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Does it pay to work in the public sector?

by

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Abstract

The paper examines the trend in public sector – private sector wage differentials in the 1980s and 1990s, using a variety of econometric methods. It argues that background economic trends, such as the sharp rise in pay inequality in the private sector, and government policies, such as privatisation and compulsory competitive tendering (CCT) have had identifiable effects on the average public sector 'premium' and on the inequality of public sector pay. Panel data methods are used to examine whether these findings are attributable to unobservables that correlate with sectoral affiliation. An agenda for further research is identified.

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Does it pay to work in the public sector?

1. Introduction

Does it pay to work in the public sector? Unions representing public sector workers do not believe so, arguing that they are worse off in relation to their private sector counterparts and indeed that their relative position has deteriorated over the 1980s and 1990s. This perception has been heightened since 1993, when tough cash limits were imposed on the public sector and pay increases granted by public sector pay review bodies have not been implemented; a policy which New Labour shows no sign of reversing. At the top end of the pay scale, increases in the relative wages of skilled and educated workers in the private sector have not been reflected in public pay settlements. At the bottom end of the scale, policies such as contracting out and the encouragement of competitive tendering are seen to constitute a general policy of 'levelling down'. Lower paid public sector workers, it is argued, have been reduced to the status of their worst paid private sector counterparts. In addition to lagging pay, public sector unions are angry at a variety of policy measures over the last few years which may have affected the distribution of pay within the public sector and weakened their national bargaining position. These include explicit links between pay and individual or group performance and decentralisation of pay setting.

There is, as always, another side to the story. On average public sector workers are still better paid than are private sector workers. In 1994, for example, male hourly public sector earnings were about 14% higher than male hourly private sector earnings. (Source: *New Earnings Survey*). Public sector wage rates are more likely to be set by unions, who are also likely be able to achieve better working conditions for their members. According to the 1990 Workplace Industrial Relations Survey, 91% of public sector establishments recognise unions for manual workers, and 98% for non-manual workers. In the private sector, the respective figures are 44% and 28% (Disney *et al* (1995) Table 1). Furthermore, white collar public sector workers typically have indexed-linked pensions, and most public sector workers have more job security, as measured by longer job tenures, than employees in the private sector. Looking at simple measures of average pay, therefore, public sector workers in the past have had both better pay *and* conditions than their private sector counterparts.

It is, however, the argument of this paper that looking at levels and trends in average wages between the public and private sectors provides a misleading picture. The question of interest must be what a public sector worker, taken at random, would lose or gain by obtaining a job in the private sector and how much this differential has changed over time. At least part of the measured wage gap between public and private sector workers is likely to be driven by the fact that workers in the two sectors have very different skills. Moreover, any change in the composition of the public sector driven by privatisation or contracting out will affect relative wages even if the "true" (i.e. holding everything else constant) mark-up does not change. Pay *inequality* also differs between the public and private sectors and this may have changed over time as a result of shifts in policy or the economic environment. In order to assess the importance of this, it is necessary to look at individual rather than aggregate data.

This paper therefore examine trends in public pay over the last two decades, relative to the private sector, but also look at how individual groups in the public sector have

fared. The answer to the question in the title is: it all depends who you are and what you do. Specifically, the main findings are:

• although the ratio of average public to private sector pay is roughly the same at the end of the 1990s as it was at the end of the 1970s, these averages conceal substantial changes in the employment composition of the two sectors. When we control for changes in occupational composition in the private and public sectors, there is a clear secular decline in the public-private pay differential over that period. Nevertheless, controlling for occupation, women in particular in the public sector still enjoy a clear 'premium' over the average female private sector wage.

• the same period has seen a substantial rise in pay *inequality* in both the public and private sectors, but especially in the latter. Examining sub-groups of the public sector, therefore, shows that the equalising effect of public sector status on pay have been enhanced over the period.

• quantile regressions using the General Household Survey for 1983 and the British Household Panel Study for 1991-95 are utilised to examine the public sector 'premia' or 'penalties' at different percentiles of the wage distribution, disaggregated by educational qualification and gender. There is evidence that the public sector reduces pay inequality both between and within educational groups, but this effect is not uniform by qualification and gender. In particular, women with school leaving qualifications benefit disproportionately in the public sector, but the position of men in the public sector with degrees and both men and women without qualifications have worsened considerably, relative to the private sector.

• we examine the interpretation and consequences of these findings. In particular, are other attributes of jobs playing a part in these pay discrepancies? And what are the consequences of observed differentials for labour *quality*? If, for example, the public sector pays higher wages to a particular group relative to wages paid by private sector employers, does the public sector attract better quality workers, in terms of other attributes such as ability, aptitude and commitment? Do we then observe workers with such characteristics 'self-selecting' into the public sector? If not, what are the consequences of discrepancies in pay for public sector productivity and morale?

2. Pay and employment in the public sector since 1979

The advent of the Conservative administration in 1979 was associated with the onset of a period of economic change in the UK, which has continued to the present time. Many of these changes impacted directly and indirectly on the public sector.

The most obvious change has been the contraction of public sector employment: from 7.45 million people in 1979 to 5.23 million in 1995. This 30% fall saw the share of the public sector in total employment drop from more than a third to less than a quarter. Much of this change arose from the privatisation program, which saw wholesale transfers of components of the public sector labour force to the private sector, accompanied by widespread job losses and retrenchment. At the same time, policies of contracting out and compulsory competitive tendering (CCT) have both reduced total employment in the public sector (although the number of workers *financed* by public expenditure will have fallen by a smaller amount) and forced 'in-house' suppliers to compete with private sector competitive firms.

Although pay in the public sector has not been explicitly determined in the 1980s and early 1990s by 'incomes policies' and periods of wage restraint, public pay has been settled according to various forms of public sector pay management involving cash limits combined, not always consistently, with the reports of pay review bodies. Some groups, such as fire fighters and the police, have done reasonably well from the pay review system. In general, however, the combination of the pay review system with cash limits since the early 1990s has avoided the 'catch-up' pay awards such as those awarded by the Clegg Inquiry at the end of the 1970s.[2] If anything, cash limits have been enforced more tightly since the advent of the Labour government in 1997.
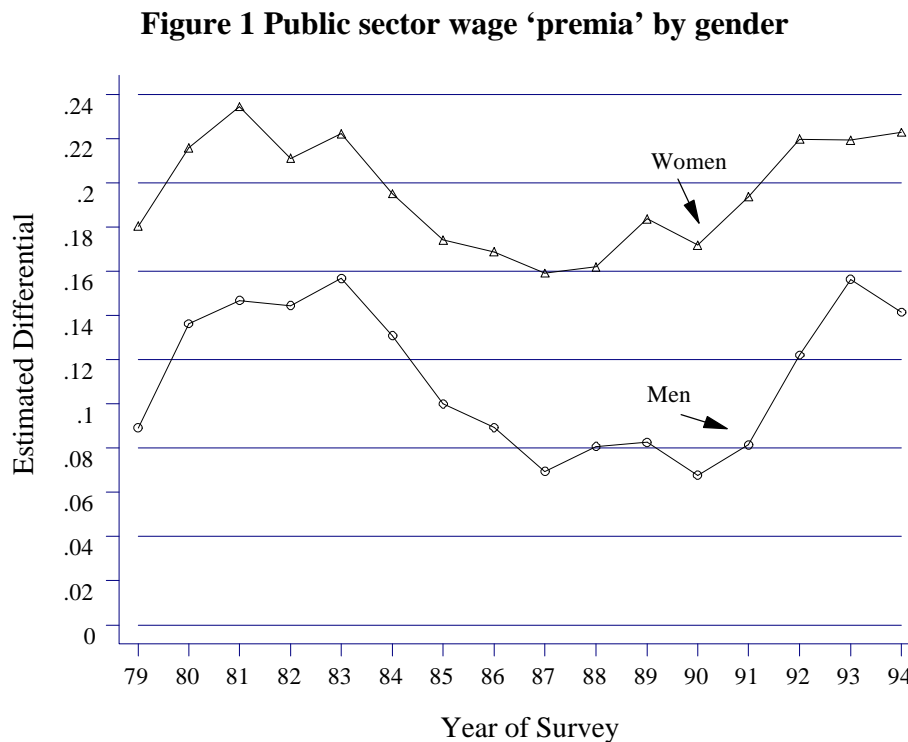
Finally, as mentioned, public sector trade unions still have almost complete coverage of the public sector, especially in comparison to their free-fall decline in the private sector. Nevertheless, their bargaining power has been considerably weakened since their heyday of the mid-1970s by falls in membership, the destruction of some key sectors such as the coal-mining industry, and increased emphasis on decentralised bargaining and the construction of autonomous agencies in most branches of government.

