the later period the gap is far lower it still increases for women with one child. Compared with having no children, having a child increases the pay gap considerably. This rises further with one more child but then levels off or falls slightly. The difference between having no child and one child is 97p in the earlier period and 55p in the later period. However, these increases are 40% and 51% respectively. The wage penalty for childbearing, as expressed in the gender pay gap, therefore seems to have increased slightly. Although the penalty for having three or more children is a little less than for two children, this is only a small

decline, indicating perhaps that men in this situation face as much a penalty as women.

The LFS contains no information on caring or household responsibilities. To examine this we use the UK Household Longitudinal Study (UKHLS), Waves 1-5, which covers the period 2009-2014. We do not look at this within households so the analysis is of all women against all men. First, upon divorce (or separation) women lose or have reduced access to the generally higher income of their husbands. It is unclear, however, whether this should affect hourly pay. As with the LFS we find that the gender pay gap is highest for married people (£3.45 per hour) but only slightly less for those who are separated (£3.38 per hour) and divorced (£3.20 per hour). It is lower for cohabitants, who are of course younger on average, at £2.04, and quite marginal for single and never-married people at 59p.

The survey asks respondents how long they spend on housework in a week. As would be expected, women not only do more housework, but this amount is closely (and negatively) related to work hours. The correlation between housework and work hours for women is -0.29, indicating that where women work fewer hours they do more housework. The correlation for men is much smaller, at -0.07, though still statistically significant. Thus men do not vary their housework hours much according to how many hours a week they do in paid work. Their contribution tends to remain low regardless.

We have no means of knowing how reliable these housework amounts are. However, we group hours into three categories: low (four or less hours), medium (five to nine) and high (10 or more), so this will remove some of this unwanted variation. As this question is only asked in three of the five Waves (which are pooled in the analysis) the total sample is roughly halved. Table 4.7 shows the pay gaps for these categories, the gap in paid typical work hours for men and women, and the proportion of the entire sample in each category. Wages are not adjusted for inflation as they only cover a five-year period. In fact, the pay gap barely changes over this period (though it does not go down).

**Table 4.7: Housework and paid work hours (UKHLS; 45,533 observations)**

Housework hours	Hourly pay gap	Work hours gap	Percentage of sample	
			Men	Women
Less than 5	2.26	3.77	27.6	12.8
5-9	2.10	5.51	13.0	17.6
10 or more	2.67	8.20	5.2	23.7

Note: The six cells in the last two columns total 100%.

Looking at the second column, it is clear that the greater the level of housework the greater the gap in work hours, quite simply because women bear the brunt of this. The last two columns show that 23.7% of the sample comprises women doing 10 hours a week or more of housework, compared to just 5.2% of the sample where men do the same amount, while 27.6% of the sample comprises men who do less than five hours. The proportion of men and women doing 5-9 hours of housework is much more similar: men in this category comprise 13.0% of the sample and women 17.6%. Looking at the second column, it is clear that the greater the level of housework the greater the gap in work hours, implying that men who do 10 or more hours of housework may do it in addition to paid work, while women may do it instead of paid work.

When we look at the pay gap we get an unexpected result. The gap varies little across the first two categories but is higher at 10 hours or more housework a week. The reason is that while men doing this amount of housework have a relatively low hourly wage rate, the rate for women doing this much housework is proportionally even lower. These women (comprising nearly a quarter of the sample in the table) work less than other women and men and thereby have relatively low earnings, but even compared to men doing similarly high average housework they are likely to be poorly paid. Whatever the nature of the causal influences at work here, it suggests that there is a relationship for working women between high housework demands and low pay.

As for hours spent on care (whether in or out of the home, but excluding childcare), 82% of women and 87% of men do none at all. For men and women who do up to and including four hours a week (7.3% of the sample) the pay gap is £2.57, falling to £1.96 for 5-9 hours (but this is only 3.5% of the sample) and £1.77 for 10-19 hours (2.0%). Thus, care responsibilities affect men as well as women, such that the higher the number of hours spent on care the lower the gender inequality in terms of pay.

However, this lower level of inequality in experiencing such negative effects applies to a very small proportion of the population.

#### 4.2.4 The pay gap and education

In 1993, 17% of male employees had a degree (or equivalent higher education) compared to 11% of women. In 2014, more women than men entered university and this is reflected in the data with 28% of male employees being graduates compared to 33% of female employees. Over the period, the gender pay gap for graduates is £1.90 per hour, while it is £2.42 for those with A-levels or equivalent, and £2.18 for those with lower qualifications. The pay gap is therefore greater in absolute and relative terms for lower paid people.

The next table shows the pay gaps for these three educational levels for the same periods as previously, both in absolute terms and as a proportion of the female wage in each group. In the earlier period the biggest differential is for graduates, but because relatively poorly qualified women earn less than others this differential is a far greater proportion of women's average wage – as much as 31.4%. In the later period there is only a small differential remaining for graduates but it is far greater for those with A-levels and not much lower for those with less than that. These figures as a percentage of the female wage for each group are lower than before, especially for women with no A-levels, but are still large. The main policy problem therefore is that while highly educated women are to a large extent able to escape disadvantage relative to men, less qualified women are not.

**Table 4.8: The pay gap by educational level**

	1993-1997	Pay gap as % of female wage in each group	2010-2014	Pay gap as % of female wage in each group
Graduates	3.15	20.9	0.80	5.1
A-levels/equivalent	2.38	23.4	2.23	20.5
Less than A-level	2.44	31.4	1.50	15.7

Because analysing the gap within levels of education is in effect controlling for education (in other words, comparing like with like) the skewedness of the wage

distribution is reduced and so the median results (not shown) are similar to the above. Attending higher education in larger numbers is therefore enabling female graduates to reduce gendered wage inequality.

