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Unions and the Wage Distribution in Ireland*

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Abstract: This paper examines the effects of trade unions in Ireland on the first two moments of the wage distribution. Using data from the ESRI's 1987 Survey of Income Distribution, Poverty and Usage of State Services, a union membership mark-up of over 20 per cent is obtained. A smaller variance in wages is also observed for union members. Only small parts of the differentials in the mean and variance of the wage between union and non-union members are explained by differentials in worker characteristics. The larger unexplained components are taken to reflect, among other things, the role played by structural differences in the wage determining processes between the union and non-union sectors.

I INTRODUCTION

It is generally accepted that trade unions can affect the wage distribution in a number of significant ways. For example, they can alter the mean of the distribution for their membership, and for those covered by union agreements, by the creation of wage differentials. In addition, the pursuit of standard wage rate policies can have the effect of compressing the wage distribution of both union members and those non-members covered by

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union agreements. The empirical tradition of investigation into the economic effects of trade unions has, by and large, focused on providing estimates for the former effect. This has been particularly true in terms of the United Kingdom where this tradition has evolved from the initial use of aggregate industry and occupation level data (for example, see Pencavel (1974), Mulvey (1976), Mulvey and Foster (1976) and Layard *et al.* (1978)) to the use of establishment level data (for example, see Blanchflower (1984) and Stewart (1987)) and individual level data (for example, see Stewart (1983), Shah (1984), Green (1988) and Symons and Walker (1990)).[1]

In contrast to the research effort devoted to quantifying the union effects on the first moment of the wage distribution, little effort has been devoted to assessing the union effects on the second moment of the distribution. Freeman (1980 and 1982), using individual and establishment level data for the United States, has examined the effect of union wage policies on the dispersion of wages and concluded that they had a narrowing effect. More recently Freeman (1992), using individual level data for nine countries (including Ireland), examined raw differences in the standard deviations of log earnings between union and non-union workers and concluded that the dispersion in the union sector was, in general, lower. Metcalf (1982), using industry level data, found unions to have an ambiguous effect on the overall distribution of earnings in the United Kingdom but Metcalf (1989) concluded that unions are "... undoubtedly a force for equality in the workplace". More recently, Blackaby *et al.* (1991) and Murphy *et al.* (1992), using individual level data sets, examined the effects of union coverage and union membership on earnings dispersion. The former concluded that most of the differential in earnings' variances was due to structural differences between the union and nonunion sector. This may be interpreted as attributable to the effectiveness of union standard wage rate policies. In contrast, the latter study found most of the differential in wage variances between the two sectors to be explained by differentials in the dispersion of worker characteristics. Thus, the lower dispersion in the union sector was taken to reflect the more homogeneous nature of unionised workforces.

There now exists a wealth of empirical literature on union wage effects for the United Kingdom. In Ireland, however, little research has been devoted to this important issue. The two exceptions, to the authors' knowledge, are provided by Walsh and Whelan (1976), who used a sample of recently laid-off

1. The broad consensus provided in these studies for the United Kingdom is that unions raise wages. The industry and occupation level studies suggest a mark-up of 20 per cent, and the establishment and individual level studies report estimates of approximately 10 per cent and 5 per cent for manual and non-manual workers respectively. However, see Geroski and Stewart (1986) for a criticism of trade union mark-ups estimated from industry or occupational level data.

workers, and Freeman (1992) who used the International Social Survey Programme data for Ireland for 1988 and 1989. The former estimated a union membership mark-up of over 16 per cent for male workers with the latter providing an estimate in excess of 23 per cent for male and female workers. By international standards these estimates are relatively high. However, the data sets employed in both these studies could be regarded as deficient in a number of important respects. In the context of the Walsh and Whelan (1976) study, the use of a sample of workers who may not be a random sample from the population of workers as a whole may induce selection bias effects, and the union wage mark-ups reported thus demand a cautious interpretation. Although the data employed by Freeman (1992) are more representative than the Walsh and Whelan (1976) data, the quality of the data available on important worker characteristics is poor. No information relating to occupation or industry is available and labour force experience is proxied by age minus schooling (which is a relatively poor measure for the females present in his sample). In addition,the sample employed in estimating the union wage effect is an amalgam of males and females and part-time and full-time workers with the gender, employment and union status effects captured only by the inclusion of dummy variables. The specification adopted in Freeman (1992) could be treated as relatively naive with the omission of key industry, occupation and other effects possibly inducing a degree of bias in the reported union wage gap estimate.