Thus the nature of the public sector workforce has changed, as has the environment in which it works. These changes are likely to have affected different groups disproportionately; for example, CCT is likely to have affected relatively unskilled workers who may have found any 'premium' from working in the public sector eroded by competitive pressures. In contrast, other groups, such as civil servants, may be relatively immune from these pressures. It should be remembered, too, that the private sector has seen major changes over the period, such as growing pay inequality, attrition of older men from the labour force, and technical change biased in favour of particular skills and sectors such as information technology use and development and personal services.

How have public sector workers fared in practice against this background of economic and social change? Figure 1 plots the "raw" difference between average wages in the public and private sector for men and women between 1979 and 1994,

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[2] For more evidence on trends in pay for particular groups covered by pay reviews over time, see Trinder (1994) and Elliott and Duffus (1996).

from the annual published New Earnings Survey data. There is a positive gap between wages in the public and wages in the private sectors throughout the period: for women, of around 20% and for men of around 12%. Note that we do not control for other determinants of pay in this figure, thereby ignoring both the possibility that workers in the public sector may have different qualifications, and work in different types of occupations, than in the private sector. Both these omissions are rectified shortly.

Figure 1 Public sector wage 'premia' by gender

Source: New Earnings Survey: successive years

Two other features of Figure 1 are of interest. First, there is no evidence of trends in the 'premia' for either men or women over this period. Second, there is clear evidence that the public sector 'premium' is counter-cyclical: when the economy is moving towards its peak (as in the mid-1980s and the mid-1990s), the 'premium' is stationary or falling. When the economy is moving into recession, as in the early 1980s and late 1980s, the 'premium' rises sharply.

This counter-cyclicality is largely driven by the nature of macroeconomic shocks to the private sector, which tends to exhibit greater temporal volatility in employment and wage movements. Movements in the political business cycle and in public budgetary constraints may also induce fluctuations in the level of public pay, but these fluctuations, too, are likely to be pro-cyclical. For example, governments may prefer to hold general elections in upturns in the economic cycle, and to be relatively generous to public sector workers prior to elections, leaving the bill to be paid later. And similarly, public budgetary constraints are likely to be more relaxed in economic
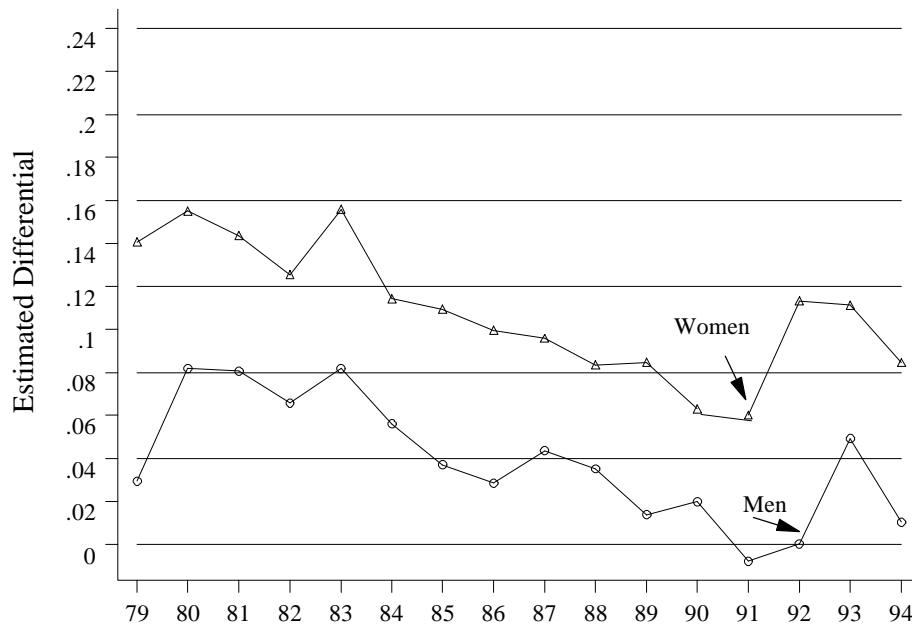
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upturns if the notional public sector borrowing requirement (PSBR) is taken as a measure of the need for tight fiscal policy. Thus *levels* of pay are likely to be pro-cyclical in both the private and public sectors, but the greater pro-cyclicality of the former generates the observed *counter-cyclical* public sector 'premium'.

As observed previously, these 'premia' do not control for the different characteristics or skills of public sector workers, nor for the different sorts of jobs that they do. This is an important omission. Certain occupations, such as teaching and nursing, are predominantly public sector. Others, such as sales and machine operatives, are largely private sector. The occupational mix of the two sectors has changed over the 1980s and 1990s. For example, many low paid occupations such as refuse collection and ancillary services in hospitals have been privatised or subject to CCT; some of these workers are no longer in the public sector. At the other end of the pay spectrum, there is increased emphasis in the public sector on private sector-style management and business practices, and recruitment into central and local government, and its agencies, of more qualified manpower. We examine later how workers with the same qualifications fare in the public and private sector. For the moment we adjust measured pay for these changes in occupational composition.

Figure 2 therefore utilises the New Earnings Survey data to provide information of the public sector pay 'premia' controlling for occupational change. To do this, the original New Earnings Survey data tapes were utilised, and cross-section ordinary least squares (OLS) regressions were run for each year from 1979 to 1994 in which individual pay was regressed on a public sector binary (dummy) variable and a set of (3 digit) occupational dummy variables. By this means, an average public sector 'premium' for each year is obtained, abstracting from all variations in pay attributable to occupational 'affiliation'.[3]

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[3] Write the equation to be estimated as $\ln(w)_{it} = a_t + b_t D_{it} + d_t O_{it} + e_{it}$ where $\ln(w)_{it}$ is the logarithm of the wage of individual i at time t, D is a dummy indicating public sector status and O is a vector of occupational dummies with (possibly) time varying returns δ_t and α_t is a set of year specific constant terms. Note that, in this specification, β_t is the predicted average premium at time t, that the occupation-specific components of pay are time-varying but do not vary across individuals at a point in time, and that individual-specific variations in the public sector pay 'premium' at a point in time are not measured (other than on grounds of gender). These points are addressed later.

Figure 2 Public sector wage 'premia' controlling for occupation

Source New Earnings Surveys

The difference between Figure 1 and Figure 2 is dramatic. Although there is still evidence of counter-cyclicality in pay (although it is not perhaps as transparent as before, especially for women), there is clear evidence of a downward trend in the public sector 'premia' for men and women over the period. For both men and women, it falls by about 8 percentage points from a somewhat lower base in 1979 than in Figure 1. Indeed there is no clear evidence of a 'premium' for men between 1990 and 1994, other than in 1993. This provides compelling evidence that the position of public sector workers has worsened on average over the period.[4]

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[4]   Elliott and Duffus (1996) identify non-manual occupational sub-groups in the New Earnings Survey and suggest that this occupation-corrected decline has being occurring since as long ago as 1970. However, Poterba and Rueben (1994) do not find that correction for occupational composition affects the *trend* in US public-private sector differentials, although the *level* is thereby reduced.