Why do we get this discrepancy between education and income, with a high gender pay gap for people with no A-levels and a low gap for those in low income brackets, as shown earlier? It could be because a higher proportion of men with low qualifications are in the higher wage brackets. For instance, 50% of women in the highest wage bracket have a degree compared to only 37% of men. Many of these will be in managerial jobs where a degree has in the past not been seen as a prerequisite, or in highly skilled manual jobs based on vocational training. Another factor is that the hourly wage of people with A-levels is only slightly higher than those with lower or no qualifications.

If we express the female hourly wage as a percentage of the male wage, then in the early period this is 82.7% for graduates, 81.0% for those with A-levels, and 76.1% for those with lower qualifications than A-levels. However, in the later period these figures are 95.2%, 83.0% and 86.5% respectively. The gaps shown in the second and fourth columns of Table 4.8 show that these differences can be acute where women's pay is already low.

An additional human capital measure we can use is the percentage of graduates in an occupation. The correlation between this and hourly pay is .50 for men and .61 for women. It seems women, whether graduate or not, gain more than men from working in a graduate occupation.

#### **4.2.5 The public and private sectors**

Over the entire period 20.8% of men worked in the public sector compared to 36.5% of women. The public sector is therefore very important to women's pay. Does public sector pay help to reduce inequality for women? It is well known that wages are more polarised in the private sector, with a greater disparity between the lowest and the highest salaries. In the public sector, the pay ranges are narrower because of collective wage agreements, the stronger presence of trade unions and more fixed and transparent institutional arrangements (though some large private sector organisations might be comparable in this regard).

However, it is not clear that these factors are of primary importance because it is also the case that the public sector attracts more highly educated people, so the comparison between the two sectors alone does not compare like with like. In Table

4.9 the pay gap by sector is shown in the first column, and then by graduate status within sector, pooling all the years together.

**Table 4.9: Pay gap by public/private sector and graduate status (£ per hour)**

	All	Graduates	Non-graduates
Public	2.38	1.63	2.27
Private	3.11	2.77	2.98

The gender pay gap is lower (averaged over the period) in the public sector than in the private sector, though still substantial. The gap is also larger among non-graduates than graduates, in both sectors. However, the pay gap between male and female graduates in the public sector is comparatively small, at £1.63 per hour, while the same gap in the private sector is £2.77.

These results imply that the difference in the pay gap between public and private sectors is not entirely due to the fact that there are more graduates in the former. As Table 4.9 shows, female graduates in the private sector gain little from their education in terms of parity of pay with men. In the public sector, on the other hand, women with degrees experience a much smaller pay gap than those without, when compared with men within the same cohort.

In all, the public sector does not confer as much advantage to women as might be thought, as only 10.5% of all female employees in the entire sample are graduates working in the public sector, while 26.0% are non-graduates in the sector. The equivalent figures for men are 7.1% and 13.8%. A large number of women are in non-graduate public sector employment, which is associated with a substantial pay gap.

Basing the gap on the median produces similar results except for graduates in the private sector, which rises to £3.55.

Expressing the female hourly wage as a percentage of the male wage, female graduates earn 84.8% of the male wage in the private sector and 91.5% in the public sector. For non-graduates the figures are 75.6% and 83.2% respectively. Comparing the whole private sector with the whole public sector produces figures of 76.3% and 84.5% respectively.



#### 4.2.6 The pay gap across the UK's regions

Table 4.10 shows the absolute pay gap within regions in the first column, based on the mean. The second column shows this pay gap as a percentage of the average female wage in the region. These results are ranked by this percentage, with the lowest at the top of the table. It should be noted, however, that the regions are where people **live**, not necessarily where they work. The regions reflect those used in the LFS.

**Table 4.10: Pay gaps by region**

	Pay gap (£)	Pay gap as % of female wage
Inner London	0.55	3.77
Northern Ireland	1.30	12.50
Outer London	1.95	14.42
West Yorkshire	2.02	18.88
Greater Manchester	2.03	18.92
Wales	2.00	19.07
Tyne and Wear	1.99	19.17
Strathclyde	2.20	20.07
Merseyside	2.13	20.96
West Midlands	2.22	21.20
Rest of Scotland	2.38	21.83
South Yorkshire	2.29	22.49
Rest of North West	2.45	22.96
East Anglia	2.50	23.43
East Midlands	2.47	23.48
Rest of West Midlands	2.60	24.69
Rest of South East	3.08	25.83
South West	2.72	25.59
Rest of Northern region	2.58	26.26

Rest of Yorkshire/Humberside	2.66	26.26
<b>UK</b>	<b>2.39</b>	<b>21.43</b>

The pay gaps by region do not exhibit any clear overall pattern. However, London has by far the lowest relative gaps. The gap is even lower in Inner London based on the median (35p). This London difference runs counter to earlier work (Perfect, 2013) using Annual Survey of Household Earnings (ASHE) data which shows that the full-time gap based on the median is 12.0% in London as a whole in 2012 – higher than the national average. Olsen *et al.* (2010) find the same using the British Household Panel Survey (BHPS) which has a much smaller sample. Table 4.10 is based on the mean rather than the median, however, and this might have made a difference. (Regions are also areas of work rather than residential areas in the ASHE analysis.) Table 4.10 is based on the gap as a percentage of the female wage (in each region) rather than the female wage as a percentage of the male wage. Nevertheless, the patterns should be the same.

