The Impact of Deunionisation on Earnings Dispersion Revisited

John T. Addison
Department of Economics, University of South Carolina (U.S.A.) and IZA

Ralph W. Bailey
Department of Economics, University of Birmingham (U.K.)

W. Stanley Siebert
Department of Commerce, University of Birmingham (U.K.) and IZA

June 2004

ABSTRACT

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This paper examines the effects of union change in Britain on changes in earnings dispersion 1983-1995. We investigate not only the decline in union density, but also the greater wage compression among unionised workers, as well as changes in union density across skill groups. For the private sector, we find that deunionisation accounts for little of the increase in earnings dispersion. What unions have lost on the swings (lower density), they have gained on the roundabouts (greater wage compression). But for the public sector we find strong effects, because unions are increasingly organising the more skilled. This change in the character of public sector unions means that they no longer reduce earnings variation nearly as much they once did.

JEL Classification: D3, J31, J51

Keywords: **deunionisation**, union structure, earnings dispersion, wage gap, variance gap, private/public sector

Corresponding author:

John T. Addison
Department of Economics
Moore School of Business
University of South Carolina
Columbia, S.C. 29208
U.S.A.
Tel.: +1 803 777 4608
Fax: +1 803 777 6876
Email: ecceaddi@moore.sc.edu

1. Introduction

The British earnings distribution has widened considerably since Mrs Thatcher's sustained attack on the unions. The possibility of there being a connection between the two developments has been the subject of a fairly large literature. In this paper, we revisit the subject, using the general variance decomposition technique first put forward by Freeman (1980) and Metcalf (1982). We follow Card's (2001) modification of this approach to allow for changes in the "structure" of unionisation across the workforce; specifically, the greater decline in union density among the lower paid than the higher paid. Using this method, and allowing for changes in union wage and variance gaps, as well as union density, we show that the effect of deunionisation on earnings dispersion has on the whole been more modest than generally believed.

Certainly, casual inspection shows a striking association between movements in union density over time and changes in the earnings dispersion (see Leslie and Pu, 1996, Figure 4d). Emphasising this link, Schmitt (1995, p. 201) has calculated that the decline in union density could account for 21 per cent of the rise in the pay premium for a university degree and for 13 per cent of the increase in the non-manual differential, 1978-88. Machin (1997, p. 653) obtains more dramatic results: comparing 1983 with 1991, he calculates that the male earnings variance would have been 40 per cent less had the 1983 levels of union coverage prevailed in 1991. Bell and Pitt (1998, pp. 520, 523) also conclude that deunionisation between the early 1980s and 1990s widened the male earnings distribution – in this case by about 20 per cent.

That said, not all research points the same way. Notably, in their recent analysis of the wage distribution of U.K. males, Gosling, Machin, and Meghir (2000, p. 661) do not even mention unions. Instead, they emphasise education: the way recent cohorts have improved their acquisition of education, as well as changes over time in the returns to education. Moreover, Card (2001) has pointed out that the equalising effects of unionism can be exaggerated if we do not allow for the fact that unionisation effects vary across the wage distribution. He shows that if the *structure* of unionisation changes, so that union density falls less over time for the higher paid – as has happened both in the U.S. and the U.K. (see below) – then estimates of the equalising tendency of unionisation can be reduced.

The plan of the paper is as follows. In the next two sections we first describe the datasets used before reviewing the variance decomposition approach (and deriving some descriptive results on changes in unionisation over time). In the fourth section we give the results of the variance decomposition analysis. Then, in the fifth section, given the diverging trends of unionisation in the public and private sectors, we present some results for the two sectors separately. The final section provides a summary and conclusion.

2. The Data[1]

We require data on earnings, unionisation, and individual characteristics over the last two decades. The earliest dataset available is the 1983 General Household Survey (OPCS, 1986) dataset (see also Machin, 1997; Gosling, and Lemieux, 2001). 1983 is the only year in which the General Household Survey (GHS) included a union membership question, but this year is early enough to represent the "golden age" of unionism. For the later period, we use the Labour Force Survey (LFS), which has always asked a union question, but has only asked an income question since 1993. We choose the 1995 LFS (OPCS, 2000), because 1995 represents the nadir of the union movement's fortunes, and well precedes Labour's 1997 election victory. Most of the changes in unionisation and earnings dispersion had occurred by 1995, as shown in Figure 1 (see also Card, Lemieux, and Riddell, 2003), and we therefore concentrate on this period.

The two datasets are comparable, as can be seen from Figure 1. Figure 1 shows that the GHS measure of earnings inequality steadily increased from the late 1970s to the early 1990s, and the two surveys yield similar measures of inequality for 1995. While the measures are more divergent in 2000, both sources agree that the rise in inequality plateaued in the 1990s. Moreover, union status is measured by the same question in both surveys: 'Are you a member of a trade union or staff association'? As regards union coverage, however, which would arguably better address the issue of union impact on wages, the survey questions differ. In the GHS the question is: 'Is there a trade union or staff association where you work, which people in your type of job can join if they want

[1] The original data creators, depositors or copyright holders, and the U.K. Data Archive bear no responsibility for our analysis and interpretation of the General Household Survey and the Labour Force Survey.

to?' In the LFS the question is simply: 'At your place of work, are there unions, staff associations, or groups of unions?' Hence, as with most of the literature, we restrict the analysis to union membership alone.

(Figure 1 near here)

As regards the wage variable, we take several steps to ensure comparability. For both datasets, we restrict the sample to individuals aged 16-66 years, and not self-employed. For both, we use the same hourly wage variable computed by dividing weekly earnings by usual hours. In addition, we convert the 1983 wage data to 1995 values using the retail price index. Finally, for both years we trim off observations with implausibly low or high wage rates, excluding hourly wages outside the £1 to £45 range.[2]

3. Accounting for the Impact of Deunionisation

There are different ways to account for the impact of deunionisation on earnings dispersion. First, various counterfactuals are possible. Most researchers have followed Freeman (1980) in computing the impact of deunionisation by asking what earnings dispersion would be if union density had not declined. However, there are two other important dimensions of unionism: the union wage gap, and the variance gap (the difference in the variance of wages for union and non-union workers). It is worth considering counterfactual changes in these dimensions as well. Second, as noted above, we can allow for differences in union density across skill groups. Let us look at these points in turn.

Beginning with the basic two-sector formulation, average wages $\overline{w}$ are

$$\overline{w} = \mathrm{U}\,\overline{w}^{\mathrm{u}} + (1-\mathrm{U})\,\overline{w}^{\mathrm{n}}, \tag{1}$$

where U is union density and the superscripts u and n refer to union and non-union respectively. This equation can be rewritten in terms of union "power", namely, union density multiplied by the union/non-union wage gap

$$\overline{w} - \overline{w}^{\mathrm{n}} = \mathrm{U}\Delta_{\mathrm{w}}, \tag{2}$$

[2] These adjustments have a minor effect. Our 1995 figure for aggregate union density is 33.1%, comparable with Brook's (2002, Table 1) figure of 32.3% for employees in Great Britain.

where $\Delta_w = \bar{w}^u - \bar{w}^n$ is the wage gap. This equation shows that the term $U\Delta_w$ determines the extent to which average wages are pushed above non-union wages, hence our term union power. It is important to consider how union power differs across the skill groups, which we do below.