Education and the distribution of wages in the public and private sectors

This section utilises the 1983 General Household Survey and the 1991-1995 pooled British Household Panel Survey to look at the pay gap between the public and private sectors and to see how it changes after conditioning on education and age.

The first row of Table 1 shows that weekly earnings in the public sector are about 12% higher than weekly earnings in the private sector and that this has not changed between 1983 and 1990s. The next rows look separately at men and women, akin to Figure 1. In line with the results from the NES discussed in previous section, the estimated wage gap is much larger for women than it is for men. The gap for men falls slightly over the 1980s and that for women rises by 4% points. However a different story emerges after controlling for the different skills (measured by age and education) of the public sector. Not only are the measured gaps much lower but the change over the 1980s is different. Rather than experiencing no change in relative wages (as suggested by the first row), male public sector workers have experienced a fall in their relative wages. Women however continue to experience an increase in the public sector premium.

**Table 1: Percentage difference between the weekly earnings
of public and private sector workers**

	1983 (GHS)	1990s (Pooled BHPS)	Change 1983-1990s
Unconditional Effects			
All	12 %	12 %	0
Men	9%	8%	-1
Women	23 %	27%	4
Conditional on age and Qualification			
Men	5%	1%	-4
Women	11%	14%	3

Notes: Conditional estimates were obtained as the coefficient b in the following regression, estimated by OLS on the for each gender on the BHPS and the GHS separately.

$$w_i = a_t + bD_i + g_1 age_i + g_2 age_i^2 + d_1 Q_i^1 + d_2 Q_i^2 + d_3 Q_i^3 + e_i$$

where w_i is the weekly earnings of the ith individual, D_I is a dummy variable equal to 1 if the person works in the public sector, Q_i^1 to Q_i^3 are dummy variables for qualifications. Q_i^1 = degree, Q_i^2 = A levels, Q_i^3 = 0 levels, the base category is nothing, a_t is an intercept term, allowed to differ across years in the BHPS and e_i is an error term.

Table 2 looks at the level and change in inequality of wages in the public and privates sectors. Average pay has of course risen over time; what is more interesting is that pay inequality has increased, especially in the private sector. The measure of inequality used is the 90:10 percentile ratio of weekly earnings. The first three rows of

Table 2 show that not only is wage inequality higher in the private sector (apart from women in 1983) but that it is risen much faster over time. The last two rows give the figures for wage inequality controlling for observable dimensions of skill. These are basically regression residuals. The fact that the trend growth in wage inequality appears to be much closer between the public and the private sectors in these rows suggests that the skills of public sector workers have become a lot more homogenous over time. Nevertheless, there is still a disparity in the growth of inequality.

Table 2 Earnings dispersion in the public and private sectors

	90:10 percentile ratio of weekly earnings in the public sector			90:10 percentile ratio of weekly earnings in the private sector		
	1983 (GHS)	*1990s (Pooled BHPS)*	*Change 1983-1990s*	*1983 (GHS)*	*1990s (Pooled BHPS)*	*Change 1983-1990s*
Unconditional Effects						
All	2.82	2.86	0.04	3.05	3.32	0.27
Men	2.53	2.66	0.13	2.63	2.96	0.33
Women	2.70	2.81	0.11	2.47	3.11	0.64
Conditional on age and Qualification						
Men	2.23	2.38	0.15	2.44	2.61	0.17
Women	2.13	2.38	0.25	2.35	2.69	0.34

Notes: Conditional estimates measured as residuals from the regressions used in Table 1.

In this light Table 3 looks directly at the changes in the probability of working in the public sector by educational qualification. If there was no change in the relative composition of the public sector, it should be the case that the changes in probabilities should be the same across all education groups. This is quite clearly not the case. Low qualified men have experienced a much faster fall than have qualified men. Among women, those with at least one "A" level and with no formal qualifications have seen the biggest drop.

**Table 3 Probability of working in the public sector
by gender and highest educational qualification**

	GHS (1)	Pooled BHPS (2)	(1)-(2) (2)
All Men	0.35	0.22	-0.38
Men with a Degree	0.49	0.34	-0.30
Men with at least one "A" Level	0.39	0.25	-0.37
Men with at least one "O" Level	0.35	0.19	-0.46
Men with no formal qualifications	0.32	0.15	-0.54
All Women	0.38	0.34	-0.10
Women with a Degree	0.63	0.55	-0.13
Women with at least one "A" Level	0.71	0.43	-0.39
Women with at least one "O" Level	0.35	0.30	-0.13
Women with no formal qualifications	0.28	0.18	-0.35

The absolute growth in inequality, the differential growth rates in inequality across the two sectors, and the apparent downward trend in the public sector 'premium', when we control for occupation, together suggest that the 1980s and early 1990s have had disparate effects on various groups in the public sector. However, these findings are consistent with a number of stories as to what is happening to public sector pay.

1) Taken together, the trends in the 'premium' and in relative inequality might suggest that individual-specific public sector 'premia' have held up better among lower-paid public sector workers than among higher-paid workers. Higher paid workers are, on average, more qualified, so this might imply that returns to qualifications have suffered disproportionately in the public sector. This would suggest greater disparity in 'between group' returns in the public sector when groups are defined by qualification level.

2) Alternatively, given overall structural change in the labour market towards better qualified workers and increased competition facing relatively less skilled public workers via CCT and privatisation of services, 'between group' returns may be relatively invariant. What is then being observed is a (relative) compression of 'within group' 'premia' in the public sector: that is for given educational qualifications, the relative faster growth of inequality in the private sector has enhanced the equalising effect of working in the public sector.

These possibilities can be examined by separating the sample into groups by highest educational qualification obtained by the individual, and by using the technique of quantile regression.[5] Whereas OLS predicts the average (mean) wage of an individual with a given set of characteristics, this technique predicts quantiles of the distribution of wages for individuals with a given set of characteristics. For example, 10% of
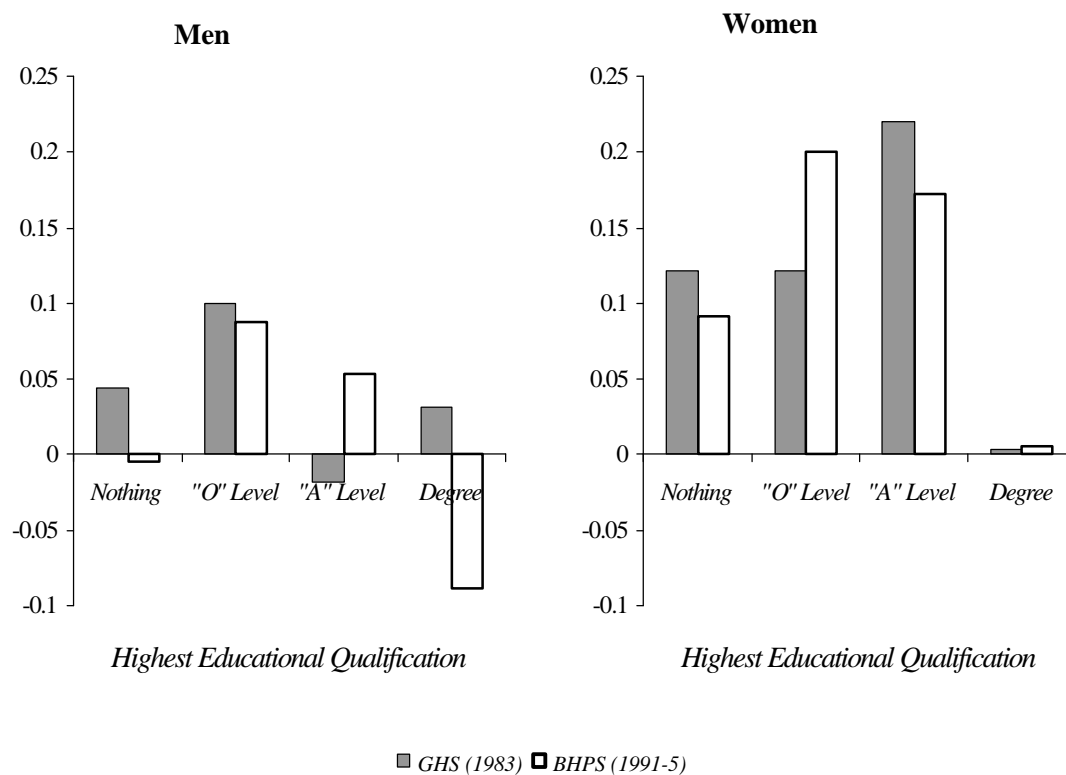
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[5] For a similar technique applied to the US, see Poterba and Rueben (1994).