This ‘London effect’ perhaps suggests that regions in which there are many highly skilled jobs tend to have smaller gender pay gaps. The average age in London is three years lower than the national average (in the data). The national percentage of employees in the data with a degree is 21.2% compared to 42.8% in Inner London and 27.6% in Outer London. Commuting areas such as the South East and East Anglia, interestingly, have relatively large pay gaps. Comparing Inner London, where the pay gap is 55p (3.8%) to the ‘Rest of South East’ (that is, excluding London), where the gap is £3.08 (25.8%), the latter is five and a half times larger. The absolute difference is nevertheless a matter of pennies between many other regions. Just taking the regions with the lowest absolute gap (Inner London) and highest (Rest of South East), the female wage is 96.4% of the male wage in the former and 79.5% in the latter.

How important is this in terms of the number of people affected? While the proportion of men and women varies only slightly between regions, they clearly vary enormously in number. London (Inner and Outer combined) accounts for 9.1% of the sample, that is, nearly 1 in 10. The rest of the South East, where the gender gap is highly unfavourable to women, accounts for 19.8%, slightly over double the contribution of London. Northern Ireland contributes only 2.8%.

Table 4.10 pools the years across the entire period, but not only has the pay gap declined, it is likely that differences between regions have changed. Table 4.11 shows results for two five-year periods, 1993-1997 compared to 2010-2014. In the

earlier period the ranking is again by the pay gap as a percentage of the female wage. Looking at the second column shows how much individual regions have shifted position over time. Several positions change, though overall in the later period the picture is not very different from the earlier period. In particular, the three regions where the pay gap is the lowest percentage of the female wage are the same as in Table 4.10, suggesting some stability.

Of greatest note, however, is how large the percentages are in some regions in the earlier period – as much as 40.4% in the South West. The highest in the later period is 16.8% (in the Rest of Yorkshire and Humberside, that is, excluding West and South Yorkshire). If we define ‘small’ as less than 10%, the rate is now small in seven regions. Remarkably, in Inner London it is actually now in favour of women while in Outer London it is only 4.0% in favour of men.

Is this a sign of the future, with London leading the way? In fact, taking 2014 alone (not shown), the rate is very slightly in favour of women also in Outer London while in Northern Ireland the male advantage is only 55p. In that year the female wage is 103% of the male wage in Inner London. However, it ought to be borne in mind that the analysis excludes extremely high values, of which there are likely to be more in Inner London, due to the higher number of very well-paid positions in industries such as finance and banking.

**Table 4.11: Pay gaps by region and over time**

	1993-1997		2010-2014	
	Pay gap (£)	As % of female wage	Pay gap (£)	As % of female wage
Inner London	1.34	10.32	-0.34	-2.36
Northern Ireland	1.76	20.83	0.91	8.08
Outer London	2.94	25.13	0.57	4.04
Merseyside	2.53	27.56	1.46	13.18
West Midlands	2.75	31.14	1.09	9.67
West Yorkshire	2.76	31.15	1.37	12.02
Strathclyde	2.92	31.50	1.36	11.45
Tyne and Wear	2.79	32.37	0.99	8.79

Wales	2.81	32.52	1.08	9.40
South Yorkshire	2.79	32.75	1.54	14.23
Greater Manchester	2.95	32.96	1.13	9.83
Rest of Yorkshire/Humberside	2.96	35.45	1.84	16.77
Rest of North West	3.20	35.59	1.28	11.04
East Anglia	3.24	36.82	1.78	15.59
Rest of Scotland	3.29	37.17	1.37	11.42
Rest of Northern region	3.19	37.31	1.87	17.12
East Midlands	3.28	37.96	1.61	14.07
Rest of West Midlands	3.43	39.15	1.64	14.25
Rest of South East	4.00	39.64	1.71	13.46
South West	3.50	40.41	1.61	13.68
<b>UK</b>	<b>3.18</b>	<b>33.90</b>	<b>1.38</b>	<b>11.56</b>

#### 4.2.7 Features of the gender pay gap: main conclusions

The gender pay gap has declined considerably over the last two decades, but women's average hourly wage is still between roughly 85% and 90% of the average male wage (depending on the measure used). The pay gap within occupations was also high at the start of the period— in fact, this formed a substantial proportion of the general wage gap. This suggests that women were then paid less for doing roughly the same work as men, or had worse jobs than men within the same occupations. While this within-occupation gap has declined, almost the entire general wage gap is now taken up by this occupational gap.

Many women are in low-paid occupations, and not only that, tend to occupy the lower-paid positions within these. The decline in the pay gap is reflected by the fact that the gap is far higher for older people, implying an historical effect that might be gradually fading away. It seems that the pay gap which affects older women is in part a 'career' effect stemming from career breaks, and that this effect is itself declining. Related to these trends, the pay gap for graduates is now close to negligible but remains high for non-graduates and for those with A-levels or equivalent.

## 5 | Research findings: the drivers of the gender pay gap

This section of the report explores variables which are associated with raising or lowering pay. These are referred to as 'drivers' although it is only possible to say that these are associated with, rather than the causes of, pay gaps. Various statistical techniques are used to analyse these drivers. The following paragraphs outline the main findings, and the methods used where appropriate.

