More or less unequal? Evidence on the pay of men and women from the British Birth Cohort Studies

Heather Joshi, Institute of Education, London, Gerry Makepeace, Cardiff University and Peter Dolton, Royal Holloway, London

24 May 2010

Abstract

Gender pay differences are not merely a problem for women returning to work and part-time employees, but also for those in full-time, continuous careers. In data from cohort studies, the gender wage gap for full time workers in their early thirties fell between 1978 and 2000. This equalisation reflects improvements in women's education and experience, rather more than a move towards equal treatment. Indeed, had the typical woman full-timer in 2000 been paid at men's rates she would have actually received higher pay than the typical man. Women in one cohort faced increasing inequality as they aged from 33 to 42, partly due to differences in qualifications and experience. However, unequal treatment also rose among women employed full-time at both ages.

Keywords

Gender pay gap; Lifecourse; British Birth Cohort Studies

Word count: 6,443 + abstract+ references, 2 pages of Tables and 1 Figure.

Address for correspondence:

>   Professor Heather Joshi
>   Centre for Longitudinal Studies
>   Institute of Education
>   20 Bedford Way
>   London WC1H 0AL

Acknowledgements

Introduction

The relative pay of men and women is a key feature of the gender order, of the efficient use of resources and of equity in access to them. The elimination of unequal treatment has been an object of public policy since the Equal Pay Act of 1970 and remains under review (Kingsmill 2001, Equal Pay Task Force 2001, Women and Work Commission, 2006). The 'headline' measure of the gender pay gap for those in full-time employment, as shown in the New Earning Survey, has tended to fall over time, but to rise with age between the ages of 20 and 40 for people born in the 1950s and 1960s.

A conventional analysis of the pay gap in economics distinguishes an 'explained' component - which reflects differences in workers' productive attributes, from a component which is 'unexplained' by these factors. Any differences not accounted for by personal characteristics (or 'human capital') are, by definition, differences in the rate at which these characteristics are remunerated, or unequal pay for the same attributes. Any unequal treatment may be due to direct, now illegal, discrimination, but also to a number of other factors. These include features of the employment contract on either the employer's or employee's side, such as occupational segregation, monopsony, differential union coverage, attitudes to risk, negotiating style, preferences, or domestic commitments, which may result in women and men of equivalent education and employment experience being paid differently (Joshi and Paci 1998, chapter 2). What these features of the employment context may be, and how they may impinge upon pay is left outside the scope of this paper (they can and have been treated as a separate issue, see Paci et al 1995). Our concern here is how the components of the gender pay gap - human capital ('explained') and unequal treatment (or 'discrimination' and/or 'unexplained') -

have been changing for comparable people over time and for the same people through the course of their life.

We exploit the combination of earnings, education and employment history data collected in three British cohort studies These three multi-purpose longitudinal studies, NSHD – The MRC National Survey of Health and Development, NCDS -National Child Development Survey and BCS70-British Cohort Study, follow people born in particular weeks of 1946, 1958 and 1970 respectively into adulthood (see Ferri et al, 2003). The most recent evidence used here comes from surveys in 2000 when the members of the 1958 cohort were aged 42 and the 1970 cohort were aged 30. We ask how gender earnings differentials have evolved across cohorts, for individuals employed full-time in their early thirties, comparing the people born in 1970 and 1958, and also how this differential has evolved as the 1958 cohort aged from 33 to 42. We take a retrospective look at the pay gap between men and women in their early thirties by relating these results to our previous work based on the NCDS and the 1946 cohort (NSHD) (Makepeace et al 1999). Our expectation had been that a comparison of 1991 with 1978, 16 and 3 years respectively after the implementation of Equal Pay, would reveal progress towards the elimination of unequal treatment, once differences in men's and women's 'human capital' had been allowed for. We did indeed find a modest drop in the unequal remuneration of the human capital of full-timers between 1978 and 1991, but our main conclusion was that Equal Pay legislation had not eliminated unequal treatment by then. We are now interested to see how much further, if at all, the move to equal pay progressed during the 1990s, both for the new generation of thirty-year–olds and for the cohort moving into middle age.

These data are particularly interesting since there have been numerous labour market changes during the times when these people progressed through the education system and entered the labour market (described in Ferri et al 2003). Most remarkable are the changes in opportunities for women. Female participation in the labour market continued to rise, and young women have continued to improve their basic human capital. Participation in higher education has more than doubled, and girls now systematically out-perform boys in terms of school examination results. This study aims to estimate the extent to which these structural features have impacted on the male-female earnings differential of cohorts arriving at the threshold of thirty. It also investigates what happened to men and women moving into their forties, and looks beneath the surface of the widening of gender earnings differentials between age 33 and 42. This paper thus examines whether improvements in the educational achievement and work attachment of women relative to men has had a major impact on unequal pay and might reasonably be expected to steadily eliminate it in the future.