people with the same characteristics will be predicted to have a wage below the estimated 0.1^{th} quantile (or the 10th percentile). Estimating quantiles of the distribution of wages will be more informative than estimating with OLS if the returns to or the distribution of unobserved determinants of wages differs across given sets of characteristics at other points of the wage distribution. Thus if public sector workers with degrees are more equal in terms of ability and "drive", than their private sector counterparts, or if private sector workplaces are more likely to pay a premium for these attributes, then there will be a difference between the estimated effects of the public sector at, say, the 50th and the 90th percentiles.

The impact of looking at the effect of public sector status across groups differentiated by qualifications attained is apparent from Figure 3, which uses standard OLS regression techniques. For men, the 'between group' reduction in inequality is evident in the higher returns to lower levels of qualifications in 1983, and in the negative return to graduates in the 1990s. For women, the absence of a premium for graduates is apparent in both periods, although women with intermediate qualifications tend to fare the best in both periods.
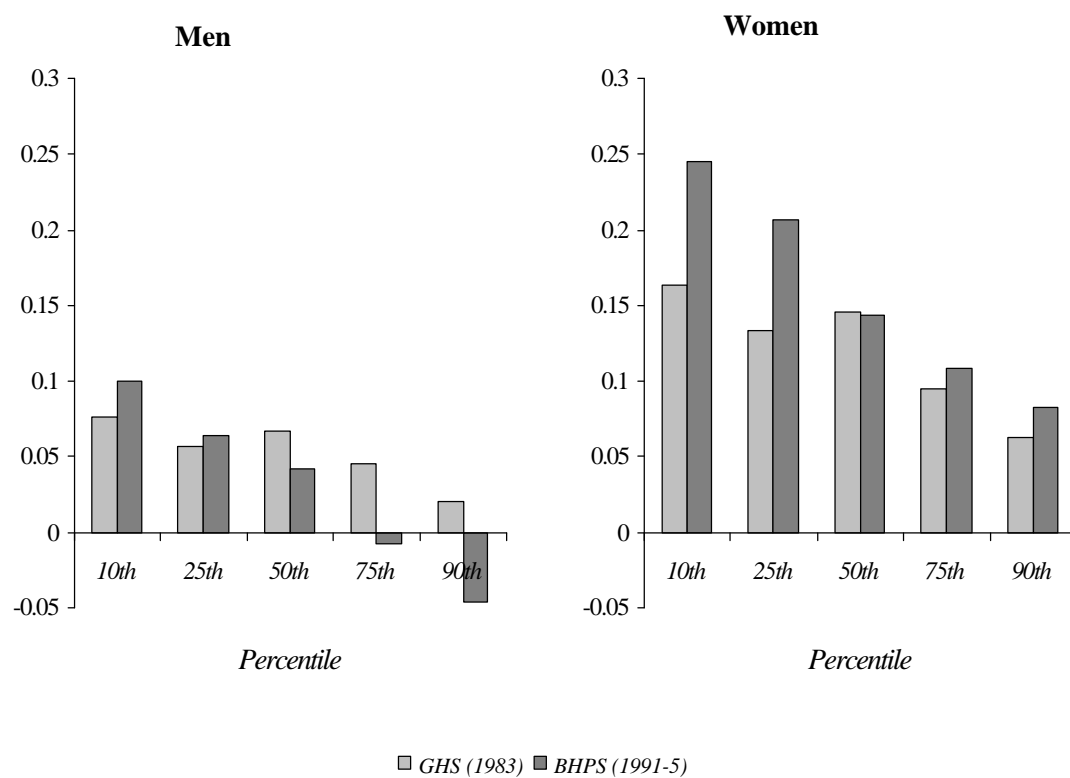
Figure 4 provides quantile regressions, aggregated over all educational qualifications. The compression of pay in the public sector is illustrated by the higher 'premia' at the lower end of the earnings distribution, and by the higher 'premia' for women relative to men. It is also noticeable that the variation in 'premia' and 'penalties' across the percentiles has increased over time, as has thereby the relative pay compression effect of the public sector, and that the 'premia' have also declined over time for men, confirming the earlier results.

Figure 3. Public sector pay 'premia' by qualification

Men

Highest Educational Qualification

Women

Highest Educational Qualification

■ *GHS (1983)* ☐ *BHPS (1991-5)*

Source: GHS (1983) and Pooled BHPS

Figure 4: Public sector pay 'premia' across the pay distribution

Men

Women

Percentile

Percentile

◻ *GHS (1983)* ◼ *BHPS (1991-5)*

Source GHS (1983) and Pooled BHPS

Figures 5 and 6 combine the results by qualification and percentile to look at the impact of public sector status on pay within and between educational groups. Both figures again use data on weekly earnings from the GHS for 1983 and the BHPS for the period 1991-95; the latter utilised as a pooled data set. The regressions are by each gender and educational qualification; covariates are a quadratic in age and, for the BHPS regressions, year dummies.[6] Dark bars are statistically significant 'premia' or 'penalties'. Unshaded bars indicate that the estimated coefficients on public sector status are statistically insignificant (at the 0.05 level).

Figure 5, four panels, provides the information for men. In the top left hand panel, the impact of public sector status on men with degrees across the income distribution is illustrated across the two time-separated data sets. Both for 1983 and for the averaged period 1991-95, working in the public sector clearly reduces pay inequality among graduates, relative to the private sector. In 1983, graduates at the 10th percentile working in the public sector obtained a 25% 'premium' over their private sector counterparts. The premium falls and becomes negative (albeit insignificant) as one moves up the income distribution in 1983. The same inequality-reducing effect is evident for graduates in the public sector from 1991-95 but the whole distribution of 'premia' have shifted downwards: indeed at the 25th percentile and above, graduates in the public sector obtain significant 'penalties' by not working in the private sector.

Thus, among male graduates, the stories implicit in Figure 2 and Table 1 are confirmed: the (relative) inequality-reducing effect of the public sector has been enhanced over time, but the 'premium' has eroded over time and indeed become a 'penalty' for the majority of male graduates. Because graduates are among the highest paid public sector workers on average, and because the highest paid graduates in the public sector have fared disproportionately badly, the public sector has reduced pay inequality both between and within groups demarcated by qualification.