### 5.1 Graduate status and occupational segregation

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That pay is lower in occupations in which women predominate is well known and confirmed in this report. Both men and women who work in female-dominated occupations are paid less than those who work in male-dominated occupations. Based on their larger numbers, women are obviously more likely to experience this disadvantage than men.

We indicate this with simple correlations where a correlation of zero means no relationship between pay and feminisation of an occupation (i.e. the number of women), and a positive correlation of one shows a hundred percent relationship. A negative correlation, in contrast, means that the two are inversely related: when one is high the other is low. The correlation is  $-0.01$  for men and  $-0.17$  for women (both correlations being highly statistically significant, that is at  $p < .001$ ). Therefore within feminised occupations women tend to have much lower incomes than men.

Do female-dominated occupations pay less than male-dominated ones even when the average educational level within both is high? We look at this through dividing the sample into graduates and non-graduates, and dividing each group into three levels of feminisation: 0 to 33% (low feminisation), 34% to 66% (medium), and greater than 66% (high). These are clearly arbitrary divisions but have the advantage of producing three groups roughly equal in size. In Table 5.1 we show the pay gap for these six groups and also as a percentage of the female wage in each of these.

The lower half of the table shows that non-graduate women working in mixed or male-dominated occupations experience the largest pay gaps.

The table also shows that the pay gap is smaller for graduates than non-graduates at all levels of occupational feminisation. Compared to female graduates, women without degrees therefore potentially face low pay in general and particularly low pay in relation to men.

**Table 5.1: The gender pay gap by graduate status and level of feminisation in occupations**

% female in occupation	Gender pay gap (£ per hour)	As % of female wage in each group
<b>Graduate</b>		
0-33 (low feminisation)	1.90	11.4
34-66 (medium)	1.69	10.4
> 66 (high)	0.77	5.0
<b>Non-graduate</b>		
0-33 (low feminisation)	2.04	19.6
34-66 (medium)	2.36	21.9
> 66 (high)	0.76	8.1

Based on the median, these gaps are slightly higher and the median gap is in fact lower for non-graduates in highly feminised occupations (not shown).

## 5.2 Explaining the gender pay gap: which factors carry more weight?

In this section of the report, all the variables and many others are included in a separate regression analysis for women and for men based on ordinary least squares (OLS). The dependent variable is the log of hourly wages, which means that the coefficients can be interpreted as roughly the percentage effect of the variable on the outcome. (This is less true, however, the larger the effect.) Thus, Table 5.2 shows that each year of age increases the pay of men by roughly 6% and of women

by 4%. For simplicity the table excludes the effects for the large number of industries and regions but the full table is available in the Appendix.

Many of the outcomes discussed above in simpler analyses are confirmed, now in a framework including many controls. Higher education advantages women more than men in that it provides a greater within-gender premium (that is, the effect is in comparison with women with middle-level qualifications, not directly with men). Also apparent is that having low (or no) qualifications disadvantages women less than men, in comparison with women and men (respectively) with A-level qualifications or equivalent. Also, as shown above, part-time work affects men and women negatively, but men far more than women. The same applies to temporary work. The public sector lifts women's pay.

A key variable is the proportion of graduates in an occupation. The higher this is, the higher the average wage in the occupation, as would be expected. This benefits women more than men. However, the graduate squared term shows that this positive effect tails off so that at high levels of graduate density the advantage to women declines. As shown earlier, women gain more than men not only from having a degree but from working in graduate occupations.

'Proportion female' works differently as by definition this distribution is very different for men and women. The loss of pay is greater for women than for men but, as the squared term indicates, the negative effect becomes positive. A separate calculation (not shown) reveals that at high levels of feminisation (well over 60%) women benefit from working in female occupations, controlling for education and other factors.

The full regression analysis – the statistical process for estimating the relationships among variables – presented in the Appendix strongly confirms the regional variations discussed earlier. Despite controlling for other variables, for instance education, statistically speaking women's pay is lifted by living in London.

In some other areas such as Tyne and Wear, and Wales, but above all in Northern Ireland, a severe wage penalty for living in the region is compensated in large part for women in that this affects men far more. The reference category is the South East of England (excluding London), which is the dominant region in terms of numbers. People in Northern Ireland earn far less than those living in the South East, but in Northern Ireland in percentage terms it helps to be female. The last point is important. Men still earn more than women in Northern Ireland but their deficit relative to men in the South East is greater than the equivalent for women.

**Table 5.2: Regression (OLS) results for men and women**

	Men	Women
Age	0.06	0.04
Age squared	-0.00	-0.00
Married	0.05	-0.01
Number dependent children under 19	0.00 <sup>NS</sup>	-0.01
Degree	0.13	0.17
Education GCSE or less	-0.14	-0.11
Tenure	0.01	0.01
Temporary job	-0.12	-0.08
Part-time	-0.05	-0.02
Public sector	0.02	0.06
Proportion female in occupation	-0.29	-0.56
Proportion female squared	0.12	0.49
Proportion graduate in occupation	1.48	1.89
Proportion graduate squared	-1.16	-1.35
Constant	-3.75	-5.45
<b>Observations</b>	<b>365,285</b>	<b>379,090</b>
<b>R-squared</b>	<b>0.47</b>	<b>0.53</b>

Note: All  $p < 0.001$  except NS=non-significant; reference category for education=A-level qualifications or equivalent

It was shown in Table 4.1 that the pay gap has reduced over the period 1993-2014 from 27% to just over 9%. This is the unadjusted gap, which could be explained by a large number of factors, many of which have been reviewed and tested above. These 'explanations' are not necessarily causes but they give an indication of the variables associated with the pay gap. It is higher for part-time workers, for instance, and lower for public sector workers. According to the data, reducing women's reliance on part-time work and increasing public sector employment would probably reduce the pay gap, but the causality is more complex. Women working part-time tend to have lower education and public sector workers to have higher education, for example, although of course this is not the case for every individual.