Our previous analysis of the falling full-time wage gap between men and women in their early thirties from 1978 to 1991 (Makepeace et al 1999) found that, though measured unequal treatment had probably fallen, the average woman full-time worker would still have earned an estimated 17% more if she had been paid the same as a man. The explained gap fell considerably reflecting the improvement in the qualifications and work experience of women. BCS70 data for age 26 suggest that the labour market position of young women had continued to improve (Joshi and Paci 1997) We show here that by 2000 the raw wage gap for full-timers in their early thirties had continued to fall, but this was mostly because of the improvement of the human capital of those women

who were in full-time employment at that age. Differential treatment of the sexes, though reduced, remained substantial. Following the 1958 cohort from age 33 to age 42 in 2000 revealed a widening raw gender gap. This is due partly to the change in composition of those employed towards more women with lower qualifications and interrupted employment. But the estimate of unequal treatment has also increased between these ages. Although cross-sectional data had suggested that the gender penalty might be intensified with age, these results are important because they establish that it occurs within the life cycle of a single cohort. These results are also important in that they challenge the assumption that the achievement of Equal Opportunities is just a matter of time, and may suggest the need for active policies across the lifecourse, a topic to which we return in the conclusions.

Method

Introducing the Index of Unequal Treatment

We adopt a standard methodology for decomposing pay differentials, originating with the work of Oaxaca (1973). We begin by briefly reviewing these procedures, set out in more detail in Dolton et al (2002). Our objective is to divide the difference in earnings into components explained and unexplained by human capital characteristics such as education and work experience. The impact of different personal characteristics on earnings is estimated in separate regressions for men and women in each cohort. Hourly earnings are expressed in logs so that the coefficients estimate the proportional mark-up for each characteristic, say the return to a year of employment experience or to a level of qualifications. The coefficients (mark-ups) in the equation fitted to men's wages are interpreted as the rates of remuneration or return that would be paid on each characteristic

if an individual were treated as a man. The coefficients in the women's equation reflect remuneration if treated as a woman. By definition, differences in the returns reflect unequal treatment.

Persons with identical characteristics will not have identical earnings if returns differ. For example, a man might receive a return of 2% per year of work experience and a woman 1%. This difference is unexplained in the sense that the analysis provides no reason, other than gender, for the returns to be different. By contrast, a man's earnings may be higher than those of a woman even when rates of remuneration for a given attribute are the same because he has more of an attribute that is valued by the labour market (for example, if he has 14 years of work experience against her 5). In this case, the different pay is explained by the differences in the attribute. The difference between the predicted earnings of a man and a woman consists of the explained and unexplained differences. The explained difference is a weighted sum of differences in attributes, across all the attributes in the equation, and the unexplained difference is a weighted sum of differences in returns. In doing the weighting, we follow the most frequently used procedure (also recommended by Jenkins 1994), which is to weight the differences in remuneration by the average attributes of women and the differences in attributes by the rates paid to men. The unexplained differential then estimates how much the pay of the average woman would change if she were remunerated at the man's rate. The explained differential estimates how much the average woman would gain from acquiring the characteristics of the average man, even at her existing rates of remuneration.

The average unexplained differential is the conventional economic measure of pay discrimination, though this interpretation is open to challenge. The differences in

rates of remuneration certainly reflect unequal treatment since the same attributes are being rewarded differently. However differential returns are not necessarily discriminatory if they reflect different market conditions or choices. If (some) women choose careers that are low paid but complementary to other activities such as child rearing, then the differential returns would show unequal treatment but would not reflect discrimination in the labour market. Conversely, if the acquisition of productivity-enhancing attributes is affected by discrimination, part of the explained differential could also reflect unfair treatment. If access to certain kinds of qualification is discriminatory or women are unfairly prevented from acquiring work experience, then part of the differential explained by different attributes would be due to discrimination prior to the current labour market situation.

What some have called the index of discrimination, but we prefer to label the 'index of unequal treatment', is the unexplained differential written as a percentage increase in earnings that a woman would receive if the pay penalty were lifted. We use it to compare individual experiences of unequal treatment (given the individual's set of attributes) within cohorts and across cohorts. The index of unequal treatment is defined as:

$$Index = 100 \times \left[\frac{\text{Predicted earnings of a woman when paid as a man}}{\text{Predicted earnings of a woman when paid as a woman}} - 1 \right]$$

The index converts the two figures for predicted earnings into a percentage. If the predicted earnings are £1 per hour when paid as a woman and £1.16 when paid as a man, the index is 16%. Since the index refers to the same person, any difference in predicted earnings is due to differences in the returns. For example, we find that this index takes a

value of 12% for a woman full-time employee with average characteristics in the 1970 cohort in 2000, implying that her earnings would have been 12% higher if she had been paid as man.