This pattern is not, however, repeated amongst all qualification groups. In the next panel, for example, men who left school with 'A' levels are highlighted. Here the equalising effect of the public sector relative to the private sector is again apparent, with the negative gradient of 'premia/penalties' as we move up the income distribution. However, in 1983, these pay differences are only statistically significant at the 10th and the 90th percentiles. By 1991-95, those with 'A' levels at the lower percentiles (at the median or below) of the income distribution were receiving significant positive 'premia' by working in the public sector. These data do not therefore replicate the erosion of the male premium observed in Figure 2.

The reverse is observed in the next panel, however, which comprises those who left school with 'O' levels. Here there is no systematic evidence of an equalising effect of public sector status on pay, at least, within the group. In 1983, for example, between the 10th and 75th percentile, there is little difference in the 'premium' obtained by working in the public sector; indeed by 1991-95 it is clearly workers just below and around the median who fare the best. On the other hand, insofar as workers with 'O'
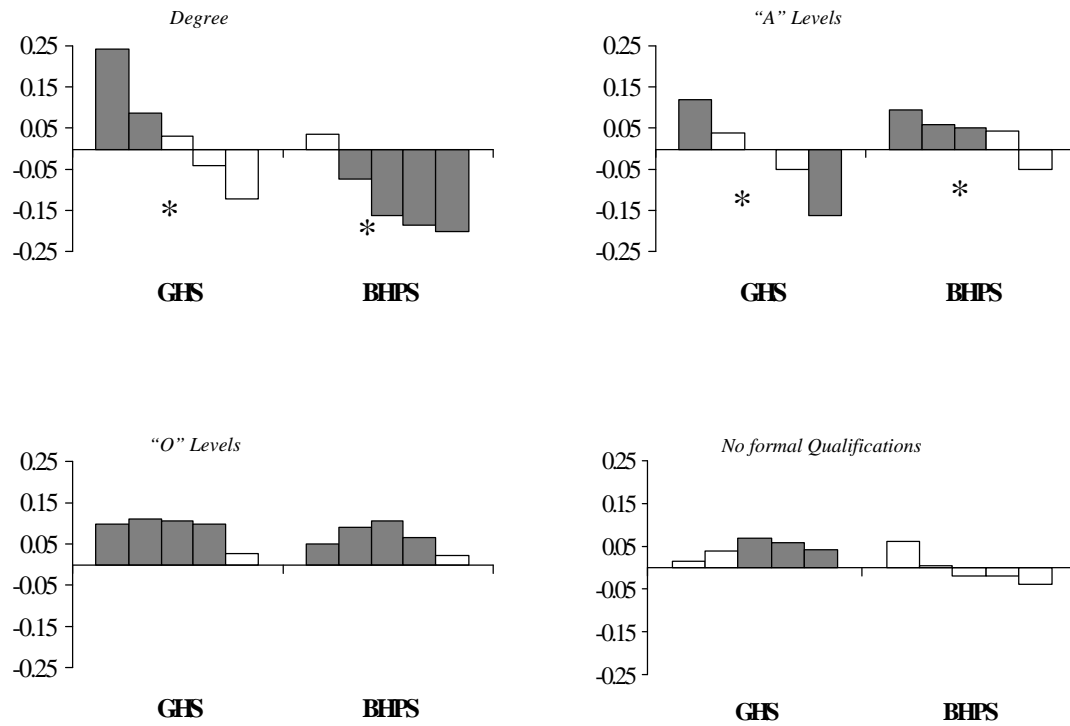
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[6] The estimated equation utilised here is: $w_i^p = a_i^t + bD_i + g_1 age_i + g_2 age_i^2 + e_i$, where w_i is the logarithm of weekly earnings of the ith individual, D is a binary variable denoting public sector status and the remaining terms comprise year specfiic intercepts (α^t) and quadratic in age. The p superscript to the earnings term denotes that the object is to estimate the pth percentile of the earnings distribution conditioned on the independent variables.

levels have lower *average* wages than those with degrees and 'A' levels, there is an equalising effect *between* groups attached to public sector status. However, the average level of the 'premium' for this group has declined between 1983 and 1991-95 especially at the lower percentiles.

Comparison of the two top education categories with those with 'O' levels suggest that the public sector has a between-group equalising effect. Examination of the two top educational categories suggests a within-group equalising effect. For those with degrees and 'O' levels, there is a clear erosion of the public sector 'premium' over time. However, as the last panel suggests, those leaving school with no qualifications offer yet another permutation which is, in many ways, the most interesting illustration of the impact of policies towards the public sector in the 1980s and 1990s.

In 1983, most men working in the public sector with no qualifications earned a significant 'premium' over their counterparts in the private sector, although there was no clear equalising effect across the distribution of public sector pay for unqualified workers. By 1991-95, the 'premium' for unqualified workers had disappeared and public sector pay was not significantly different from the private sector for this group, although there is some evidence of a within-group equalising effect of public sector status. It is tempting, and not unreasonable, to believe that this elimination of the public sector premium arose from the policies of compulsory competitive tendering and contracting-out pursued enthusiastically by successive administrations over the last two decades. This provides some evidence of 'levelling down' between groups to the private level of pay, although the poorest of the unqualified have fared slightly less badly than those with no qualifications who had initially been paid relatively more.

Figure 5 Quantile regression estimates of the public sector wage premia/penalty for men by highest educational qualification .

Notes: Successive bars (reading from left to right refer to the 10th, 25th, 50th, 75th and 90th percentiles. Dark bars denote that estimates are significantly different from zero at the 5% level or below and * means that the test of parameter equality of the public sector wage effect across percentiles is rejected at the 5% level or below.
Source: General Household Surveys (1983) and British Household Panel Surveys 1991-1995
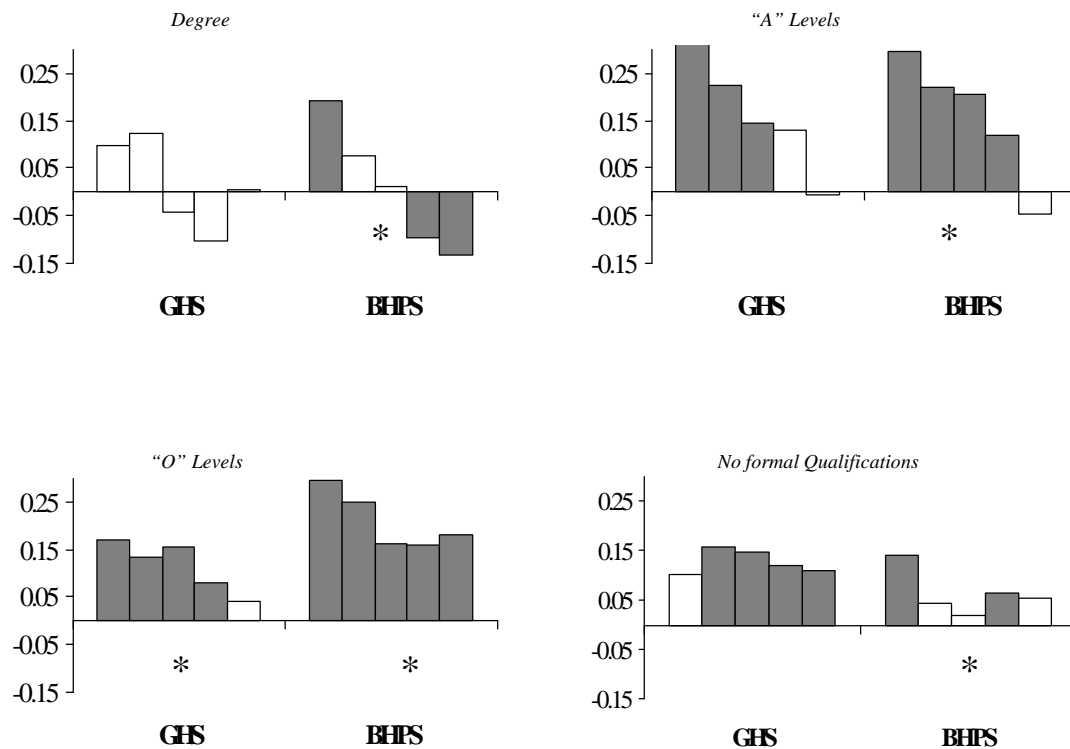
Figure 6 illustrates the results for women, and again we observe a heterogeneous experience across qualifications and the income distribution. Focusing first on women with degrees (the top left-hand panel), there is evidence of a negative gradient in both years in the 'premium'/'penalty' across the income percentiles, as with men. However, unlike men, there is no clear downward shift in the return to female graduates between 1983 and 1995. Indeed all the premia in 1983, were insignificant. In 1991-95 it is apparent that female graduates do significant better than their private sector counterparts at the lower end of the distribution and significantly worse at the top end. The within-group equalising effect of public sector status is very clear in the later period for this group.