The impact of unionism on the variance of average wages is what we wish to assess. Equation (1) provides a framework for estimating this effect. According to this equation, the variance of wages can be expressed in terms of union density, and the union-non-union wage and variance gaps. Using Freeman's formula (1980, p. 19), the variance (V) is

$$V = V^n + U\Delta_v + U(1-U)\Delta_w^2, \qquad (3)$$

where $\Delta_v = V^u - V^n$ is the union-non-union variance gap, V^u and V^n being the variance of wages in the union and non-union sectors, respectively. The impact of unionism is then $D=V-V^n$, namely, the overall wage variance minus the (larger) wage variance that would prevail without unionism. As can be seen, the impact can be decomposed into a term involving the union variance gap, $U\Delta_V$, the so-called '*within-sector*' effect, which is generally negative since Δ_v is generally negative. The impact will also depend on the term $U(1-U)\Delta_w$, the '*between-sector*' effect, which is positive since unions widen wage dispersion due to the union wage gap. On net, the impact of unionism on the variance of average wages is generally negative, since the variance gap effect tends to outweigh the wage gap effect.[3]

In assessing the impact of unionism on changes in wage variance over time – our focus here – we need to hypothesise what would have happened if unionism had taken a different path, that is, develop a counterfactual. Various approaches are possible. First, let us write an equation for the change in impact between time periods 0 and 1

$$D_1-D_0 = V_1-V_0 - (V^n_1-V^n_0) = U_1\Delta_{1v} - U_0\Delta_{0v} + U_1(1-U_1)\Delta_{1w}^2 - U_0(1-U_0)\Delta_{0w}^2, \qquad (4)$$

where the subscripts indicate the time periods. Card (2001) compares D_1 with D_0. The counterfactual here is then the change in the non-union wage variance, $V^n_1-V^n_0$. For

[3] Equation (3) will not hold exactly if we adjust the wage or variance gaps for differences in characteristics of union and non-union workers, as we sometimes do (Table 1 shows such an adjusted wage gap). Equation (3) is basically useful because it provides a foundation for specifying the union within- and between-sector effects.

example, if deunionisation is causing a decline in union impact on the wage variance, the (negative) impact of unionisation will be smaller in period 1 than period 0; that is, in absolute terms, $D_1 < D_0$. This condition requires the change in the overall wage variance to be greater than the change in the non-union wage variance, or $V_1 - V_0 > V^n_1 - V^n_0$. Thus, changes in the non-union wage variance are meant to control for changes in the "other factors" which determine the overall wage variance. On this argument, the extent to which an increase, say, in overall wage variance is greater than an increase in the non-union variance, measures the importance of reduced union power (i.e. lower density, and reduced wage and variance gaps).

But others (e.g. Freeman, 1991) compute a counterfactual union impact for period 1, D'_1, based on union density in period 0, U_0. The union variance and wage gaps are held constant at their period 1 levels. The measure here is

$$D_1 - D'_1 = (U_1 - U_0)\Delta_{1v} + (U_1 - U_0)(1 - U_1 - U_0)\Delta_{1w}^2. \quad (5)$$

As can be seen, this measure weights the change in union density by period 1's variance gap, Δ_{1v}, which is the main term given that the second term involves the near-zero factor, $1 - U_1 - U_0$. Thus, $D_1 - D'_1$ shows the extent to which the union impact in period 1 would be increased if period 0's union density *alone* prevailed. However, ignoring changes in wage and variance gaps over time seems arbitrary to us. Variance gaps – which are also a measure of union power – have in fact increased over time in Britain, as we will see. Therefore, while we will report $D_1 - D'_1$ values for some analyses, for comparative purposes we will generally rely on the $D_1 - D_0$ measure.

Let us now turn to the point that unionisation varies across skill groups. A way of showing this variation, following Card (2001), is to define skill groups using predicted earnings percentiles based on the non-union wage structure. We can then compare union densities across these skill groups.[4] We can also consider how union "power" (viz.

[4] The prediction equation is based on Card's (2001, p. 303) specification, and includes years of education, dummies for race, marital status and (5) regions, linear, quadratic and cubed experience, and interactions of five levels of education with linear and quadratic experience. It is fitted to non-union workers only, and then used to assign union and non-union workers into ten equally-sized groups.

density multiplied by the wage gap, noted earlier) varies across skill groups. The picture for males (females) is given in Figures 2a and 2b (Figures 3a and 3b).

(Figures 2a and 2b near here)

Figure 2a shows that, for males in 1983, union density was lowest among the least skilled (lowest decile), highest at the third decile and then somewhat lower for the more skilled. Corresponding data for 1995 data show density falling most among the least skilled, leaving the highest density at the top decile. The male union density measure thus suggests that unions help a labour "elite". However, the picture is different for union power. Figure 2b shows that union power was definitely greater both in 1983 and in 1995 for the least skilled. Nevertheless, it is evident that there has been a significant fall in union power among the less skilled in 1995. For females, the union density and union power graphs are more similar. Over time, both density and power have fallen among low skill groups, but have remained quite steady in the top three deciles. Thus, Figure 3b shows that, particularly in 1995, there is a positive covariance between union power and skill for women, so that unionisation appears to benefit an elite.[5]

(Figures 3a and 3b near here)

Allowing for different union effects by skill category requires modification of equation (3). Card (2001, p. 298) shows that the formula becomes

$$V = V^{n*} + \overline{U\Delta_V} + \overline{U(1-U)\Delta_w^2} + \mathrm{Var}[U(c)\Delta_w(c)] + 2\mathrm{Cov}[w^n(c), U(c)\Delta_w(c)]. \qquad (6)$$

V^{n*} is the non-union wage variance, namely, the variance that would result if all workers were paid according to the non-union wage structure.[6] U(c) is union density in the c

[5] It is likely that union power is overstated for low-skilled workers, and understated for the high skilled. Card (2001, p. 300) finds that low-skilled union workers have higher unobserved skills than their non-union counterparts, and the opposite for high-skilled union workers. Hence the true wage (in efficiency units) for the low-skilled union worker will be lower than the observed wage, leading to an overstatement of union power here, with precisely the opposite result for the high skilled. We do not make an adjustment for this factor, but it should be kept in mind when assessing the extent to which union power is "pro-poor".

[6] V^{n*} will differ from V^n in equation (3). $V^{n*} = \overline{V_i^n} + \mathrm{var}(\overline{X_i^n})$, where $\overline{V_i^n}$ = weighted average of wage variances of the c groups, and $\mathrm{var}(\overline{X_i^n})$ = variance of wage averages of the c groups.

groups, Δ_v (c) are the variance gaps, Δ_w(c) are the wage gaps, and w^n(c) are the non-union wage rates. The over-bar terms indicate averages over the c skill categories, and are analogous to the terms in equation (3). But the terms for variance and covariance between categories are new, and in practice we will find the covariance to be the most important. This covariance is precisely that between skill, w^n, and union power, $U\Delta_w$, which we have been discussing above in connection with Figures 2b and 3b. A negative covariance term will indicate that unions are more helpful to the least skilled, and this will pull the overall wage variance, V(c), below the variance prevailing without unions, V^n*. A positive covariance term indicates the opposite.

Over time, as Figures 2b and 3b have made clear, union power in the cases of both men and women has been shifting towards more skilled workers (the covariance term in equation (6) is becoming less negative). This factor will have offset the equalising tendency of unions brought about, in particular, by the variance gap. We now consider the size of these effects.