Data

Data source

This paper draws on the three British Birth Cohort Studies (Ferri et al, 2003). Table 1 gives some relevant dates for these data. Each cohort study follows individuals born in the same week to form a large longitudinal sample providing remarkably good evidence for this kind of analysis. The studies began with the NSHD, which followed a sample of individuals born during one week in 1946. The NSHD includes a postal survey returned in early 1978 when the individuals were nearly 32. The resulting wage data were analysed in our previous work (Makepeace et al 1999, Joshi and Paci 1998). The 1958 and 1970 birth cohorts also followed one week's births, at variable intervals into adulthood. By the time we observe adult wages (at ages 33 and 42 for NCDS and age 30 for BCS70), there were over 11,000 individuals in each cohort still in touch with the study out of around 17,000 births. Both of these cohorts provide excellent information on family and social background as well as educational achievement. The computer-assisted interview of these two cohorts with identical questions in 2000 provides a unique opportunity to compare people across ages. The data contain excellent work history and training information and give a detailed record of educational performance since primary school.

[Table 1]

The three studies enable us to focus on what has happened (i) to individuals at roughly the same age over time and (ii) to individuals as they age. The use of these data sets enables us to summarise the experiences of large numbers of men and women rather than the small numbers often used in case studies. It is also consistent with evidence based policy based on replicable procedures rather than more personal analyses of the experience of discrimination. This approach focuses on a few specific measurable features of the labour market and cannot therefore take a holistic approach to the process of discrimination.

Modelling wages in relation to Personal Attributes

We assume that a person's earnings depend on the highest qualification obtained, measures of achievement in mathematics and reading when young, work experience and region. We have deliberately not extended the model to include job and firm characteristics (although we have done this elsewhere for the 1991 NCDS data (Joshi and Paci 1998)). Segregation by industry or occupation is a possible route through which unequal treatment operates, so we do not wish to include them in a model of the remuneration of personal attributes. Anderson *et al* (2001) report analyses of British wages for employees of all ages in 1998 and 1999/2000 which all include a number of workplace characteristics, as well as commuting time in the case of the 1999/2000 Labour Force Survey. The presence of these terms in their model means that the pay gap remaining unexplained cannot be treated as an estimate of unequal treatment and is not directly comparable with ours. We exclude part-time employees, at this stage, because

the different outcomes in these jobs require complex modelling (Ermisch and Wright 1993) and may incorporate a larger element of individual choice.

This formulation of the model enables us to compare these results with the earlier study so that the changes in full-time earnings differentials can be tracked over 3 cohorts spanning 22 years. In contrast to many other studies, we can draw on data for actual (rather than potential) work experience and scores on mathematics and reading tests in childhood. These tests, at the end of primary school and outside of the formal examination system are a valuable independent indicator of early achievement, arguably 'ability'. The NCDS and BCS members undertook different reading and maths tests at ages 11 and 10 respectively. We have standardised the scores to make them comparable (see Table 2 for details). Region is included (after some experimentation), as a simple dichotomous variable distinguishing London and the South-East from the rest of Britain to allow crudely for different levels of prices and wages, and gender differences in commuting.

The analysis distinguishes full-time work experience from part-time work experience and also includes a variable for tenure with the current employer. The sample comprises full time employees with recorded wages. No attempt is made to control for selection bias among those observed in employment, which was not a significant factor in our earlier study (Makepeace 1999).

[Table 2]

Summary statistics

Table 2 shows the means of hourly wages and our explanatory variables for both sexes at the contact around age 30 and, for the NCDS 1958 cohort, at age 42 in 2000.

The present samples for NCDS 1991 contain almost a fifth more men and women than in previous work, due to better treatment of the qualifications, region and work history variables (details on request). Hourly earnings, corrected for changes in price levels between survey dates, rose between 1991 and 2000 if one compares respondents in the 30-33 age band, but more for women (8%) than men (2%). One purpose of this paper is to see how far this convergence is due to differential changes in the attributes of those employed full-time, or to treatment becoming less unequal. Following the 1958 cohort from age 33 to age 42, when the earnings might still be expected to be on a rising curve, men's average wages went up by 30%, whereas those of women employed full-time at the surveys rose by only 9%. The other purpose of this paper is to see how far greater employment continuity of the men accounts for their greater earnings growth. Of the 3,659 men in the sample with complete data at age 33, almost three quarters (2,710) were also in the sample at age 42, but the overlap in sample membership was much less for women. We have 1,704 women in our sample here as full-timers at age 33, and more (2,270) at 42, but only 989 appear in both samples, well over a half of the 33 year sample but well under half of the age 42 sample. At 42 there were substantial numbers of women returning after a labour market break. Many of those who were in full-time employment at 33 had left the labour force or switched to part-time employment at 42.