The next panel examines women with 'A' level qualifications. There is clear evidence of within-group equalisation of pay within the public sector but again, very little evidence of an erosion of the average public sector 'premium' over time. Indeed taking, say, a woman with 'A' levels at the median, the premium has risen from 14% in 1983 to 17% in 1991-95. This group will include some, such as nurses, who have fared relatively well in pay reviews, but it is nevertheless interesting that more qualified women in the public sector appear to have maintained or enhanced their relative pay in the period 1983-95. As we shall see, a different pattern emerges at the lower end.

The next panel examines women with 'O' levels. Here the evidence of a within-group equalising effect on public sector status is much less apparent and there is also again evidence of an improvement in the position of the public sector over time: by 1991-95 the public sector 'premia' were positive and significant at all the percentiles of the distribution for which estimates were made.

The last panel offers the biggest contrast with what has gone before. Among women with no qualifications, in 1983 there was evidence of a significant public sector 'premium' at the 25th percentiles and above, with enhanced within-group inequality relative to the private sector: that is, a positive gradient in the 'premium' relative to the percentile of the income distribution. This positive premium has largely disappeared by 1991-95, with only the 10th and the 75th percentiles benefiting from public sector status. This therefore confirms the result for unqualified men, namely, that the big losers relative to the private sector from trends in public sector pay determination in the late 1980s and early 1990s have been unqualified workers. Again, competitive tendering and contracting-out of basic services seem likely to have played a major role in this.

Figure 6 Quantile regression estimates of the public sector wage premia/penalty for women by highest educational qualification

Notes: Successive bars (reading from left to right refer to the 10th, 25th, 50th, 75th and 90th percentiles. Dark bars denote that estimates are significantly different from zero at the 5% level or below and * means that the test of parameter equality of the public sector wage effect across percentiles is rejected at the 5% level or below.
Source: General Household Surveys (1983) and British Household Panel Surveys 1991-1995

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4. How do we interpret public sector pay 'premia' and 'penalties'?

So far, the paper has used a standard procedure, the estimation of wage equations, coupled with less standard procedures, such as the use of quantile regression, to examine wage differences between the public and private sector. Clear evidence of public sector pay 'premia' and 'penalties' has emerged, varying across time, by gender and educational qualification, and across the earnings distribution. But are these differences in pay between the public and private sector 'true' premia and penalties, or are there other factors at work? And if they are 'true' differences, what are the consequences for the quality of provision of public services?

Taken at face value, the estimated conditional[7] premia and penalties are a consistent prediction of what a worker of given characteristics *taken at random* would gain (or lose) from moving from the private to the public sector. However, there are various alternative interpretations of the results. In this section, we provide a list of these possible interpretations with brief comments on each one. In the next sub section, we focus in greater detail on the possibility that unobserved individual attributes are the key reason for observing these premia and penalties.

• The differences may reflect unobserved individual characteristics in aptitude for training, quality of educational qualifications (for example a First Class rather than a Pass Degree), ability, preferences for different types of jobs, and so on. This means that differences in predicted wages are simply picking up differences in unobserved individual attributes. It could also be the case that such unobserved skills are more evenly spread within the public sector.

Comment

If individuals are free to move between the public and the private sectors, it seems very plausible that at least part of the differences in the wage distributions arises from differences in unobserved labour quality. We have shown that the estimated wage gain, controlling for observed measures of skill (education and age) is very different to the raw measure; it is likely therefore that other unmeasured skills will have similar effects. In the next section we exploit the longitudinal structure of the BHPS to look at the relative changes in wages of people who move in and out of the public sector which could control for such a possibility. We argue, however, that this will only control for individual specific differences if job moves across sectors are random, which seems unlikely.

• the results are biased as a result of other omitted explanatory variables: that is, there are other characteristics of workplaces which 'explain' pay which, were they to be introduced into the estimated equations, would eliminate the 'premia' or 'penalties'. An example is trade union status.

Comment

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7   That is, controlling for the characteristics included in the regression equations.

As suggested in the introduction to the paper, trade union status is highly correlated with public sector affiliation. Adding a binary (dummy) variable for union status in a regression equation covering all workers is likely simply to generate a problem of collinearity. A procedure suggested, and implemented in OLS regressions of BHPS data on hourly earnings, by Disney *et al* (1998) is to compare the pay of public sector workers with *unionised* private sector workers. Any 'penalty' or 'premium' found for working in the public sector is then conditioned on union status. The results of the exercise show that a significant 'premium' remains for female workers in most parts of the public sector but is eliminated for male workers (as is confirmed in Figure 2 above). An interesting finding is that unionism raise the wages of unqualified workers by a greater amount in the private sector than the public sector, other things being equal. However, the fact that, especially for men, much of the "mark-up" is explained by union status does not imply that there is no public sector wage effect for men. If workers in the public sector, for some intrinsic reason, are more likely to be unionised, then this merely shows the route by which public sector status affects wages.

Other possible candidate variables are training, region and occupation. Inclusion of regional dummies does not eliminate 'public sector pay effects' [8]. The role of occupational affiliation has been considered in the time series analysis underpinning Figure 2. Training variables may be endogenous to sectoral affiliation and this issue is considered more fully below.

• 'compensating differentials': that is individuals in the public sector have other non-monetary attributes which offset pay differences between the public and private sectors. These may include working conditions, fringe benefits, and so on.

Comment

Since individuals self-select into jobs according to a variety of personal and job characteristics, this issue is hard to pin down. There is some evidence of 'compensating variation' in pay in the UK but little evidence that the characteristics of jobs which require 'compensation' are disproportionately present in the public sector, such as adverse working conditions. Furthermore disparate measures of job satisfaction (which may, in any event relate to pay) provide little support for pay disparities across the two sectors. Among fringe benefits, the main pecuniary value is attached to occupational pensions, which are disproportionately attached to public sector jobs, especially among white-collar employees. The fact that there remains a public sector 'premium', especially among women, and that the main 'losers' in the public sector in the last decade have been among the least qualified workers, who are least likely to be covered by occupational pension schemes, militates against this general explanation.

• Some of the differences in within group inequality between the public and the private sectors could arise simply because public sector workers are less vulnerable to shocks to wages, rather than any difference in the distribution of and the returns to unobserved skill.

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[8] For a more comprehensive attempt to do these kinds of decompositions, see Blackaby *et al*, 1997.

Comment

As is shown in the next section, shocks to wages are certainly smaller in magnitude in the public sector, but this by no means explains away all of the public sector effect on the distribution of wages.

• the consequences of risk-aversion among workers; if shocks to wages or employment are greater in one sector than the other, then individuals in the sector prone to greater shocks would wish to obtain higher wages.