Given the data deficiencies inherent in these two previous studies, it is clear that there still exists a major vacuum in the empirical literature on unions and wages for Ireland. The ESRI's 1987 Survey of Income Distribution, Poverty and Usage of State Services provides a data set that overcomes the limitations of the two studies cited above. It is a nationally representative sample that contains a relatively rich array of individual level information on, among other things, worker characteristics. The rich nature of this data set clearly facilitates a cleaner empirical analysis of union wage effects in Ireland than has, heretofore, been possible.

The objectives of this paper can now be laid out. Firstly, the effects of unions on the first moment of the wage distribution will be examined. In addition, the effect of unions on the second moment of the wage distribution will also be assessed. Using a method to be subsequently outlined, the differential in variances between non-union and union sectors can be decomposed into a part attributable to differentials in the dispersion of worker characteristics between the two sectors, and a part attributable to differentials in the wage structure between the two sectors. This decomposition facilitates a judgment about the extent to which a narrower wage dispersion in the union sector is explained by union wage policy and not simply by the fact that the union sector's workforce may be more homogeneous. This procedure is clearly superior to the analysis adopted in Freeman (1992) where the focus was purely on the raw differential in the standard deviation of log earnings.

The layout of this paper is as follows: Section II outlines the empirical framework for this study and Section III presents the results. Section IV provides estimates for the effects of union membership on the mean wage with Section V examining the effect of unions on the dispersion in the log wage. Section VI provides conclusions.

II EMPIRICAL FRAMEWORK

The usual point of departure in estimating the union mean wage mark-up is the specification of separate union and non-union wage equations. Thus we specify:

$$W_i = \beta_i' X_i + \varepsilon_i \tag{1}$$

where i = u,n (with u and n denoting union and non-union respectively). W is the log of the hourly wage, X is a vector of worker characteristics, β is a parameter vector. The error terms ε_i are assumed normally distributed and, in the absence of non-random sampling of workers across union and non-union jobs, their expected values are zero.[2]

Since, with the use of OLS, the regression plane passes through the means of the data, the differential in mean log wages can be decomposed into two component parts, one attributable to differing structure (the mark-up effect), and the other attributable to differing worker characteristics between the two sectors. This can be more formally stated as:

$$\overline{W}_u - \overline{W}_n = (\hat{\beta}_u - \hat{\beta}_n)'\overline{X}_u + \hat{\beta}_n'(\overline{X}_u - \overline{X}_n) \tag{2}$$

The bars denote means and the hats estimates. The first term on the right-hand side of Equation (2) is the mark-up effect. The index number problem is evident here. The mark-up could be evaluated using the mean characteristics of the non-union sector. We follow Stewart (1983) in using the union sector's

2. If a non-random selection process exists in allocating workers between the two sectors OLS may provide biased parameter estimates. Heckman (1979) and Lee (1978) provide appropriate procedures for estimation in the presence of sample selectivity. A major problem that besets the application of selectivity models to unions and wages is the choice of identifying restrictions which is never an easy issue. For a pessimistic review of the literature see Lewis (1986). In our use of the Heckman procedure, however, no evidence of sample selectivity bias was detected. Further details and results are available from the authors on request.

means, since it seems more reasonable to estimate the effect for those currently in receipt of a union wage. However, the mark-up can also be calculated for each individual in the sample which is an exercise examined below.

In an analogous fashion, the differential in the second moment of the wage distributions of the two sectors can also be decomposed into two component parts. For purposes of convenience and interpretation, the differential in variances between the two sectors will be expressed as the difference between the non-union and the union sector which is the reverse of the convention adopted in examining the first moment differential. Following Dolton and Makepeace (1985), the decomposition in variances is given by:

$$\hat{s}_n^2 - \hat{s}_u^2 \cong \hat{\Delta}_{nu}^2 + \hat{\beta}_n'[\Omega(X_n) - \Omega(X_u)]\hat{\beta}_n \tag{3}$$

where:

$\hat{s}_i^2$ = The variance of the log hourly wage in sector i.