[Table 2]

The women employed full-time in their early thirties are a select group with respect to human capital. In NCDS, their average maths and reading scores are 0.07 to 0.10 standardised units above those of men. Men represent nearly the whole cohort present at 33 (89%) while only around one third of women participated in full-time employment. Among the BCS full-timers women have a slight advantage over men in

terms of maths score and a pronounced lead in reading scores. In 1991, 37% of women employed full-time had either degree or diploma level qualification compared to 32% of the men. For BCS 30 year olds in full-time work these proportions are 47% and 38% respectively. In each cohort, the men have more work experience than the women, but for BCS at 30 the gap is less than 1 year (and not much more for NCDS if part-time experience counts).

By age 42, the women then in full-time employment had less human capital on average. Women of lower earning power had returned to employment and some of the highly qualified, who may have postponed childbearing into their 30's, would have dropped out of full-time work. The average childhood test scores of men working at 42 are now higher than those of female full-timers, as is the percentage with degree level qualifications. There is a large gender gap in employment experience (6 years on full-time experience), as a result of the re-entry of women with employment interruptions.

Thus the measured characteristics would lead one to expect the smallest wage gap for the 30 year olds in BCS, followed by the 33 year olds in 1991, with the women in their forties, who include the less qualified returners, experiencing the lowest rates of pay relative to their male contemporaries. This is the pattern we observe in the raw data and the pattern we would expect to find in the "explained" component of the pay gap. But we might also expect the unexplained pay gap to have diminished or disappeared if the implementation of Equal Pay laws had continued during the 1990s.

Results

Determinants of earnings

Regressions for each gender at each date analyse earnings (expressed as log hourly pay) in terms of the explanatory variables in Table 2. For brevity, we only report the relevant aspects of the results in Table 3 although the underlying results follow a familiar pattern. Earnings increase with the level of highest qualification, full time work experience, tenure with the current employer, and achievement in maths and reading. Earnings are higher in London and the South East than elsewhere. Almost all these effects are significantly different from zero at the 5% level. Part-time work experience is not significant in any of our equations. In all three cases, the rewards to the characteristics are determined in a statistically different way in the earnings equations for men and women. We can therefore be confident that pay is determined in a different way for men and women. The estimates of differential treatment vary with respect to experience and qualifications. For the 30 year olds born in 1970, men seemed to benefit more from accumulating experience. For the NCDS, tertiary qualifications (degrees and diplomas) seemed to protect women's wages particularly at 33. For further details, see Dolton et al (2002) or Makepeace et al (2004).

Unpacking the Pay Gap

The falling gap between the pay of men and women in their early thirties is analysed in Table 3. The wage gap between men's and women's wages, expressed as logs, declined from 0.305 for NSHD in 1978 to 0.163 for NCDS in 1991 and finally to 0.082 for BCS in 2000. (These wage gaps are, respectively, 36%, 18% and less than 9%

of the pay of an average woman at each point in time). However, in NCDS the improvements in the wage gap were reversed as age advanced from 33 to 42, and the raw gap in log pay at 42 increased from 0.163 to 0.303 (35% of women's pay).

The second panel of Table 3 summarizes the decomposition of the pay gap into the percentage of row 1 that can be explained by differences in attributes, and the remainder which has to be assigned to unequal treatment (using the conventional weighting scheme). Consider the pay gap of 0.305 in the present NSHD 1978 data. Only 30% of this gap can be explained by the different characteristics of men and women. The remaining 70% is unexplained. Note that in every case the unexplained component is larger than the explained – women in full-time jobs have relatively high productive characteristics so that the explained difference is relatively small. Indeed in the case of the 1970-born women working full-time at age 30, their characteristics are such that they should be paid 3% more than the average man. Women in BCS cohort had improved their characteristics over the previous cohort to such an extent that full-time employees should actually have earned more than men. If they were given the average man's human capital, their pay would actually fall. Hence the negative sign in their entry for the proportion of the gap explained. For this group the raw pay gap of 8% understates the degree of unequal treatment they are receiving, 12% on the conventional index. Thus while unequal treatment has fallen, raw data exaggerates the rate of progress. In 2000 there was more unequal treatment than was apparent in the raw full-time pay differential (the often quoted 'headline figure').

To explore this trend further Table 3 shows two versions of the index of unequal treatment. The conventional index of unequal treatment, index (a), shows the percentage

by which the average woman's wage would increase if her characteristics were rewarded using the men's rates of remuneration. Index (b) is an alternative version describing the percentage by which the average man's wage would fall if his attributes were remunerated on the women's rates. Both indices lead to similar conclusions, bearing in mind that index (b) is based on a bigger denominator.