Comment

This argument, which is analogous to the 'compensating variation' argument, is unlikely to operate here. As argued previously, shocks to the private sector are likely to be greater in magnitude and frequency than in the public sector but notwithstanding this fact, public sector workers are more likely to obtain 'premia' than 'penalties'. However the disproportionate incidence of shocks may be a explanation of second order importance for unqualified workers who have seen their public sector pay 'premium' eliminated over a period in which unskilled workers in the private sector may have faced greater volatility of employment prospects due to technical change, the growth of small businesses, and so on. If, however, more risk averse workers select themselves into the public sector, greater volatility in one sector may have no clear implication for a sectoral premium.

In this sub-section, therefore, we have examined alternative hypotheses concerning the nature of the public sector 'premia' and 'penalties' estimated in previous sections. Three of the alternative 'explanations' for the differentials considered: omitted variables, compensating variation and attitudes to risk, all suggest that the estimated effects of public sector status may be biased, but not away from zero: that is, they do not suggest the 'premia' and 'penalties' are overstated, rather the reverse. However, we now exploit the panel structure of the BHPS to try to control for unobserved individual effects.

5. Comparing individual wages over time

This section assesses whether it is possible to exploit the panel nature of the BHPS data to control for individual-specific differences as discussed above. Such models, commonly called 'fixed effects' models, treat unobserved determinants of wages as being constant for each individual over time. The effect of explanatory variables on, in this case wage determination, is then obtained by exploiting their time series variation within an individual's history.[9] A set of individual specific constant terms (fixed effects) are added to the regression to control for the unobserved components of wage determination which may be correlated with public sector status.

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[9] Aa rather general fixed effect model can be written

as: $\ln w_{it} = f_i + a_t + b \left(D_{it} - \overline{D_i} \right) + b \overline{D_i} + g \left(X_{it} - \overline{X_i} \right) + g \overline{X_i} + e_{it}$

where f_{it} are the individual fixed effects, possibly correlated with public sector status and D is here a dummy for public sector status, X is a vector of other explanatory variables and a bar refers to an individuals mean over time

Table 4 contains a number of OLS specifications which attempt to measure the impact of public sector status on the average wages of groups differentiated by qualifications and gender. Column 1 contains simple OLS regression estimates pooled over the whole BHPS sample with our standard covariates and year dummies. These equations of course obtain similar results to those obtained earlier: significant positive public sector premia with the exception of men with degrees (where the relationship with public sector status is negative and significant) and unqualified men (where the coefficient is insignificant). The results repeat the findings of the quantile regressions that it is those with school leaving qualifications which fare best in the public sector. The average premium for women, as 19%, is far higher than that for men (4%).

The second column removes all the time series variation in the data by treating each sampled individual as a separated group, averaging the values across the five annual observations for each individual, and then regressing the grouped average on the identically grouped covariates and time dummies (to capture the fact that not all individuals are observed in every period). This equation therefore examines the component of the differences in predicted wages that is solely attributable to differences in average characteristics *across* individuals.[10] It is apparent that the coefficients are very close to those obtained by the pooled regression: individual differences are a major component of the predicted association between public sector status and wages.

In contrast, the third column removes all the cross-sectional variation (the individual differences) by focusing on the time series variation, relative to the grouped means, of the variables. By netting out the individual 'effects', the equation examines the component of the differences in predicted wages that is attributable to variations from the grouped mean in the explanatory variables of interest, including public sector status.[11] So, for example, if an individual spent two years of the five in the public sector, the grouped mean is 0.4 and, in the third column, the variable will take the value +0.6 in two years and -0.4 in three years. We are therefore interested in whether these positive and negative values are associated with changes in individual wages from the grouped means of each individual, other things being equal.

It will be noticeable that these coefficients are rather different from those obtained in the previous columns, especially for men. For example, the only significant positive 'premium' for men is for graduates: taken at face value, the coefficient suggests that graduates who move to the public sector on average obtain a 13% wage gain. For women, almost all the coefficients are positive and significant, and suggest that transitions into the public sector are associated with average significant wage gains for each qualification group. However the average wage gain, of just under 14%, is

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[10] This model can be written as: $\overline{w}_i = \sum_{it=1}^{5} a_t + b\overline{D}_i + g\overline{X}_i + \overline{e}_i$ where D, likewise defined,

takes values at 0.2 intervals between 0 and 1 depending on the time spent in the public sector. The fixed effects, f_is in footnote 9 are asuumed in this case to be zero or uncorrelated with the individual group means of the explanatory variables

[11] This model naturally follows from the model in footnote 9. It can be written as:

$$w_{it} - \overline{w}_i = a_t - \sum_{it=1}^{5} a_{it} + b(D_{it} - \overline{D}_i) + g(X_{it} - \overline{X}_i) + e_{it} - \overline{e}_i$$

where the coefficients are as interpreted in the text.

somewhat lower than the 19-22% obtained from the models that do not control for individual-specific differences. In principle, therefore, this last model suggests that individual fixed effects are important and casts some potential doubt on the 'premia' and 'penalties' calculated by the more conventional approaches.

Table 4: Pay 'premia' across and within groups

	Men			**Women**		
	All Differences	*Across Individual differences*	*Within individual differences*	*All Differences*	*Across individual differences*	*Within individual differences*
	(1)	*(2)*	*(3)*	*(1)*	*(2)*	*(3)*
All Education Groups	0.042 *0.013*	0.050 *0.022*	0.037 *0.028*	0.191 *0.011*	0.218 *0.018*	0.135 *0.024*
No Formal Qualifications	0.006 *0.032*	-0.011 *0.050*	0.060 *0.077*	0.137 *0.022*	0.159 *0.035*	0.177 *0.058*
O level or Below	0.091 *0.023*	0.101 *0.044*	0.046 *0.047*	0.212 *0.016*	0.219 *0.028*	0.078 *0.035*
At least one A Level	0.089 *0.022*	0.106 *0.039*	-0.064 *0.046*	0.264 *0.023*	0.295 *0.039*	0.173 *0.045*
Degree level Or above	-0.094 *0.028*	-0.085 *0.047*	0.132 *0.062*	0.066 *0.033*	0.135 *0.063*	0.166 *0.061*

Source: BHPS panel 1991-95

The wage gains or losses associated with sectoral changes are not immune from the problem of interpretation, however. Individuals move either because they believe that the wage gains to moving exceed those obtained from staying within the same job, or because their are differential non-monetary attractions to different jobs (perhaps their preferences have changed, or their household characteristics), or some combination of both. Thus wage gains on moving cannot be given the interpretation of a random change of sector

One variant of this counter-argument is to suggest that individuals differ in their aptitudes for different jobs. Individuals self-select into the occupations, including public sector status, where their aptitudes are best suited. While such a model does not predict a given public sector 'premium' or 'penalty' *per* se, it suggests that predicted wages for individuals that ignore this self-selection are likely to be biased estimates. What is then required is an equation to explain the decision to join a particular occupation, or the public sector, in addition to the model of wage determination. But such a joint model requires identifying restrictions, which are not always obvious.[12]

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[12]   For example, unpublished work by Dustmann and van Soest (1997a) use parent's occupation as an instrument in order to explain occupational choice between the public and private sector using West German data. But parental decisions may also correlate with

It should be noted that a model with wage gains attached to job moves is not surprising - this is why many people move jobs. However it is somewhat more difficult to explain why in the third column of Table 4 for men and women, only moving to the public sector is associated with wage gains. A corollary of our interpretation of the coefficients in the within-group estimates of the effect of public sector status is that movement to the private sector is associated with wage *losses*. Why should this be the case? One can think of several possible explanations, all of which suggest that there are 'spurious' correlations between public sector status changes and wage changes:

• If individuals acquire better job-specific skills in the public sector than in the private sector, then movement out of the public sector will induce a fall in (relative) wages.[13] This does not, however, mean that there is a public sector wage 'premium' as such; it should be thought of as an argument concerning differential returns to tenure.