$\hat{\Delta}_{nu}^2$ = $\hat{\sigma}_n^2 - \hat{\sigma}_u^2 + (\hat{\beta}_n - \hat{\beta}_u)'\Omega(X_u)(\hat{\beta}_n - \hat{\beta}_n)$.

$\hat{\sigma}_i^2$ = The estimated variance of ε_i in Equation (1).

$\Omega(X_i)$ = The variance-covariance matrix of worker characteristics in the sector i.

The first term on the right-hand side of (3) is the effect on the dispersion in wages of differences in structure. This term provides a handle on the extent to which the wider dispersion of wages in the non-union sector is explained by the absence of wage rate standardisation policies favoured by unions.[3]

III EMPIRICAL RESULTS

The data for this analysis are taken from the ESRI Survey of Income Distribution, Poverty and Usage of State Services conducted in 1987. It gathered detailed information on gross and net earnings, hours of work and current occupation and industry. It also contains information on educational qualifications and on the cumulative labour market experience of individuals since first leaving full-time education. The hourly wage variable is constructed from the usual gross weekly or monthly pay and usual hours. The union variable is a membership and not a coverage variable. An individual is

3. It should also be pointed out that Equation (3) does not represent a complete decomposition of the variance differential. In contrast to the mean decomposition of Equation (2) where, under OLS, the two component parts add up to the total differential, this is not the case in Equation (3). This follows from the non-linearity associated with the variance decomposition.

defined as a union member if they paid a trade union due or subscription on their last pay day. The sub-sample used in this analysis consists of all full-time male non-agricultural workers who numbered 1,167, of which 54.6 per cent were union members. This estimate of trade union density is a little lower than the national estimate of 56.2 per cent reported in Roche (1992). A more detailed description of our data base is provided in Callan *et al.* (1989) and Table A1 contains summary statistics by union status for the wage equation variables employed in this analysis.

Table 1 reports the OLS estimates for the union and non-union wage equations.[4] Given the presence of a significant Breusch-Pagan (1979) test in both sectors, White (1980) standard errors are reported to correct for the presence of heteroscedasticity.

The effects of labour force experience and unemployment appear well determined in both sectors. The returns to labour force experience are significantly higher (statistically so) in the non-union sector.[5] However, the wage/experience profile peaks at comparable points for union workers (31.9 years) and non-union workers (30.7 years). The effects of unemployment on the wage have a comparable negative effect in both sectors.[6]

The training variable suggests a wage premium of 5.4 per cent for union workers but registers no effect for the non-union workers. Similarly, being a Dublin resident or residing in an urban area has a positive and significant wage effect attached to it for union workers but no similar effect for workers in the non-union sector. The effects of educational qualifications are all well determined in the union sector. However, non-union workers in possession of a Group or Intermediate Certificate do not receive wage rewards that are statistically significantly different from those possessing no formal educational qualifications. The dispersion in the estimated rates of return to educational qualifications is narrower in the union sector. This may be attributable to standard wage rate policies applied by unions which act, in this case, to the benefit of individuals with no formal educational qualifications.

The industry effects provide a contrasting set of results across the two

4. An F-statistic is calculated to test the null of common parameters across the union and non-union sectors. The resultant statistic is 1.5102 and with F(28,1109) is statistically significant at the 5 per cent level. A further split of the union and non-union sectors into manual and non-manual categories was also tested but rejected by the data. Details of these tests are available from the authors on request.

5. The returns to labour force experience, evaluated at 5 years of experience, are 3.2 per cent per year for union members and 5.1 per cent per year for non-members. On the basis of a t-statistic, these effects are significantly different from each other.

6. The unemployment effects, evaluated at one year of unemployment, suggest a decline of 3.2 per cent per year for union members and one of 3.9 per cent per year for non-members. On the basis of a t-statistic, these effects are not significantly different from each other.