4. Findings

The Economy As a Whole

Table 1 contains panels for 1983 and 1995 that show how the overall variance in log wages has increased over the period. For men the increase has been 86 log points (from 0.223 to 0.309), and for women it has been 70 log points (from 0.192 to 0.262). These large increases are what we are concerned to explain. Notice that the increase in wage variance for non-union workers has been smaller: 69 points for men (0.289 to 0.358), and 44 points for women (0.197 to 0.241). Thus, forces operating on the non-union sector alone cannot explain the increase in overall wage variance, suggesting a role for deunionisation. The table also shows that the union wage variance is lower than the non-union, thereby pointing to the equalising effect of greater unionisation.[7] Interestingly, it can also be seen that while both the union and non-union wage variances

[7] Union wage variance remains much lower than the non-union variance when we standardise for differences in the characteristics of union and non-union workers. The variance of residuals from a wage regression for union workers is also lower than that for non-union workers.

have risen over time, the union variance for men remains much smaller than the non-union: the variance gap has increased. In other words, even though they are less extensive than heretofore, male unions can still strongly "standardise" their members' wages.

(Table 1 near here)

Table 1 also contains information on the wage gap, both unadjusted and adjusted for a set of conventional human capital variables.[8] The unadjusted wage gaps are always larger than the adjusted gaps because union workers have higher skills than their non-union counterparts. However, the difference between adjusted and unadjusted wage gaps grows between 1983 and 1995, reflecting the increased unionisation of high skill groups in 1995. For men, the adjusted wage gap falls over time as well, reflecting reduced union power on this dimension (but we must remember that male unions can still standardise members' wages). By contrast, female unions still seem to retain the power to bring about a wide wage gap (0.205 in 1995), but not so strongly to standardise their members' wages.

(Table 2 near here)

We now estimate basic union effects on wage dispersion, using equation (3). The results are given in Table 2. Taking males in 1983, for example, the within-sector effect is $U\Delta_V = -0.078$, which is negative because the variance gap is negative. The between-sector effect is $U(1-U)\Delta_W^2 = 0.006$ which is positive, following the wage gap, but bound to be small since the wage gap term is squared. The total effect is -0.072. This figure represents a sizeable contribution – about one-third – to reducing male wage variance in 1983 (0.223 from Table 1). In 1995, the impact is smaller, -0.055, or about one-sixth of the male wage variance (0.309 from Table 1). Taking changes over time, as in equation (4), male deunionisation contributes to a rise in wage variance of 0.017, which is 19.8 per cent of the overall increase. As for women, we see that in 1983 unionism is weakly egalitarian, reducing wage variance by -0.012. By 1995, however, women's unionism actually *widens* the wage variance by 0.004. Over time, then, the impact of

[8] The adjusted union wage gap is the union coefficient from a regression controlling for years of education, years of experience (plus experience squared and cubed), and dummies for non-white, marital status, and 5 regions. As will be seen, this two-sector wage gap does not play a major role in later calculations, and so we do not refine it.

deunionisation for women is similar – namely, 22.9 per cent – but is achieved by a different route.

The last row of Table 2 shows the different estimates for deunionisation that are arrived at when we use the counterfactual of equation (5). It will be recalled that here we estimating what the 1995 wage variance would have been had the 1983 level of union density prevailed, taking as given the 1995 union wage and variance gaps. Using this method, deunionisation contributes 34.3 per cent to the widening in the male wage variance, but only 2.4 per cent in the case of females. However, as we have also noted, this method ignores changes in wage and variance gaps.

The next step is to allow for differences in union structure (i.e. in coverage and in wage and variance gaps) across skill groups, where the latter are defined using Card's (2001) predicted earnings deciles. We have already seen (from Figure 2b) how union power, for men, although tending to be pro-poor, has become less so with the passage of time. And the trend is the same for women (Figure 3b). Table 3 now quantifies the impact of these trends.

(Table 3 near here)

The estimates in Table 3 serve to reduce the impact of deunionisation on wage dispersion for men, although not for women. Looking first at men, unions reduce overall wage variance in both years: by -0.041 in 1983 and by -0.042 in 1995. However, as can be seen, the reduction is as great in 1995, which implies that deunionisation cannot be a factor in the widening male wage variance. To put this finding another way: the counterfactual variance of wages if all were paid according to the non-union wage structure, $V^{n}*$, has increased by 0.087, which is as much as the increase in the overall wage variance, 0.086. Since the male non-union wage variance has increased so much, there is little room for a deunionisation effect.

The main factor behind the strong variance-reducing effect of unions for men in 1995 is the larger variance gap term: $\overline{U\Delta_V}$ = -0.033 in 1995 compared with -0.024 in 1983 (see the lower panel of the table). In other words, unions standardise their members' pay more in 1995 than 1983. This factor counteracts the tendency for union power to become less pro-poor, as shown by the diminution of the covariance term (see also the significant flattening of the union power line in Figure 2b). On the other hand, the

adjusted and simple estimates are similar for women. The dispersion-reducing effect of unions is estimated to be much larger in 1983 (at -0.015) than in 1995 (0.001). For women, union power has tended over time to become less egalitarian (see also Figure 3b).[9] Consequently, the change in the *character* of women's unionisation appears to play a considerable role in the widening of women's wage variance.

These results differ from the received wisdom. In particular, it seems that the increase in wage dispersion for men can hardly be attributed to deunionisation. What unions have lost on the swings (less power among the unskilled) they have gained on the roundabouts (more wage compression for their members). It is true that deunionisation still seems to have a role to play in explaining increased wage dispersion among women. Nevertheless, we conclude that the equalising effects of unions are less than might be thought. Let us now consider whether distinguishing between the public and private sectors upsets this conclusion.

Public-Private Sector Comparisons of Unionism

It is interesting to assess the impact of deunionisation on wage inequality in the public and private sectors separately, since union trends have been so different. As can be seen from Tables 4a and 4b, public sector union density in 1995 is 78 to 86 per cent of its 1983 value. Indeed, some public sector groups such as women with further or higher education, have even maintained or increased in union density reflecting the rise in unionism among teachers and nurses. However, private sector density has declined considerably. In particular, the 1995 value for women (men) reaches only 57 (69) per cent of the 1983 value.

(Tables 4a and 4b near here)

At the same time, the private and public sectors are similar in that the more educated categories have maintained their union density better than less educated groups.

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[9] We have the counterintuitive result for women that their average variance gap within skill groups, $\overline{\Delta_v}$, is larger than the variance gap for the labour force as a whole, Δ_v. In 1995, for example, $\overline{\Delta_v}$ = -0.06 (bottom panel, Table 3), yet Δ_v=-0.015 (Table 2). The reason is that Δ_v depends upon the distribution of union density across skill groups, as well as variance gaps within groups. The fact that most female union members are in the high skill groups, coupled with the fact that variance gaps are small for some of these groups drives Δ_v down to –0.015.

The picture is best appreciated from Figures 4a through 5b, which graph the union power variable – union density multiplied by the wage gap – against predicted earnings (the covariance term in equation (6)). Men and women are shown separately by sector. As can be seen, the 1995 relationship is significantly less negatively sloped than that for 1983 in all cases (except private sector males), indicating that the more educated have maintained their union power better than the less educated.

(Figures 4a through 5b near here)

We now calculate the basic union effects on wage dispersion. The necessary data are given in Tables 5a and 5b. Private-sector males are the group with the greatest wage variance in both years. Private-sector males have also had the greatest increase in wage variance over the years, namely, 0.083 (Table 6). However, only in the public sector has the increase in overall wage variance been much greater than the increase in the non-union group's wage variance. In the terminology of equation (4), the inequality $V_1 - V_0 > V^n_1 - V^n_0$ holds strongly for the public sector. The implication is that deunionisation has influenced the wage distribution more in the public sector than in the private sector. Let us turn to the facts.