[Table 3]

For the samples in their early thirties the average unexplained pay gap falls over time, as one would expect if there was continued progress in the implementation of Equal Pay Policy. Using index (a), unequal treatment fell from 24% in 1978 through 16-17% in 1991 to perhaps as low as 12% in 2000.

By contrast, as the 1958 cohort grew older during the 1990s, women experienced growing levels of unequal treatment, from 16% to 21% on index (a). The gap in log wages almost doubled but the explained differential also increased to 39% suggesting that part of the wage gap was due to the changing characteristics of the women in full-time jobs and raising the question of whether the extra unequal treatment at 42 is encountered by the women returning to full-time work after a break from the labour force or period of part-time work.

Women employed at both 33 and 42

The large increase in the index of unequal treatment as the NCDS cohort ages from 33 to 42 is striking. To investigate this change, we consider the subset of women who were observed in full-time employment in both surveys. These women can be thought of as mostly having been employed continuously. Over 89% had been employed for at least 8 of the 9 years involved, and 93% for at least 7 years (not much less than the

corresponding figures for men). The women observed twice in full-time jobs had higher test scores than the wider cross-sectional samples of women, and more tertiary education. At age 42, they also had more full-time experience since age 16 than other women, but less than men, and less part-time experience than other women, but more than men. Table 4 shows that they initially had higher wages than the age 33 cross-sectional sample and that their lead against other women in employment had widened by age 42. They experienced a growth in the mean of real wages of 27% over the 9 years. The corresponding figure for all men in full time employment at both dates was 31%, so the men's lead had widened even against these women committed to full-time employment.

[Table 4]

We have calculated the index of unequal treatment for each of the 989 women appearing in both NCDS surveys (on the basis of her particular set of characteristics). The mean of the index is 15.7% at age 33 and 20.0% at 42, an increase of over 4% percentage points. Despite their rather distinctive educational profile and experience of full-time employment, these estimated values for the mean of the index of unequal treatment are virtually identical to those estimated for the two cross-sectional samples in Table 3. The experience across individuals is not uniform. When we compute the difference in the values of the index at ages 33 and 42 for this group, slightly more than a quarter (25.7%) have decreases in the value of the index while another fifth (21.4%) have increases in the value greater than 10%. Nevertheless, the greater continuity of employment of this sub-sample did not, in general, protect them from the deteriorating relative terms on which women in this cohort were treated as they moved into middle age.

Those facing the greatest gender penalties at 33 also tended to face them at 42. It is likely that pay discrimination varies by workplace characteristics (occupational segregation, private sector, unionisation, firm size) and that women will tend to be in the same types of job at both dates. The general increase in the gender penalty is likely to reflect a tendency for men to experience more wage growth (through promotion or job search) over these years than even continuously employed women staying in their original, rather gender-neutral types of job. The rising pay penalty could also involve net movement into relatively worse paying types of job by women compared to men.

It remains to be investigated how far the real or assumed pressures on women with family responsibilities have contributed to this development. At 33, NCDS women who had maintained continuous careers apart from maternity leave did not appear to be particularly penalised in their pay by dint of motherhood per se (Joshi and Paci, 1988), but they might not have been able to sustain pay growth over the next 9 years as well as men.

Do better-paid women receive better treatment?

It is often asserted that better paid women experience less unequal treatment. We find some evidence for this in the individual indices of unequal treatment calculated for 33 year old women in NCDS, but the reverse is true for the 30 year old women in BCS. There is little systematic variation in the index amongst our 42 year old women.

[Figure 1]

We divided the sample into five groups (quintiles) according the position of women in the wage distribution. Figure 1 shows the mean values of the index of unequal treatment for BCS and NCDS across the different pay groups. For NCDS at age 33, it

shows a clear tendency for unequal treatment to fall with pay, but for BCS, there is a rise, although less pronounced. By age 42, the indices of unequal treatment for NCDS are the highest, around 20% for all wage groups, but the association with pay is less clear cut. The mean value of the index falls for the first 4 groups and then increases. These patterns have been confirmed more formally by examining the relationship between the individual values of index of unequal treatment and measures of wages. This analysis is discussed further in the Appendix.

Conclusions

Summary

This paper examines the role of qualifications and labour market experience in determining pay inequality. Government policy throughout Europe has stressed the importance of education and vocational training in improving competitiveness. British women in particular have gained relative to men in this area. Much legislation has sought to make it easier for women to remain in the labour market either by addressing discrimination directly or through measures such as improved maternity arrangements. If this policy was going to have a major impact on equality, we would expect to see a large fall in the explained component of the differential over time. Equally, reliance on such policies would only be successful if the explained differences were initially large.