Table 1: *OLS Wage Equation Estimates for Union and Non-union Workers*

	Union		Non-union	
Constant	0.6244**	(0.0871)	0.5151**	(0.0910)
Experience	0.0383**	(0.0041)	0.0614**	(0.0053)
Experience Squared	–0.0006**	(0.0000)	–0.0010**	(0.0001)
Unemployment	–0.0365**	(0.0114)	–0.0416**	(0.0147)
Unemployment Squared	0.0017**	(0.0007)	0.0012**	(0.0003)
Urban Resident	0.0531*	(0.0314)	0.0172	(0.0502)
Dublin Resident	0.0709**	(0.0306)	0.0121	(0.0514)
Trained for Trade or Craft	0.0523*	(0.0307)	–0.0202	(0.0422)
Disability	0.0413	(0.0493)	0.0379	(0.0660)
Educational Qualifications:				
Group Certificate	0.1691**	(0.0365)	0.0794	(0.0551)
Inter Certificate	0.1795**	(0.0414)	0.0994	(0.0649)
Leaving Certificate	0.3221**	(0.0426)	0.2593**	(0.0646)
Diploma/Third Level	0.3571**	(0.0507)	0.3960**	(0.0886)
University Degree	0.5795**	(0.0569)	0.6468**	(0.0987)
Industry Dummies				
Other Production Industries	0.2614**	(0.0699)	0.0414	(0.0638)
Wholesale	0.1838	(0.1533)	–0.0175	(0.0927)
Retail	–0.0334	(0.1023)	–0.1823**	(0.0738)
Insurance	0.4312**	(0.0888)	0.2630**	(0.1198)
Transport	0.2171**	(0.0706)	–0.0647	(0.0833)
Professional, Teaching/Health	0.1799**	(0.0738)	–0.0239	(0.1323)
Public Administration	0.1767**	(0.0685)	0.0032	(0.0715)
Personal Services	0.1705*	(0.0888)	–0.1260	(0.1001)
Others	0.0845	(0.1053)	–0.0161	(0.1639)
Occupational Dummies				
Producers, Makers & Repairers	0.0988**	(0.0432)	0.1364*	(0.0709)
Transport, Commun. & Storage	0.0420	(0.0443)	0.0555	(0.0854)
Clerical	0.1492**	(0.0543)	0.1829	(0.1171)
Commerce, Insurance & Finance	0.1748**	(0.0868)	0.2153**	(0.0871)
Service Workers	0.1311**	(0.0484)	–0.0280	(0.1160)
Professional, Technical/Others	0.3328**	(0.0535)	0.3396**	(0.0821)
$\bar{R}^2$	0.5215		0.5159	
σ	0.2807		0.4149	
N	637.0		530.0	
BREUSCH–PAGAN (χ^2_{28})	57.013**		86.798**	

Notes: White (1980) standard errors appear in parentheses with * and ** denoting statistical significance at the 10 per cent and 5 per cent level respectively using two-tailed tests.

sectors.[7] The predominantly Public Sector industries exhibit strong effects for union members relative to the omitted Building and Construction category. In contrast, the non-union sector does not exhibit a similar pattern for these industries. These results, however, should be interpreted with some caution since the type of job that is unionised in these industries and the type that is not may be markedly different in character. Union membership, nevertheless, appears important in the Retail industry. Although, union members are not seen to do better in this industry relative to the Building and Construction industry, non-union members receive a wage that is, on average, 16.7 per cent lower than that prevailing in the reference industry. Finally, the occupation effects are found to be, in general, better determined in the union than in the non-union sector.

IV UNION EFFECTS AND THE MEAN WAGE

The OLS estimates from Table 1 are used to provide estimates of the union membership mark-up. The mark-up is defined as the first term on the right-hand side of Equation (2). The OLS mark-up is estimated at 20.5 per cent and is found to be statistically significant at a 1 per cent level or better. In order to ascertain the extent to which this mark-up varies across characteristics a base differential is calculated (explained in the notes to Table 2). Deviations from this base occur singly. These deviations are only important in four of the ten industries and in the service workers occupational category. The variation of the union mark-up across industries is, to some extent, in comport with Stewart's (1983) findings for the United Kingdom.[8]