(Tables 5a and 5b near here)

Basic estimates of the impact of deunionisation, following equation (3), are given in Table 6. This table is analogous to Table 2 for the whole economy. For example, for private-sector men in 1983, -0.062 is an estimate of the amount by which unionisation reduces the wage variance. As can be seen, the impact of unions has fallen over time in both public and private sectors, just as for the economy as a whole. However, the fall has been greater in the public sector, implying a greater role for deunionisation. This is a surprising result given the fact that union density has fallen less in this sector. The penultimate row gives the estimated contribution of deunionisation to the increased wage variance: 18.1 per cent for private-sector men, 5.6 per cent for private-sector women, 23.3 per cent for public-sector men, and 54.0 per cent for public-sector women. The final row shows, as a matter of interest, the very different estimate we would obtain using the counterfactual of equation (5).

(Table 6 near here)

We now turn to estimates that allow for different union effects by skill category. The results are given in Table 7, which is analogous to Table 3 for the whole economy. For men in both private and public sectors, as for the economy as a whole, the adjusted estimates are smaller than the basic estimates. This outcome is primarily because the variance gaps within skill categories are smaller than the variance gap for the sector. An indication of this fact is provided in the memo item in the last row of the table, which gives the average variance gap across skill categories, $\overline{\Delta_v}$. For example, for private-sector men in 1983 this gap averages -0.05, whereas for the private sector as a whole it is -0.16 (= 0.131 – 0.291, Table 5a).[10] Nevertheless, for men in both sectors the average variance gap has increased over time, as the memo item in the bottom panel indicates. On this measure, then, unions have increased their power in both sectors, even as union density has declined.

(Table 7 near here)

Pushing against this equalising effect of unions for men has been the shift in union membership towards the labour elite, again in both sectors. The shift is given by the decline (in absolute value) in the covariance term given in the lower panel of Table 7. The shift is also illustrated by the flatter union power graphs for 1995 (see Figures 4a and 5a). For private-sector men, the net result is that unions reduce earnings variance by about the same amount (around -0.03) in both 1983 and 1995. Therefore, deunionisation has apparently not contributed to the rise in male private sector wage variance. For men in the public sector, however, deunionisation still appears to make a contribution, accounting for nearly one-third of the increase in variance (=0.011/0.060).

For women, the adjusted estimates make less difference. For private-sector women, deunionisation still has a very small effect, 0.005; one that is comparable to private-sector men. But for public-sector women, the deunionisation effect remains large,

[10] For public sector males in 1983 we have the extreme result that the average within skill group gap $\overline{\Delta_v} = 0$ (Table 7, bottom panel), while the overall gap $\Delta_v = -0.088$ (= 0.162 - 0.250, Table 5b). This result arises because males in public sector unions in 1983 tended to be found in skill groups with high variance gaps, although variance gaps were zero averaged across skill groups (going the "wrong" way for several groups, with higher variance for union than non-union workers).

0.028, which is about 40 per cent of the increase in variance. The large effect in this case does not result from a fall in union density, as might be thought, but rather from the shift towards elite workers in public-sector women's union density. In fact, for public-sector women in 1995, the usual negative, pro-poor covariance between skill and union power turned positive, 0.016, as shown on the lower panel of Table 7. In short, there has been a change in the character of public-sector women's unionism, which the union density figures alone do not capture.

5. Conclusions

In this paper, we have analysed the impact of deunionisation on earnings dispersion over the period 1983-1995, taking men and women separately and also distinguishing between the private and public sectors. We have seen that unionism is a many-dimensioned entity. Union density is by no means the most important dimension. The variance and wage gaps attributable to unions are also important. So, too, is the "pro-poor" – or otherwise – distribution of union density. In fact, we show (following Card, 2001) that the distribution of union density has become less pro-poor over time, shifting for example from the less educated to the better educated.

Our headline finding is that the large decline in union density accounts for little of the increase in earnings variation in the private sector, either for men or women. This finding can be explained by allowing for unionism's other dimensions. We show that the variance gap has widened sufficiently over time to offset both the decline in density and the adverse shift in density towards the more skilled. In the private sector, therefore, unions appear to have maintained their power – at least as regards standardising their members' wages – notwithstanding all Mrs Thatcher's reforms.

In the public sector there has been less of a decline in union density. Yet, paradoxically, it is here that unionism has had more of a role to play. In the public sector, as in the private sector, variance gaps – and thus the power to standardise – have been maintained. The difference lies in the shift towards organising the more skilled in the public sector, particularly amongst women. This means that unions no longer reduce earnings variation as much as they once did. Changes in the character of public sector unionism – not so much deunionisation as "re-unionisation" – can thus account for a

large percentage (30 to 40 per cent) of the increased earnings dispersion in the public sector. But, to repeat, of the private sector no such statement can be made.