Has the pay of men and women become more or less unequal? The general expectation is that men's and women's wages are converging given the convergence of their educational attainment and labour force experience, and also given the development of equal opportunities policies and practices. This evidence suggests that 'headline' reports of unadjusted pay gaps for full-time employees (in which younger women are

over-represented), may overstate the underlying gender neutrality of the British labour market, even in full-time jobs.

In terms of the 'headline' pay gap between men and women in full-time jobs, our evidence on people born in 1946, 1958 and 1970 shows movements over time in opposite directions. Looking at the earnings of people at the same age, in their early thirties, pay has become less unequal. Looking at the rate of pay facing men and women born at the same time, as they advance into their forties, rates of pay offered for full-time jobs have become more unequal. This cross current of both more and less inequality also applies in the estimates of unequal treatment, adjusting pay for the differences in human capital between the men and women in our samples.

Comparing men and women in their early thirties in 1978 and in 1991, the crude pay gap narrowed from around 36% to around 18%[1]. Turning to the year 2000 and at the workers born in 1970 who were then aged 30, the crude pay gap had halved again to just over 8%. At the same time, as the 1958 cohort aged from 33 to 42, the pay gap widened. It is back to 35% again in the year 2000 for 42 year olds, just about where it was for the 32 year olds, 22 years earlier in the 1946 birth cohort.

Our analysis suggest that not much of these pay gaps is explained by worker characteristics (education and experience or 'human capital'). The explained component of the 1970 cohort pay gap at age 30 is actually negative. Women who are in full-time work are better qualified and have almost as much work experience as the men in full-time work on average, and would receive more than average men's pay if paid at their

---

[1] 36% corresponds to the gap in log wages of 0.305 and 18% to the gaps of 0.163 and 0.167.

rates. There is more pro-masculine difference in human capital between male and female workers at age 42 than there is at around age 30, but nevertheless in all cases the unexplained component, the component of the wage gap, which is not explained by human capital variables, is larger than that which is explained.

Do the changes in the raw pay gaps reflect changes in the relative treatment of men and women? The unequal treatment component falls over time with respect to workers around age 30, but it increases over time if one considers workers in the same cohort as they get older. A widening of the gender premium over mid-life is consistent with inferences from data on full-time employees of all ages in the 1994 BHPS, (Rake (ed) 2000,) especially when taken in conjunction with the findings of Manning and Swaffield (2005), using more years of BHPS data. It does throw doubt on the suggestion in the analysis of 1994 data alone (Rake (ed) 2000) that graduates might be protected from a widening gender premium as they age.

Structural influences on this degree of unequal treatment are also apparent when indices of unequal treatment calculated for individuals are plotted against wages. For the 1970 cohort aged 30, the gender penalty rises with wages, but for the 1958 cohort at age 33, it falls. For the 42 year olds the level of wages and the gender penalty are not strongly associated. The present findings confirm that the advance of equal treatment is by no means uniform across workers or across age groups. However we have not confirmed a simple picture of polarization among women whereby those with better human capital also receive better treatment. There was some sign of such a process among 33 year olds at 1991, but by 2000 it had disappeared among 42 year olds, and perhaps reversed among 30 year olds.

Women who were in full-time employment at both 33 and 42 in the 1958 cohort were hardly penalised less for their gender than were those who had re-entered the labour market full-time by age 42. Commitment to the labour market does not seem to protect many women from encountering a worsening gender penalty as they mature.

Unanswered questions for research

The growing gender gap for the 1958 cohort, even in the full-time labour market and even among women with a continuous track record, suggests that there are features of the lifecycle (as well as the labour market) that are not included in our human capital model. They would intensify the obstacles to high earning by women as they get older, or conversely increase men's chances relative to women's of wage growth and promotion as the lifecycle proceeds. Men are seldom penalised in the wage market for having spouses and children (Greenhalgh, 1980, Davies and Peronaci, 1997). Women may be penalized, or at least not rewarded. This needs further investigation, particularly with respect to part-time jobs, not considered here. It will also be worth investigating whether it makes a difference at what time the work experience recorded at age 42 was accumulated.

These findings are not the whole story about equal treatment of men and women even of these ages in the British labour market because we have left beyond our scope the wages in part-time work which are generally lower, especially when done by women. This remains to be investigated, as does the role of occupational segregation and occupational mobility. These results point to further questions about the interplay of pay, individual endowments, family circumstances and contextual factors such as workplace characteristics, on which longitudinal evidence may still help to fill in the picture. It will

also be apparent how far such developments contribute to disparity among 42 year old women that was emerging in the 33 year olds of 1991 (Dex et al 1996).

Implications for Policy.