In Table 5.3 we show figures for the adjusted and unadjusted gaps, in both cases taking periods of five years (1993-97 and 2010-14). The unadjusted gap is simply the effect of being female without controlling for education and so on. The adjusted pay gap takes account of various characteristics, using the same controls as in Table 5.2.



**Table 5.3: Gender pay gaps over time: unadjusted, adjusted and explained part**

	<b>Gender pay gap (unadjusted)</b>	<b>Gender pay gap (adjusted)</b>	<b>Explained part of pay gap</b>	<b>Explained part as % of unadjusted pay gap</b>
1993-1997	27.9	14.8	13.1	47.0
2010-2014	12.6	8.6	4.0	31.7

These show the familiar reduction in the gender pay gap over time. The unadjusted gender pay gap closely matches Table 4.1, while in comparison the adjusted gender pay gap shows a reduction for both time periods. This is the ‘residual’ – the part of the pay gap that cannot be explained by differences in characteristics between men and women – and could be in part the effect of discrimination, although we cannot know that for sure. It could be smaller still if there were more, appropriate explanatory variables in the data.

While the adjusted pay gap itself is smaller, 8.6% in 2010-2014, perhaps of greater interest is that in the recent period (2010-2014) the ‘Explained part’ (the part of the pay gap reduced through the use of additional variables), has reduced dramatically – from nearly a half to just under a third of the unadjusted gender pay gap is explained. Therefore the proportion of the overall gender pay gap that is ‘residual’ and unexplained is more than two-thirds. This is a much greater proportion of the gender pay gap than in 1993-97 when it only accounted for just over half.

The data suggests that as the gender pay gap is becoming smaller over time, the differences in characteristics for which we have data are explaining less of it. This could mean that simply being female, disregarding differences in measured characteristics between men and women, explains an increasing proportion of the pay gap. As women become less different to men, in terms of variables that explain pay, the amount these differences influence the pay gap reduces. The fact that there is a smaller gender pay gap now, but an increasing part of that is not explainable by gendered differences in employment patterns, type of work, age, children, and so on may suggest that approaches to reduce the impact of these on the pay gap are having an effect. This could also suggest that the remaining ‘residual’ unexplained difference in pay between men and women could be the persistence of discrimination, if not all of it then at least some.

A further factor has to be taken into account. Some of the explanatory variables might obscure various levels of discrimination that work indirectly. For instance, women might choose to undertake various forms of education or enter certain occupations which they consider more accessible to them. This selection effect might in turn be related to their perceptions of the problems of entry into the 'male world' (Bettio and Verashchagina, 2009).

### 5.2.1 Decomposition analysis

We now examine the pay gap directly through an explicit form of decomposition analysis. Table 5.2 presented analysis of the wages of men and women separately, where some inferences can be made about gender effects simply through comparing the male and female coefficients.

Table 5.2 used the female wage as an explanatory variable in an analysis of all wages but controlling for a wide range of factors. However, these do not model the pay gap directly. This can be undertaken through decomposition analysis. This method has its limitations. A substantial proportion of the pay gap remains unexplained – typically over 50%. This used to be interpreted as a residual effect denoting discrimination but this is no longer accepted as the gap can always be reduced with more information, as with the analysis presented in Table 5.3. Further, when we then look at the factors that contribute to or reduce the explained part these effects are (in this case) mostly very small and we cannot know for certain how they relate to the effects of these same variables on the unexplained part (Olsen *et al.*, 2010a).

Table 5.4 is based on the standard Blinder-Oaxaca decomposition method (pooling all the years). This first decomposes the gap into a part which is explained by the characteristics of women relative to men and a part not explained by these but where structural factors (which could include discrimination) mean that these characteristics have different effects. It then tells us which characteristics contribute to the explained part of the pay gap.

The gap between men's and women's pay is 20%. Information not given in the table indicates that only about 27% of the pay gap is explained by the difference in characteristics of men and women. About 42% is unexplained, which could be the result of discrimination or alternatively unexplained because we do not have enough information on other factors which might contribute to the gap. The remaining 31% is the result of a combination between the two.