Figure 1: Earnings Variance in the GHS and LFS Compared

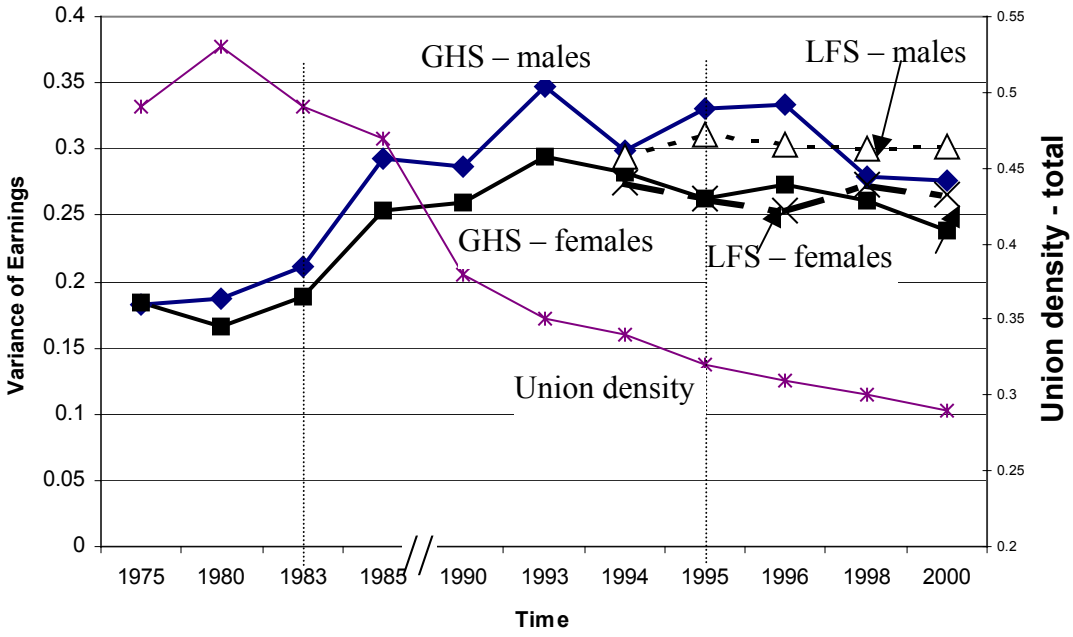

Figure 2a: Union Density by Skill, Males in 1983 and 1995

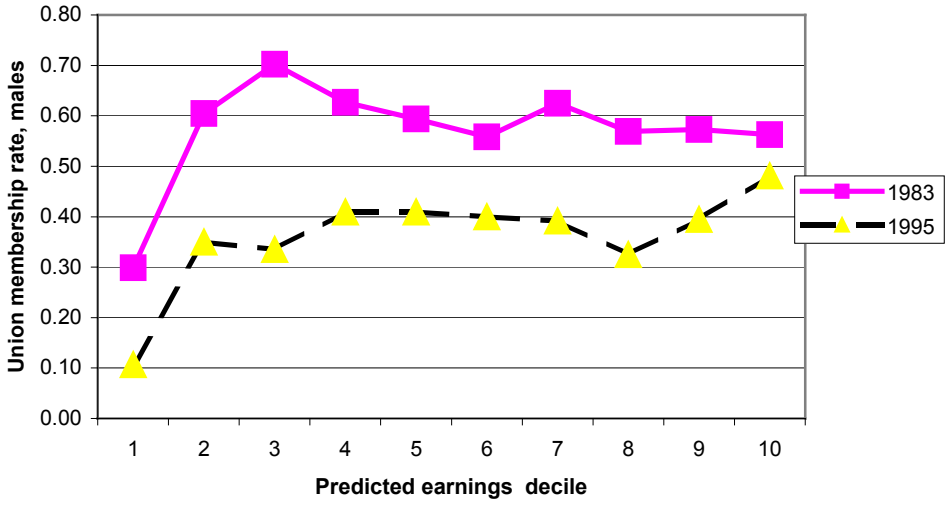

Figure 2b: Union Power by Skill, Males 1983 and 1995

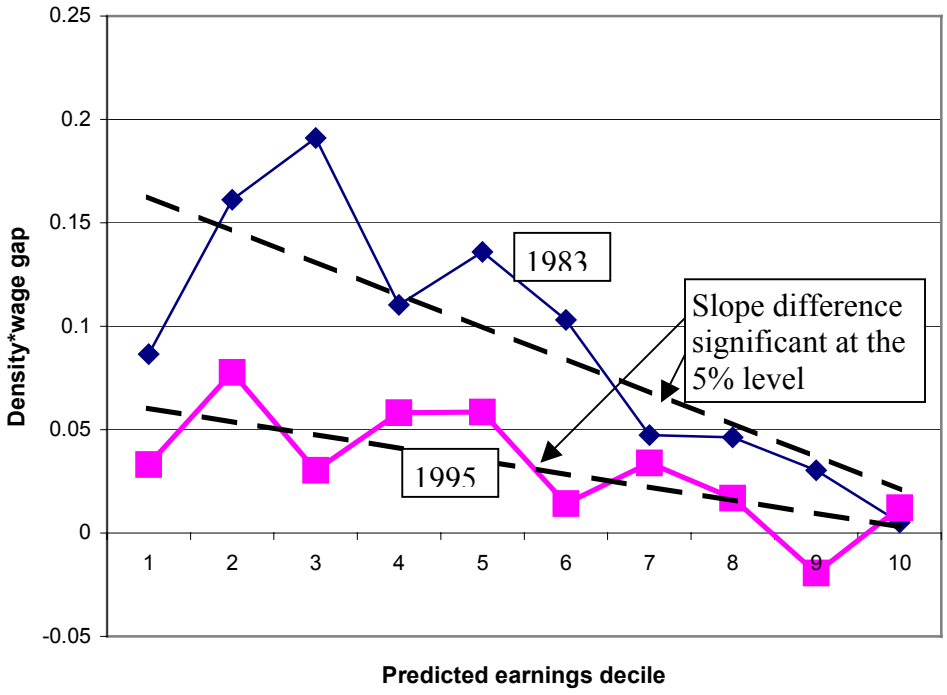

Figure 3a: Females, Union Membership by Skill, 1983 and 1995

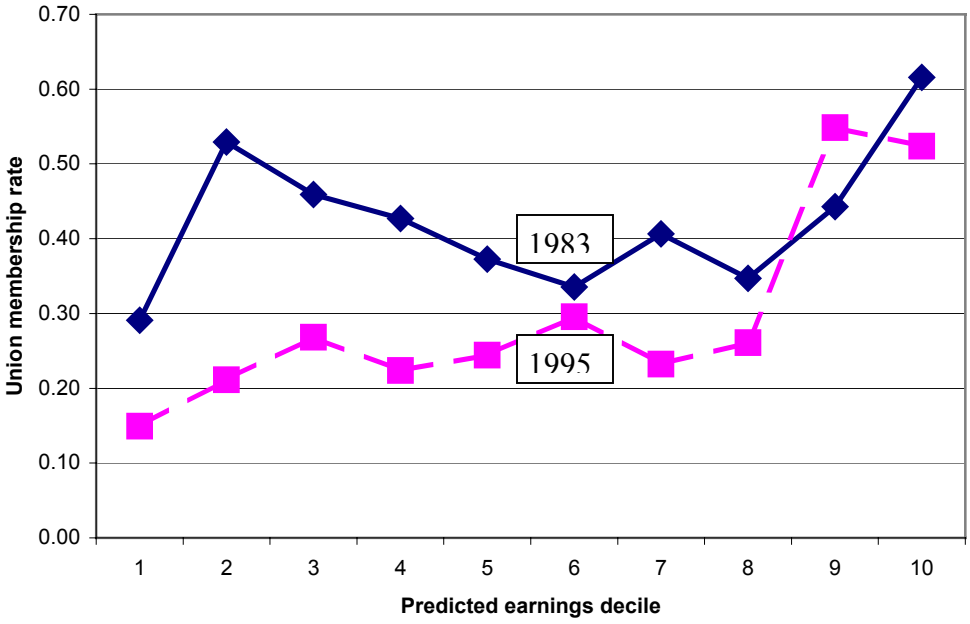

Figure 3b: Union Power by Skill, Females 1983 and 1995

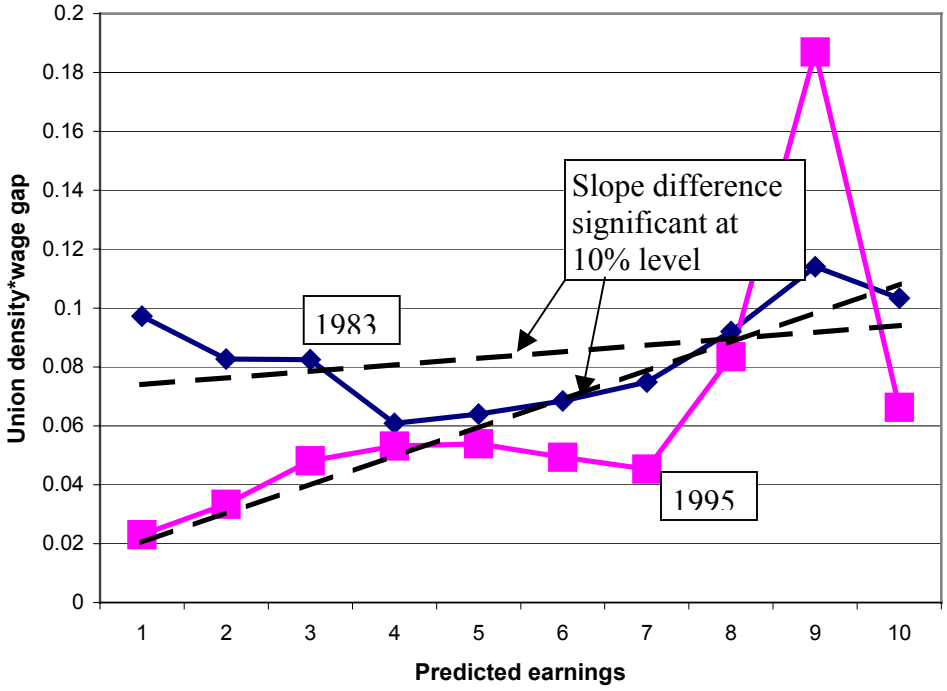

Figure 4a: Union Power by Skill, Private-Sector Males 1983 and 1995

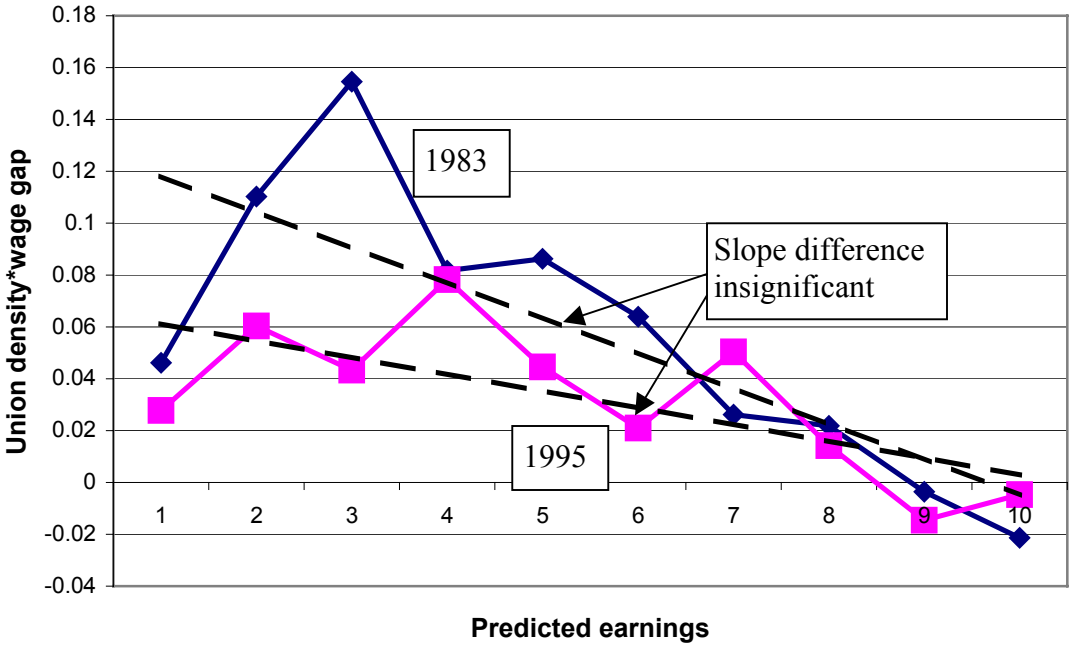

Figure 4b: Union Power by Skill, Private-Sector Females 1983 and 1995

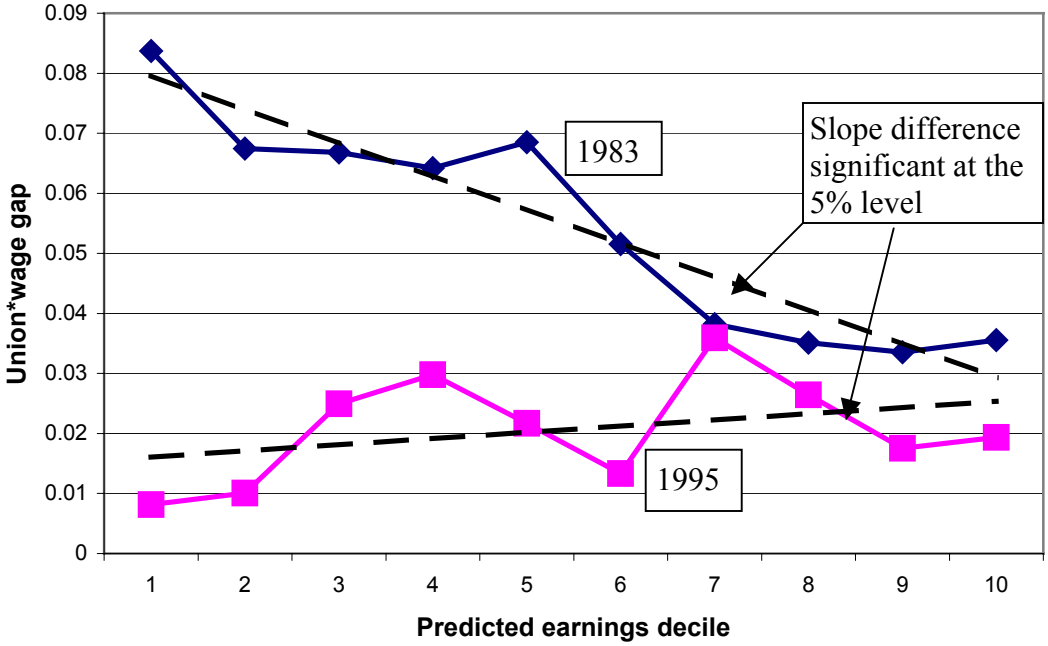

Figure 5a: Union Power by Skill, Public-Sector Males 1983 and 1995

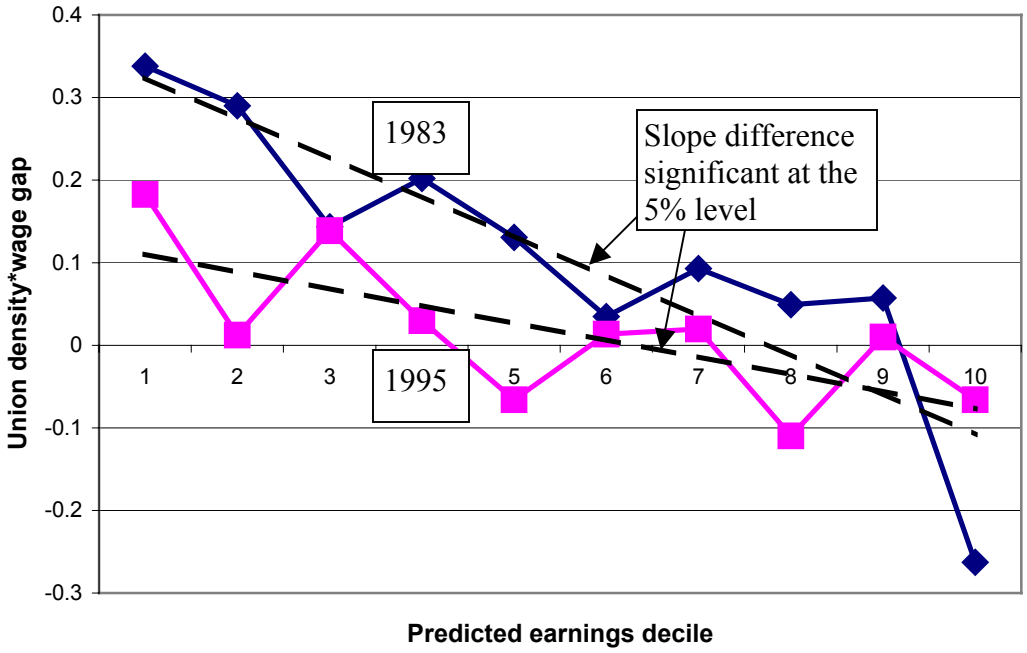

Figure 5b: Union Power by Skill, Public-Sector Females 1983 and 1995

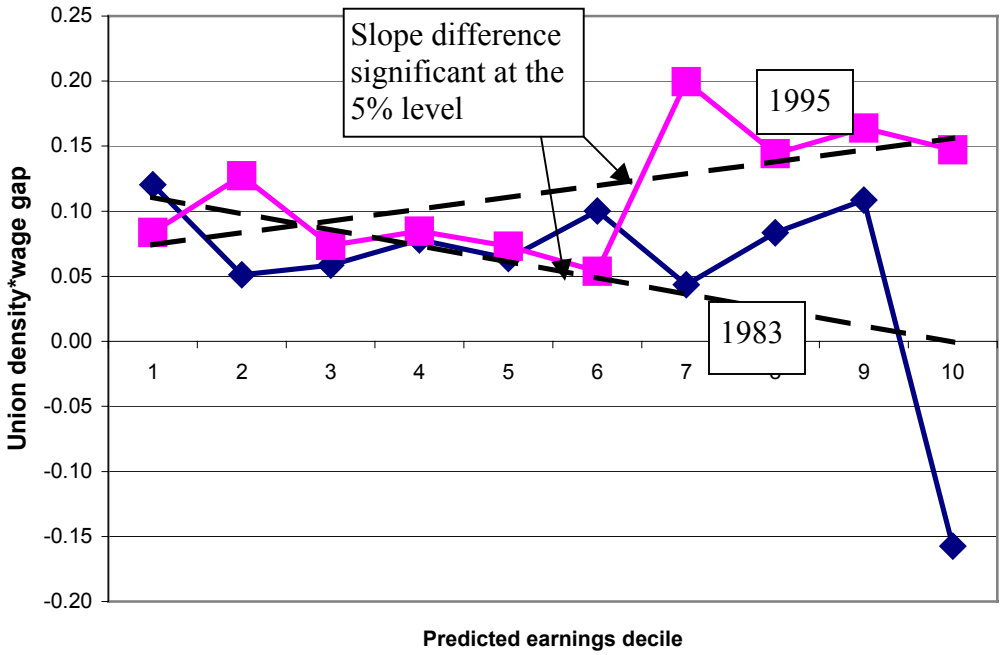

Table 1
Hourly Wage Distributions, Union and Non-Union Workers, 1983 and 1995

	Men		Women	
	Non-union	Union	Non-union	Union
1983				
Union density (%)		56.7		42.1
Overall variance log wages		0.223		0.192
Variance log wage	0.289	0.151	0.197	0.147
Mean log wage	1.639	1.854	1.280	1.534
Adjusted union wage gap		0.151		0.197
1995				
Union density (%)		37.4		30.7
Overall variance log wages		0.309		0.262
Variance log wage	0.358	0.205	0.241	0.226
Mean log wage	1.876	2.066	1.55	1.89
Adjusted union wage gap		0.086		0.205

Notes: Samples are taken from the 1983 General Household Survey and the 1995 third quarter Labour Force Survey (LFS) with Northern Ireland excluded. Samples comprise respondents aged 16-66 years who were not self-employed and whose hourly wage was between £1 and £45 in 1995 pounds (1983 wages valued in 1995 pounds according to the retail price index). For the LFS, the income weights supplied with the data are used. The adjusted union wage gap is the union coefficient from a regression controlling for years of education, years of experience (plus experience squared and cubed), and dummies for non-white, marital status, and 5 regions.