Many of the social reforms that seek to improve the status of women impact on new entrants, in education training and recruitment of young people. These seem to have had more impact on the human capital of young workers than on differential rates of remuneration, though these do seem to be moving, slowly, towards equalization. But for gender equality to be sustained into adult ages other measures need to be considered. Policies need to address the issue of unequal wage growth over the male and female lifecourse, which may well be linked to that of work-life balance, and to assess what is efficient as well as equitable. Measures, such as flexible employment, parental and maternity leave which facilitate career continuity are important here. They would be expected to have an impact on the accumulation of women's human capital and wages as well as incentives to acquire skills before and after labour market entry. These results suggest that Equal Opportunity and Equal Pay policies should also be targeted at promotions and mid-career recruitment and retention. Specifically the remuneration of women changing or advancing within jobs in mid-life merit close scrutiny as our findings suggest that these pay rates are not as they should be in a labour market with no discrimination. Campaigners and politicians should not assume that unequal treatment is on the verge of extinction. If the 1970 cohort follows the trajectory reported here for their predecessors, it may take more than the succession of cohorts to complete the implementation of Equal Pay.

Appendix

This Appendix reports the results of a more formal analysis of the association between the index of unequal treatment and wages for each of our samples (NCDS at age 33, BCS at 30 and NCDS at 42). We estimate two models. In the first, we regress the value of index of unequal treatment on dummies for the wage quintiles and, in the second, on the logarithm of wages. The index varies systematically with either measure of pay for both 30 and 33 year olds. However, higher wages are associated with less unequal treatment for 33 year olds in 1991 and more unequal treatment for 30 year olds in 2000 although the latter association is especially weak. The regression model only explains 17% of the variation in the index in the 1991 NCDS sample and as little as 3% in the BCS 2000 sample. Controlling also for whether or not the job was in the public sector shows that there is much less unequal treatment in public sector jobs but does not alter the basic relationship between the inequality and wages.

The regression analysis of the individual indices for the 42 year olds is more complex. Unequal treatment decreases with (log) wages. The results using quintiles reflect the pattern in Figure 1, unequal treatment is highest for individuals in the bottom quintile with the lowest earnings and lowest in fourth quintile. However these measures of pay explain at most 1% of the variation in the unequal treatment. Moreover the significance of pay level disappears when working in the public sector is taken into account. Working in the public sector has a significant moderating effect on unequal treatment, although it cannot explain more than 4% of the variation in unequal treatment

References

Anderson ,T., Forth, J., Metcalf, H. and Kirby ,S. (2001) *The Gender Pay Gap.* London: Women and Equality Unit, Cabinet Office.

Davies, H. and Peronaci, R (1997) Male Wages and Living Arrangements. Birkbeck College Discussion Paper in Economics 5/97.

Dex, S., Joshi, H. and Macran, S. (1996) 'A widening gulf among Britain's mothers', *Oxford Review of Economic Policy*, Vol 12, 1, 65-75.

Dolton, P., Joshi, H. and Makepeace, G. (2002) Unpacking Unequal Pay between Men and Women. CLS Cohort Studies Working Paper No.2, Institute of Education, University of London

Ermisch, J.F. and Wright, R..E.. (1993), Wage offers and full-time and part-time employment by British women, *Journal of Human Resources*, *28,* 111-133.

Equal Pay Task Force (2001) *Just Pay*. Manchester Equal Opportunities Commission.

Ferri, E., Bynner, J., and Wadsworth, M. (Eds., 2003) *Changing Britain Changing Lives: Three Generations at the Turn of the Century*. London: Institute of Education.

Greenhalgh, C. (1980) Male-female wage differentials: Is marriage an equal opportunity? *Economic Journal,* 90, 751-775

Jenkins, S. (1994) Earnings Discrimination Measurement, *Journal of Econometrics* 61(1): 81-102

Joshi, H. and Paci, P. (1997) Life in the Labour Market., in Bynner and Ferri (eds) *Twenty-something in the Nineteen Nineties, Getting On, Getting By and Getting Nowhere.* Aldershot: Dartmouth Press,31-52.

Joshi, H and Paci, P (1998) *Unequal Pay for women and men: evidence form the British Birth Cohort Studies.* Cambridge, Mass: MIT Press (with G Makepeace & J Waldfogel).

Kingsmill, D (2001) *Women's Employment and Pay,* London,Cabinet Office and DTI, *http://www.kingsmillreview.gov.uk/*

Macran, S, Joshi, H and Dex, S (1996) Employment After Childbearing: a Survival Analysis, *Work, Employment and Society*, 10, 2, 273-296.