• Any relationship between sectoral status and wages will be partially hidden by any misclassification in public sector status. Looking at deviations of observations from their means over time will exacerbate such errors. If these misclassifications are random, then this will tend to bias the estimated "within-group" effect towards zero.

• When public sector workplaces are in the process of moving towards a more competitive structure of 'downsizing' in some other form, those workers that quit or are made redundant will not normally be a random sample of the workforce as a whole. As there has been a secular decline in the size of the public workforce, selective retention of the better quality workers by public sector managers might have led to a rise in average productivity and thus in the observed wage effects associated with sectoral transitions.

• If individual moves between sectors are associated with relative shocks to technology affecting the relative wages of individuals of different skills, differential correlations between sectoral status and wage changes might be observed across the sample.

Some evidence that 'movers' are non-random can be gleaned from Table 5, which illustrates the dispersion of wages in the public and private sector over time, conditioned on gender, age and education. These data show a slight increase in inequality over time but, much more clearly, a disparity in inequality between the private and public sectors, replicating the result in Table 1. If we take out the individual-specific effects, as calculated in Table 4, then we find that the standard deviation of wages of those who always worked in the public sector throughout the

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unobserved factors (such as ability) which affect an individual's wages. Dustmann and van Soest (1997b) survey a number of other studies which attempt to model the choice between public and private sector and show that identifying restrictions are *ad hoc* and often quite contradictory across different studies. A further complication is that both employers and employees may use selection procedures in the event that both the level and inequality of pay differ between the two sectors: see Lemieux (1998).

[13] This should not be interpreted as saying that government training has higher returns than private sector training, since the evidence suggests that the reverse may be true: see Heckman (1998).

period is 0.218 whereas it is larger, at 0.256, in the private sector. But the standard deviation of wages of those who move between sectors is 0.275. This suggests, if no further confirmation were needed, that the pattern of wage changes of job movers is very different from that of job 'stayers'.

Table 5: Wage dispersion of movers and stayers

Standard Deviation of Wages, conditional on gender, age and education in:

	Public Sector	Private Sector
1991	0.426	0.494
1992	0.394	0.495
1993	0.399	0.520
1994	0.420	0.481
1995	0.431	0.504

Standard Deviation of Wages, conditional on gender, age and education minus individual specific effects

Always in the public sector	Always in the private sector	Moves between sector
0.218	0.256	0.275

The most plausible way to proceed further therefore is to exploit any 'exogenous' variation in public sector status. We have argued above that neither differences across individuals nor changes in an individual's status over time satisfy this criterion. Over the 1980s and 1990s there has been a secular decline of the public sector as a result of contracting-out and privatisation. This has impacted on differently across industries and occupations at any point in time. It ought to be possible to use these policy changes to construct an instrument for changes in public sector status.[14] One example of this approach would be to use occupation. Some occupations are almost wholly public sector and some almost wholly private sector; others have moved from being largely public sector to private sector (such as telephone engineers, or railway train drivers). Experiments with sufficiently fine occupational disaggregations suggest that occupational affiliation is a suitable instrument for public sector status, and that changes in the public sector affiliation of given occupations over time may be an adequate means of eliminating individual-specific effect.

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[14] Jakubson (1991) suggests, and utilises, an instrumental variable procedure in examining the closely related problem of estimating the wage 'premium' attached to union status in panel data.

6. Conclusions

What conclusions can be drawn from these findings? Using evidence from repeated cross sections of the New Earnings Survey, the British Household Panel Study, and one year of the General Household Survey, there is clear evidence that men and, especially, women in the public sector have earned a pay 'premium' in the past, but that this 'premium' has been eroded over time and has now all but disappeared for men. This provides strong *prima facie* evidence that the public sector has fared worse than the private sector in the past two decades, albeit from an apparently more privileged starting point.

A second striking feature of the data is that the pay distribution is more compressed in the public sector and that, although there has been some increase in public sector pay inequality in the past two decades, the more rapid increase in private sector inequality has enhanced the ability of the public sector to compress pay.

The public sector can potentially compress pay in two dimensions: by reducing between-group inequality (when groups are defined by, say, highest educational qualification) and within-group inequality. Quantile regressions of public sector pay 'premia' and penalties' throw up some complex effects. Women almost uniformly do better than men in exacting public sector 'premia', which reduces between-group inequality in the labour market in one dimension: gender. Among graduates, the public sector also has both inequality-reducing features: male graduates in the public sector face a pay 'penalty' which has been increasing over time, and this adverse effect is felt disproportionately by the highest paid graduates.

Other groups do not exhibit between and within-group reductions in inequality in the public sector. The sharpest example is among those with no qualifications, where 'premia' have been almost entirely eroded amongst all but the lowest paid women. We interpret this as resulting from the policy of CCT and privatisation which has been followed since the mid-1980s. The main beneficiaries from public sector 'premia' are those with school leaving qualifications, especially women, but there is evidence of erosion of these premia for men.

Alternative explanations for these measured 'premia' and 'penalties' were considered. Most seemed to hold little credibility bar the possibility that these pay differentials constituted differences in labour quality between the two sectors. Indeed where individuals are free to join either sector, it is hard to envisage any alternative explanation. Suppose, for example, that the different percentiles of the female graduate pay distribution in Figure 5, Panel A, represented, in ascending order, those with Pass Degrees, 3, 2.2, 2.1 and First Class degrees. The evidence of pay 'premia' and 'penalties' for 1991-95 would suggest that those with Pass and Third Class degrees would join the public sector whereas those with 2.1 and First Class degrees would enter the private sector. The quality of graduates in the public sector would on average be lower than that in the private sector. Furthermore the systematic erosion of returns to male graduates exhibited in Figure 4 Panel A over time would suggest that the quality of the graduate intake employed in the public sector would have systematically declined since the mid-1980s, and that better qualified graduates would

have moved to the private sector as opportunities arose. A similar argument could be made for the other qualification groups.

Although this is the basic conclusion to be drawn from these findings, this illustration is obviously a simplistic one. Pay inequality and measurable ability (if indeed class of degree is a good measure of ability) may not coincide. Individuals may have differing aptitudes for different jobs and may self-selected, or be selected, between the two sectors on criteria other than overt qualifications. In these circumstances, measured pay 'premia', in particular, may reflect individual job-specific attributes rather than deviations from a 'competitive' job market (i.e. one in which, other things being equal, job-specific premia and penalties are zero).

This possibility was examined by exploiting the panel element of the BHPS data set in order to decompose variation in pay into that attributable to individual-specific characteristics from that attributable to temporal variations in other variables (including public sector status) holding individual-specific effects constant. The results suggested a clear relationship between individual-specific characteristic and the size of the pay 'premium' or 'penalty'. However there was also evidence of a somewhat different set of premia (by qualification) attached to changes in public sector affiliation, holding individual characteristics constant. Since moving between jobs is voluntary, and is likely to be determined by, in part, the promise of wage gains from moving as opposed to wage gains from tenure in the same job, this observation of asymmetric wage gains from moving in one direction (from private to public sector) is somewhat puzzling.[15] We therefore described a number of possible factors that might underpin this asymmetry and suggested further research strategies to explore this issue. In the interim, the results here provide some illuminating evidence on public sector pay determination, and what has happened to public sector pay relative to the private sector over the last two decades.

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[15] For further discussion of the general issue of job mobility and earnings growth, see Topel (1986).

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