Table 2
Basic Estimates of the Contribution of Declining Unionisation to Wage Inequality, 1983-95

	Men	Women	Remarks
1983			
Union density, U	0.567	0.421	From Table 1.
Union wage gap, Δ_W	0.151	0.197	Adjusted difference between union and non-union wages (Table 1).
Union variance gap, Δ_V	–0.138	–0.050	Difference in union and non-union wage variances (Table 1).
Union effect, *between* sectors, $U(1-U)\ \Delta_W^2$	0.006	0.009	Small effect of unions in raising wage inequality by widening mean pay as between union and non-union sectors.
Union effect, *within* sectors, $U\Delta_V$	-0.078	-0.021	Larger effect of unions is to reduce wage dispersion within union sectors.
Total union effect	-0.072	-0.012	Estimated total effect of unions is to reduce wage variance; for example, for men the reduction is –0.072
1995			
Union density, U	0.374	0.307	From Table 1.
Union wage gap, Δ_W	0.086	0.205	
Union variance gap, Δ_V	–0.153	–0.015	
Union effect, *between* sectors, $U(1-U)\ \Delta_W^2$	0.002	0.009	See explanations for 1983 above.
Union effect, *within* sectors, $U\Delta_V$	–0.057	–0.005	
Total union effect	–0.055	0.004	Variance-reducing effect of unions is smaller for men in 1995 than 1983, and unions even increase dispersion for women in 1995.
Changes: 1983-95			
Change in variance of wages	0.086	0.070	See Table 1; for example, for men .086=.309-.223.
Change in effect of unions	0.017	0.016	Change in total union effect derived above; for example, for men .017= -.055-(-.072)**.**
Contribution of unions (%)	19.8	22.9	For example, for men .198=.017/.086.
Memo item			
Amount 1995 V would be lowered given 1983 U (%)*	0.030 (34.3)	0.002 (2.4)	This number depends mainly on $(U_1-U_0)\ \Delta_{v1}$, the change in U weighted by the 1995 variance gap. This gap is small for women; hence the 2.4% figure.

Note: * This number gives the deunionisation effect assuming changes only in union density; see text.

Table 3