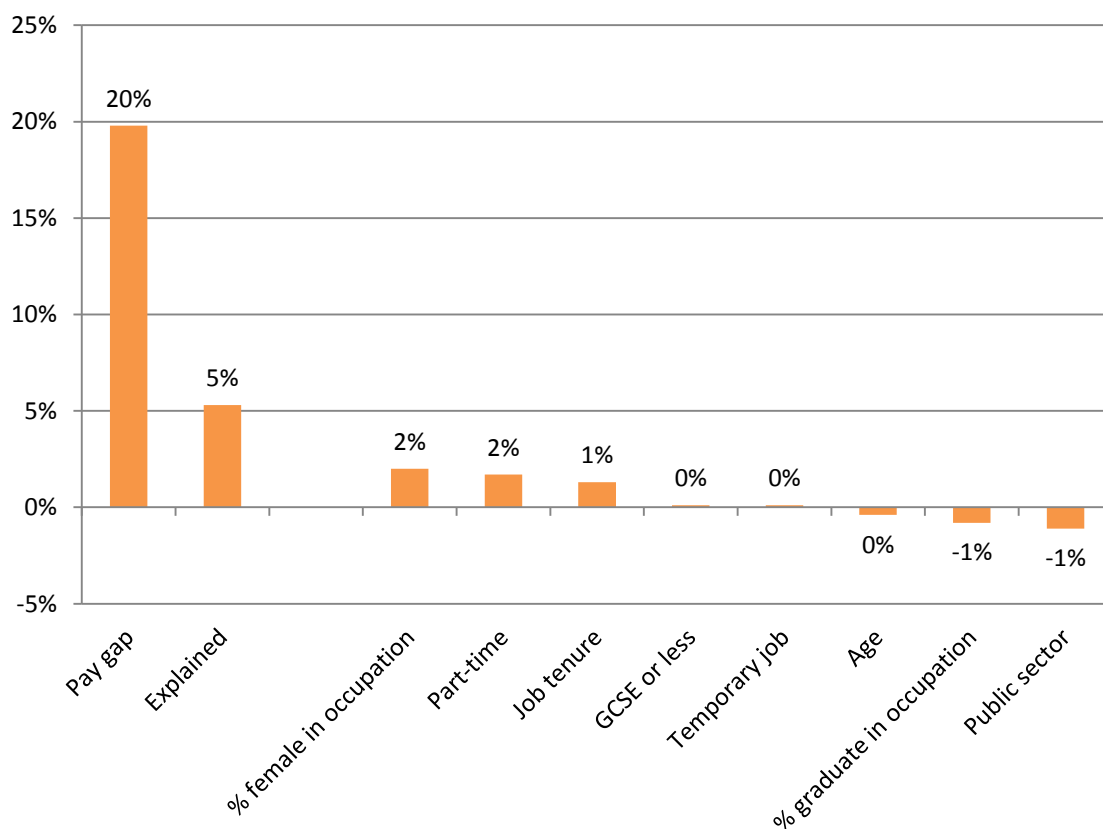
From now on the analysis only focuses on what can be explained. Moreover, only the most interesting outcomes are shown in Table 5.4 and in Figure 5.1, whether large or small (no large effects are excluded from the table).

**Table 5.4: Decomposition analysis of the explained part of the gender pay gap**

Age	-0.004
Graduate	0.000*
GCSE or less	0.001
Job tenure	0.013
Temporary job	0.001
Part-time	0.017
Public sector	-0.011
Proportion female in occupation	0.020
Proportion graduate in occupation	-0.008
<b>Observations</b>	<b>744,335</b>

Note: All p<0.001 except \*=p <.05; other controls not shown.

**Figure 5.1: Decomposition analysis of the gender pay gap**



In the decomposition analysis it is clear that a large part of the pay gap is unexplained by the data, and that even the most important drivers of pay have only a small impact on the size of the pay gap.

Each year of age reduces the gap, which goes against the earlier discussion, including Table 5.2, but age confounds many important factors such as career effects and work experience. It is possible that when we control for some of these, age does not by itself reduce women's wages relative to those of men.

The effect appears small but is not. Every year of age reduces the pay gap by half of one per cent. The effects of marriage and children are statistically significant but so small that they are not given here, yet that in itself is an interesting finding.

Collectively this suggests that, were it not for other factors, women ought to be on a more level footing with men or even possibly ahead of them in terms of pay, as they age. The fact that they are not indicates other important issues are at play, such as job tenure and work experience (see below). Obviously, as previously discussed, as women age they are more likely to take time out of the labour market for child-rearing purposes.

As shown in the previous table, being a graduate lifts pay for women more than it does for men. Table 5.4 suggests, however, that it does not reduce the pay gap. Women's relatively low education explains a part of the gap as does their lower job tenure (which can perhaps be treated as a partial proxy for work experience). This conforms to earlier research, which finds some, if not a large effect (see, for example: Manning and Swaffield, 2008). Career breaks reduce both job experience and tenure in a specific job.

Temporary work has a very small effect on the pay gap; part-time work explains much more of it. Working in the public sector reduces the pay gap. The fact that women are concentrated in occupations with high levels of feminisation increases the gap by a considerable amount, while working in graduate occupations reduces this. The biggest effects are part-time work and occupational segregation. However, as shown in Table 5.1, it is probably the case that high levels of feminisation reduce the gap for graduates. This does not show up here because they are outnumbered by non-graduates.