Makepeace, G. H., Paci, P, Joshi, H and Dolton, P. J. (1999) 'How unequally has Equal Pay progressed since the 1970s? A Study of two British Birth Cohorts' *Journal of Human Resources*, 34,3, 534-556

Makepeace, G., Dolton, P. and Joshi, H. (2004) Gender earnings differentials across individuals over time in British Cohort Studies, 1991 and 2000. *International Journal of Manpower*. Vol 25 no 3/4, 251-263 .

Manning, A and Swaffield J (2005) "The Gender Gap in Early-Career Wage Growth", CEP Discussion Paper 0700, London School of Economics

Paci, P., Joshi, H. and Makepeace, G. (1995) 'Pay gaps facing men and women born in 1958: differences within the labour market' in J. Humphries and J. Rubery (eds) *The Economics of Equal Opportunity,* Manchester: Equal Opportunities Commission, 87-112

Oaxaca, R. (1973) Male-female wage differentials in urban labour markets, *International Economic Review*, 14 (3), pp. 693-709.

Rake K (ed) (2000) *Women's Incomes over the Lifetime.* Contributing authors: Davies H, Joshi H, Rake K and Alami R. London: Women's Unit, Cabinet Office, TSO.

Women and Work Commission (2006) *Shaping a Fairer Future.* London, Women and Equality Unit, DTI.

Wright, R.E. and Ermisch, J.F. (1991) "Gender Discrimination in the British Labour Market: a reassessment", *Economic Journal,* 101, no. 406, pp. 508-552

Table 1: Data points taken from British cohort studies

	Year of birth	Dates for wages referred to here	
		Date	Age
National Survey of Health and Development (NSHD)	1946	1978	32
National Child Development Survey (NCDS 1991)	1958	1991	33
British Cohort Study 1970 (BCS)	1970	2000	30
National Child Development Survey (NCDS 2000)	1958	2000	42

Table 2: Means of samples of full-time employees in 1958 and 1970 Cohorts by gender

	Men BCS 30	Women BCS 30	Men NCDS 33	Women NCDS 33	Men NCDS 42	Women NCDS 42
Hourly wage, 2000 prices	10.02	9.02	9.84	8.35	12.81	9.10
O level or equivalent (%)	30	28	29	31	27	30
A level or equivalent (%)	18	15	19	15	18	13
Diploma or equivalent (%)	17	20	16	19	18	20
Degree or equivalent (%)	21	27	16	18	18	17
Full time work experience (years)	10.69	9.82	13.93	11.85	21.95	16.21
Part time work experience (years)	0.17	0.43	0.07	0.69	0.12	2.79
Tenure (years)	5.23	4.97	6.54	5.81	10.82	8.01
Maths: z score	0.091	.118	.128	.202	.123	0.074
Reading: z score	-0.006	.197	.108	.208	0.096	0.084
Lives in London or South East (%)	31	32	30	32	29	27
Sample size	4120	2730	3659	1704	3856	2270

The qualification variables are defined to include equivalent academic or vocational qualifications. They are dummy variables taking the value 1 if the qualification has been achieved and 0 otherwise.

Tenure is time with current employer.

The z-scores are derived from the values of the reading and mathematics scores in the largest sample of observations for each cohort and are computed for pooled samples of men and women. We obtain the z-score by subtracting the mean and dividing by the standard deviation. Observations with missing values are given a z-score of zero. The z-scores only have a mean of 0 and a standard deviation of 1 in the sample from which they are derived.

Lives in London or the South East is a dummy variable taking the value 1 for individuals living in that region and 0 otherwise.

Table 3: Oaxaca-Blinder decomposition of differences in the logarithm of wages for full time male and female workers,

	NSHD 1978 ***	NCDS 1991 ***		NCDS 1991	BCS 2000		NCDS 1991	NCDS 2000
Wage gap (log)	0.305	0.167		0.163	0.082		0.163	0.303
Decomposition (% of gap)								
Explained (%)	30	7		10	-37		10	39
Unexplained (%)	70	93		90	137		90	61
Index of unequal treatment								
Index (*a*) (increase in women's earnings)	23.9	16.9		15.8	11.9		15.8	20.5
Index (*b*) (decrease in men's earnings)	20.6	15.1		12.5	11.3		12.5	16.7

The wage gap is the difference in the means of log earnings.

*** refers to xxx (1999).

Index (a) shows the percentage by which the average woman's wage would increase if she were paid the same as a man. Index (b) shows the percentage by which the average man's wage would fall if remunerated as a woman.

Table 4: Mean hourly wages observed twice and at least once

	1991	2000	% change
	£	£	
Women			
In 1991 & 2000 samples	8.46	10.74	27
In work at time of sample	8.35	9.10	9
Men			
In 1991 & 2000 samples	9.99	13.28	33
In work at time of sample	9.84	12.81	30

Wages are in real terms (2000 prices).