Adjusted Estimates of the Contribution of Declining Unionisation to Wage Inequality, Allowing for Different Union Effects Across Pay Deciles

	Men	Women	Remarks
1983			
Variance of wages, V	0.223	0.192	From Table 1.
Adjusted variance of non-union wages, V^n*	0.264	0.207	Allowing for different union impacts across pay deciles (see ***Notes*** below).
Adjusted union effect	–0.041	–0.015	E.g. for men – 0.041 = V – V^n*; see text equation (6).
1995			
Variance in wages	0.309	0.262	
Adjusted variance in non-union wages, V^n*	0.351	0.261	} As above
Adjusted union effect	–0.042	0.001	
Changes: 1995 – 1983			
in variance of wages	0.086	0.070	For men, unionism reduces wage dispersion about as much in 1995 as 1983. So decline of unions cannot have increased dispersion. But for women, unionism has a role.
in adjusted variance of non-union wages	0.087	0.054	
in adjusted union effect	–0.001	0.016	

Notes: The adjusted formula, allowing for different union effects on wage variance by skill category, is given in equation (6) in the text. Values for the terms in the equation (taken from the c=10 decile groups in the Appendix) are as follows:

	Men		Women	
	1983	1995	1983	1995
$\overline{U\Delta_V}$	-.024	-.033	-.030	-.022
$\overline{U(1-U)\Delta_w^2}$	.009	.003	.011	.009
Var[$U(c)\Delta_w(c)$]	.003	.001	.001	.002
2Cov[$w^n(c)$, $U(c)\Delta_w(c)$]	-.028	-.013	.004	.013
Total	-.041	-.042	-.016	.001
Memo: average variance gap $\overline{\Delta_V}$	-.04	-.09	-.06	-.06

Table 4a
Trade Union Membership Rates in the Private Sector, 1983 and 1995

	Men			Women		
	1983	1995	Ratio 95/83	1983	1995	Ratio 95/83
Overall	41.4	27.5	68.8	26.0	14.9	57.3
By education:						
Degree or equivalent	13.4	18.4	94.8	30.2	14.2	47.0
Further education	40.6	24.3	59.9	27.3	21.8	79.8
'A' level or equivalent	39.3	32.2	81.9	20.2	17.7	87.6
'O' level or equivalent	30.0	17.2	57.3	21.4	14.4	67.3
Other	47.8	38.3	80.1	21.4	11.8	55.1
None	49.8	25.5	51.2	30.9	13.4	43.4
Observations	2,851	3,199		2,149	2,875	

Note: public sector employment is defined to include nationalised industries, public corporations, or central or local government.