### 5.3 The problem of low pay

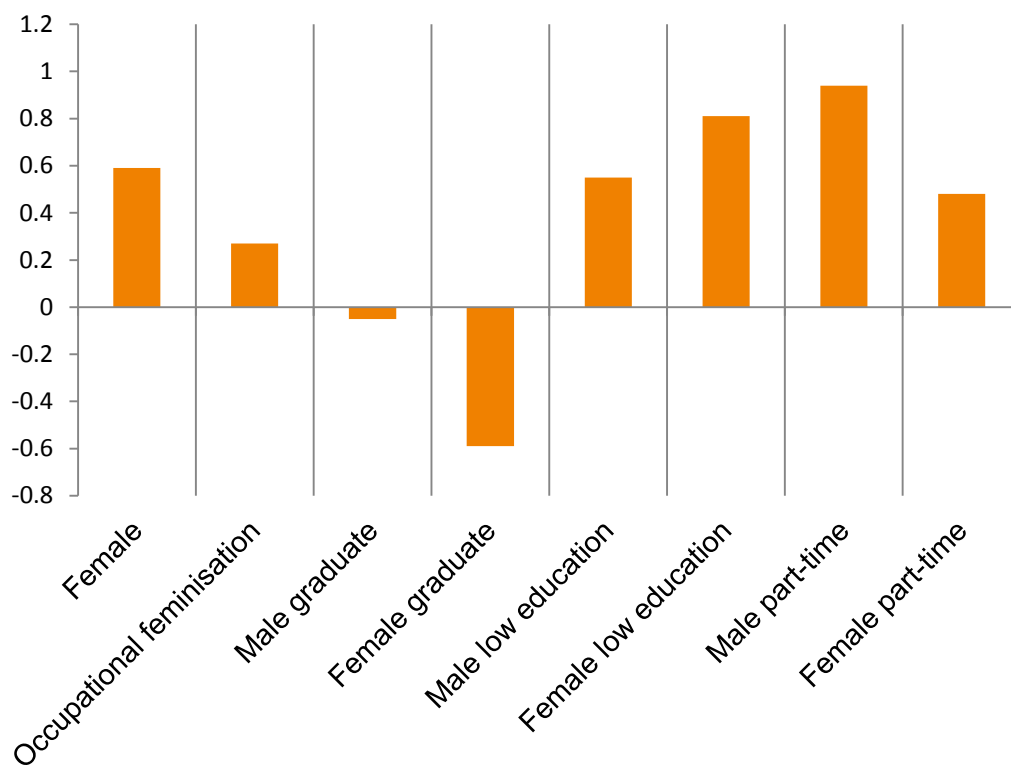
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We finally return to the issue of low pay, which was discussed earlier in the report. This is a variant of the pay gap argument insofar as it focuses attention on one part

of the wage distribution. Much of the analysis reviewed above shows a steadily improving situation for women generally but with the caveat that this might not apply to the lower part of the distribution. Put simply, women are more likely to be low paid than men. If we define low pay as £8 per hour over the entire period (adjusted for inflation), 51% of women were low paid in 1993 compared to 26% of men. By 2014 the figures had become 30% and 20% respectively. We now define low pay slightly more precisely, and purely for purposes of this analysis, as being in the bottom 10% of the pay distribution (but pooling years into two periods so that the 10% is the group below this threshold before 2000 on the one hand and after 2000 on the other). This shows that, taking both periods together, 8.4% of men and 15.8% of women were low paid.

Figure 5.2 shows the probability of being low paid in the entire period on this definition, based on the log of odds ratios. If a figure is positive it means this variable raises the odds of being low paid, if negative it reduces it. Men and women are analysed together with interaction terms between being female and (1) graduate status, (2) having low or no qualifications, and (3) part-time work, to see if being female intensifies their effects on the probability of being low-paid.

**Figure 5.2: Log odds of being in the bottom 10% of the wage distribution (logistic regression)**



A woman is far more likely to be low paid than a man, controlling for other factors such as education and part-time work in fact, this nearly doubles the odds.) Occupational feminisation also raises the odds. Being a graduate reduces the odds, far more for women than for men, but having low or no qualifications increases the odds more for women. Finally, male part-time workers are extremely likely to be low paid, even more so than female part-time workers.

## 6 | Conclusions

This research report opened by looking at trends in the gender pay gap over time. While the gap between average female and male pay remains significant, it has been in continuous decline over the period. In 1993 women (part-time and full-time combined) earned on average 73% of the male hourly wage; in 2014 the equivalent figure was 90%. The gap is larger using the median rather than the mean but it has still declined considerably, although it has narrowed in some regions more than in others. The gender pay gap is smaller in London than elsewhere in the UK.

When we take the average pay gap within occupations we see that this too is in favour of men. This means that women tend to receive less pay than men even when working in the same occupation. This does not necessarily mean that pay discrimination is happening. It could, for example, be the result of women being in less senior positions.

However, the occupational gap is lower than the general pay gap. This means that unequal pay within occupations explains only a small part of the general gap. A more important factor is the disproportionately high number of women in poorly paid occupations, many of whom work part-time. On average part-time positions do not pay as well, per hour, as full-time ones. Women who work part-time earn less per hour than women who work full-time; women who work full-time earn less per hour than the equivalent men. However, part-time women generally earn more than part-time men.

The pay gap is higher for older women, particularly for those in their forties. There are a few main reasons for this. Firstly, older women have a lower level of education on average than younger women. Secondly, the statistical analysis found that women's shorter job tenure is a key factor in lowering their pay, relative to men's. Women's career progression does not therefore normally match men's and women are less likely to be promoted later in their careers.

Married men earn more than married women and the gender pay gap is far bigger among married than unmarried people. The gap also rises with the number of children but levels off at two children, so it is no wider for women with three or more children than it is for those with two.

Taking into account education, the gender pay gap is highest among non-graduates. The gap is lower in the public sector than in the private sector and especially low – if still substantial – for graduates in the public sector. In other words, although degree-educated men maintain a pay advantage over their female peers, university education has reduced the pay gap for women. The pay gap is therefore lower for younger, graduate women.

Another factor, discussed in the introduction, is the role of occupational segregation, whereby men and women are concentrated in separate occupations. This has negative effects on wages for both men and women, because in general the better paying occupations tend to be those in which there is a fairly even mix of men and women. That said, women working in highly feminised sectors, especially if graduates, experience the smallest sectoral pay gap. The same applies to non-graduate women in highly feminised occupations, although this is likely to be because wages are similarly low for both men and women.