Table 4b
Trade Union Membership Rates in the Public Sector, 1983 and 1995

	Men			Women		
	1983	1995	Ratio 95/83	1983	1995	Ratio 95/83
Overall	85.1	66.3	77.9	68.9	59.4	86.2
By education:						
Degree or equivalent	81.2	71.9	88.5	76.1	73.3	96.3
Further education	85.2	78.1	91.7	73.9	79.0	1.07
'A' level or equivalent	83.6	56.2	67.2	68.2	45.2	66.3
'O' level or equivalent	79.5	60.8	76.5	64.3	46.8	72.8
Other	85.5	55.4	64.8	65.0	49.0	75.4
None	88.9	75.8	85.3	67.9	46.5	68.5
Observations	1,535	979		1,334	1,582	

Note: See Table 4a.

Table 5a
Hourly Wage Distributions in the Private Sector, 1983 and 1995

	Men		Women	
	Non-union	Union	Non-union	Union
1983				
Union density (%)		41.4		26.0
Overall variance log wages		0.231		0.168
Variance log wage by group	0.291	0.131	0.179	0.112
Mean log hourly wage	1.62	1.78	1.22	1.41
Adjusted union wage gap		0.132		0.206
1995				
Union density (%)		28.5		15.1
Overall variance log wages		0.314		0.239
Variance log wage by group	0.359	0.187	0.242	0.198
Mean log hourly wage	1.85	1.97	1.52	1.68
Adjusted union wage gap		0.097		0.130

Note: See Table 2

Table 5b
Hourly Wage Distributions in the Public Sector, 1983 and 1995

	Men		Women	
	Non-union	Union	Non-union	Union
1983				
Union density (%)		85.1		68.9
Overall variance log wages		0.178		0.172
Variance log wage by group	0.250	0.162	0.201	0.154
Mean log hourly wage	1.77	1.89	1.49	1.61
Adjusted union wage gap		0.115		0.099
1995				
Union density (%)		66.5		59.5
Overall variance log wages		0.238		0.235
Variance log wage, by group	0.294	0.206	0.216	0.206
Mean log hourly wage	2.09	2.18	1.67	2.00
Adjusted union wage gap		0.040		0.208

Note: See Table 2.

Table 6
Basic Estimates of the Contribution of Declining Unionisation to Wage Inequality in the Private and Public Sectors, 1983-95

	Private sector		Public sector	
	Men	Women	Men	Women
1983				
Union effect, *between* sectors, $U(1-U)\,\Delta_W^2$	0.004	0.008	0.002	0.002
Union effect, *within* sectors, $U\Delta_V$	-0.066	-0.017	-0.075	-0.032
Total effect	-0.062	-0.009	-0.073	-0.030
1995				
Union effect, *between* sectors, $U(1-U)\,\Delta_W^2$	0.002	0.002	0.0	0.010
Union effect, *within* sectors, $U\Delta_V$	-0.049	-0.007	-0.059	-0.006
Total effect	-0.047	-0.005	-0.059	0.004
Changes: 1983-95				
Change in variance of wages	0.083	0.071	0.060	0.063
Change in effect of unions	0.015	0.004	0.014	0.034
Contribution of unions (%)	18.1	5.6	23.3	54.0
Memo item				
Amount 1995 V would be lowered given 1983 U (%)	0.022 (26.7)	0.005 (6.8)	0.016 (27.3)	0.001 (1.5)

Note: See Table 2.

Table 7
Adjusted Estimates of the Contribution of Declining Unionisation to Wage Inequality, Allowing for Different Union Effects Across Pay Deciles

	Private sector		Public sector	
	Men	Women	Men	Women
1983				
Variance in wages	.231	.169	.178	.172
Adjusted variance of non-union wages, V^n*	.263	.177	.251	.215
Adjusted union effect	-.032	-.008	-.073	-.044
1995				
Variance in log wages	.314	.239	.238	.235
Adjusted variance of non-union wages, V^n*	.343	.242	.300	.251
Adjusted union effect	-.029	-.003	-.062	-.016
Changes: 1983-95				
in variance of wages	.083	.070	.060	.063
in adjusted variance of non-union wages	.080	.065	.049	.036
in adjusted union effect	.003	.005	.011	.028

Notes: See Table 4. The adjusted formula (allowing for different union effects by skill category) for the effect of unions on the variance of wages is given in equation (6) in the text. Values for the terms in the equation are as follows: -

	Private sector				Public sector			
	Men		Women		Men		Women	
	1983	1995	1983	1995	1983	1995	1983	1995
$\overline{U\Delta_v}$	-.020	-.021	-.012	-.007	.013	-.025	-.018	-.041
$\overline{U(1-U)\Delta_w^2}$	.007	.004	.009	.003	.007	.003	.004	.008
$\mathrm{Var}[U(c)\Delta_w(c)]$	.003	.001	0	0	.025	.007	.006	.002
$2\mathrm{Cov}[w^n(c), U(c)\Delta_w(c)]$	-.021	-.013	-.006	.001	-.118	-.048	-.035	.016
Total	-.032	-.029	-.008	-.003	-.073	-.062	-.044	-.016
Memo: av. variance gap $\overline{\Delta_v}$	-.05	-.07	-.05	-.04	0	-.04	-.03	-.06

Appendix Table
Union Membership Rates and Union Wage Effects by Pay Decile

	Men				Women			
1983								
Predicted earnings decile	Prop-ortion union	Log W_N	Wage gap	Variance gap	**Prop-ortion union**	Log W_N	Wage gap	Variance gap
1	0.22	0.99	0.38	-0.03	0.30	0.93	0.32	-0.11
2	0.52	1.35	0.31	-0.01	0.49	1.12	0.17	-0.05
3	0.68	1.45	0.28	-0.04	0.42	1.13	0.20	-0.04
4	0.66	1.57	0.17	-0.02	0.46	1.19	0.13	-0.03
5	0.64	1.54	0.21	-0.02	0.37	1.24	0.17	-0.05
6	0.55	1.61	0.19	0.06	0.36	1.27	0.19	-0.07
7	0.60	1.71	0.08	-0.02	0.37	1.31	0.20	-0.11
8	0.57	1.83	0.07	-0.05	0.39	1.39	0.24	-0.07
9	0.57	2.00	0.05	-0.05	0.38	1.46	0.30	0.01
10	0.57	2.28	0.01	-0.12	0.59	1.79	0.18	-0.17
1995								
1	0.12	1.24	0.28	-0.06	0.16	1.22	0.15	-0.03
2	0.36	1.53	0.21	-0.06	0.23	1.31	0.14	-0.06
3	0.34	1.72	0.09	-0.09	0.28	1.37	0.18	-0.04
4	0.42	1.73	0.14	-0.10	0.23	1.46	0.24	-0.02
5	0.44	1.83	0.13	-0.02	0.28	1.54	0.17	-0.05
6	0.43	1.98	0.03	-0.12	0.27	1.57	0.18	-0.04
7	0.41	2.02	0.08	-0.02	0.26	1.66	0.18	-0.07
8	0.36	2.14	0.05	-0.12	0.28	1.73	0.30	-0.04
9	0.39	2.42	-0.05	-0.05	0.57	1.85	0.33	-0.11
10	0.48	2.54	0.03	-0.18	0.51	2.21	0.13	-0.14

Notes: Predicted earnings decile is based on a prediction equation for the non-union sector, using an equation with years of education, experience, experience squared and cubed, dummies for marital status, non-white and 5 regions, and interaction of 5 levels of education with education and linear and quadratic experience. The wage gap is the difference between the log of hourly earnings between union and non-union workers for the given decile. The variance gap is the difference in the variance of log earnings between union and non-union workers for the given decile.

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