Controlling for a wide range of characteristics and circumstances in a regression analysis confirms the finding that higher education is an important way to address the gender pay gap. Women have a higher return to having a degree – that is the graduate premium relative to women with lower-level qualifications – than men (again relative to men with lower qualifications). They also benefit more from working in a graduate occupation.

Overall, the gender pay gap is exacerbated by the large numbers of women that work part-time and the many women in highly feminised, low-paid occupations. It is mitigated by the growing numbers of women who go to university. When it comes to exploring policy solutions it is important to consider both ends of the pay spectrum. This means tackling the ‘glass ceiling’ for high-achieving women but at the same time ensuring that women, and men for that matter, are paid adequately and fairly for less skilled work.



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# Appendix

**Table A1: OLS regression results for men and women (full table)**

	Men	Women
Age	0.06	0.04
Age squared	-0.00	-0.00
Married	0.05	-0.01
Number dependent children under 19	0.00 <sup>NS</sup>	-0.01
Degree	0.13	0.17
Education GCSE or less	-0.14	-0.11
Tenure	0.01	0.01
Temporary job	-0.12	-0.08
Part-time	-0.05	-0.02
Public sector	0.02	0.06
Industry=agriculture	-0.09	-0.07
Industry=energy-water	0.11	0.15
Industry=mining	0.18	0.20
Industry=manufacturing	0.06	0.06
Industry=construction	0.08	0.07
Industry=distribution-hotels	-0.05	-0.04
Industry=transport-communications	0.04	0.09
Industry=finance-property	0.09	0.13
Region=Tyne and Wear	-0.14	-0.10
Region=Rest of Northern Region	-0.12	-0.11
Region=South Yorkshire	-0.13	-0.11
Region=West Yorkshire	-0.11	-0.08
Region=Rest of Yorkshire and Humberside	-0.11	-0.11
Region=East Midlands	-0.10	-0.09
Region=East Anglia	-0.09	-0.07
Region=Inner London	0.03	0.13
Region=Outer London	0.04	0.10

Region=South West	-0.09	-0.08
Region=West Midlands (Met county)	-0.11	-0.09
Region=Rest of West Midlands	-0.10	-0.08
Region=Greater Manchester	-0.12	-0.08
Region=Merseyside	-0.12	-0.10
Region=Rest of North West	-0.12	-0.09
Region=Wales	-0.14	-0.10
Region=Strathclyde	-0.10	-0.07
Region=Rest of Scotland	-0.09	-0.07
Region=Northern Ireland	-0.18	-0.11
Firm size	0.04	0.03
Year	0.00	0.00
Proportion female in occupation	-0.29	-0.56
Proportion female squared	0.12	0.49
Proportion graduate in occupation	1.48	1.89
Proportion graduate squared	-1.16	-1.35
Constant	-3.75	-5.45
<b>Observations</b>	<b>365,285</b>	<b>379,090</b>
<b>R-squared</b>	<b>0.47</b>	<b>0.53</b>

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Note: All  $p < 0.001$  except NS=non-significant; reference categories: education=school-leaving qualifications or equivalent; industry='other services'; region=rest of South East.

**Table A2** Decomposition analysis of the explained part of the gender pay gap

	Explained part	Standard error
Age	-0.004***	(0.001)
Age squared	-0.001	(0.001)
Married	0.000	(0.000)
Number dependent children under 19	-0.000***	(0.000)
Degree	0.000*	(0.000)
Education GCSE or less	0.001***	(0.000)
Tenure	0.013***	(0.000)
Temporary job	0.001***	(0.000)
Part-time	0.017***	(0.000)
Public sector	-0.011***	(0.000)
Industry=agriculture	-0.000***	(0.000)
Industry=energy-water	0.002***	(0.000)
Industry=mining	0.001***	(0.000)
Industry=manufacturing	0.006***	(0.000)
Industry=construction	0.007***	(0.000)
Industry=distribution-hotels	0.002***	(0.000)
Industry=transport-communications	0.006***	(0.000)
Industry=finance-property	-0.002***	(0.000)
Region=Tyne and Wear	-0.000	(0.000)
Region=Rest of Northern Region	-0.000	(0.000)
Region=South Yorkshire	-0.000	(0.000)
Region=West Yorkshire	-0.000	(0.000)
Region=Rest of Yorkshire and Humberside	-0.000	(0.000)
Region=East Midlands	-0.000***	(0.000)
Region=East Anglia	-0.000***	(0.000)
Region=Inner London	-0.000***	(0.000)
Region=Outer London	-0.000***	(0.000)
Region=South West	-0.000	(0.000)
Region=West Midlands (Met county)	-0.000***	(0.000)
Region=Rest of West Midlands	-0.000***	(0.000)
Region=Greater Manchester	0.000	(0.000)
Region=Merseyside	0.000***	(0.000)
Region=Rest of North West	0.000	(0.000)



Region=Wales	0.000*	(0.000)
Region=Strathclyde	0.000***	(0.000)
Region=Rest of Scotland	0.000***	(0.000)
Region=Northern Ireland	0.000	(0.000)
Firm size	0.005***	(0.000)
Year	-0.002***	(0.000)
Proportion female in occupation	0.020***	(0.001)
Proportion graduate in occupation	-0.008***	(0.000)
Total explained	0.053***	(0.001)
<b>Pay gap</b>	<b>19.8%</b>	
<b>Observations</b>	<b>744,335</b>	

Note: Figures rounded to three decimal places. \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$   
Standard errors in brackets.

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