In order to analyse the variation in the union wage effect further, the union mark-up is calculated for each individual in the sample in conjunction with individual standard errors. This allows the calculation of t-ratios to test the statistical significance of the individual union mark-up estimates. Tables 3A and 3B report the results of this exercise with the former table containing the distribution of wage differentials across seven intervals, and the latter the distribution of the t-ratios across five intervals. Nearly 62 per cent of all union members obtain mark-ups in excess of 15 per cent. However, over 65

7. The issue of whether or not industry effects should be included in the wage specifications when calculating the union wage effects has been raised by a referee. It certainly is the case that in controlling for industries we are netting out certain industry specific union effects. For example, Transport is highly unionised and the Retail industry is not. However, our justification for the inclusion of industry dummies is the desire to capture other industry-specific effects. For example, inter-industry differentials in the capital/labour ratio and/or compensating wage differentials. Using industry dummies to account for such factors, albeit in a crude way, may reduce the potential biases in our union wage gap estimates.

8. An alternative characterisation of this result is that the building and construction industry is different from the rest.

Table 2: *OLS Union Wage Differentials*

Mean	0.1862**	(0.0247)
Base	0.0908	(0.1338)
Deviations from the Base		
By Personal Characteristics:		
Dublin Resident	0.1496	(0.1273)
Trained for Trade or Craft	0.1634	(0.1425)
Disability	0.0942	(0.1600)
By Educational Qualifications:		
Group Certificate	0.1805	(0.1330)
Inter Certificate	0.1709	(0.1411)
Leaving Certificate	0.1536	(0.1407)
Diploma/Third Level	0.0519	(0.1575)
University Degree	0.0235	(0.1691)
By Industry:		
Building and Construction	–0.0581	(0.1200)
Other Production Industries	0.3108*	(0.1789)
Wholesale	0.2921**	(0.0585)
Insurance	0.2590	(0.2154)
Transport	0.3726**	(0.1903)
Professional, Teaching/Health	0.2946	(0.2105)
Public Administration	0.2643	(0.1800)
Personal Services	0.3873*	(0.2088)
Others	0.1914	(0.2431)
By Occupation:		
Producers,Makers & Repairers	0.0531	(0.1179)
Transport, Commun. & Storage	0.0773	(0.1229)
Clerical	0.0571	(0.1487)
Commerce, Insurance & Finance	0.0503	(0.1091)
Service Workers	0.2499*	(0.1476)
Professional, Technical/Others	0.0839	(0.1253)

Notes: The mean differential using the OLS estimates is based on the mean characteristics for the union sector. The standard errors are calculated as the square root of $\bar{X}'V\bar{X}$ where V is the difference between the variance-covariance matrices of parameter estimates of the union and non-union equations and $\bar{X}$ is the vector of mean characteristics. The base differential is calculated on the basis of an individual with mean workforce and unemployment experience who resides in an urban area, works in the Retail industry, is unskilled, has no formal educational qualifications, is not qualified in any trade or craft and suffers no disabilities. Deviations from the base occur singly. Standard errors appear in parentheses. * and ** denote statistical significance at the 10 per cent and 5 per cent level respectively.

per cent of all non-union members possess characteristics that could command a mark-up of 15 per cent or better as a union member. According to Table 3B 42 per cent of the union members' positive mark-ups are statistically significant at the 5 per cent level or better. A comparable percentage (nearly 43 per cent) of the non-members also possess statistically significant positive effects. This result is amenable to both equilibrium and disequilibrium interpretations. The former interpretation rests on the assumption that individuals choose to remain in low-paid non-union jobs on the basis of unobservable job characteristics. The disequilibrium interpretation could view this result as indicative of the existence of rationing in regard to access

Table 3A: *Distribution of OLS Wage Gaps*

Wage Gaps	*All*	*Union*	*Non-union*
Intervals %	*Percentages*		
≤ 0	7.7	7.1	8.5
> 0 ≤ 5	7.1	7.2	7.0
> 5 ≤ 10	11.2	12.1	10.2
> 10 ≤ 15	10.5	11.8	9.1
> 15 ≤ 20	12.7	12.6	12.8
> 20 ≤ 25	11.7	10.9	12.4
> 25	39.1	38.3	40.0
Total	100.0	100.0	100.0

Notes: The differentials are calculated as $[\exp(X_i'(\hat{\beta}_u - \hat{\beta}_n) - 1)] * 100$ where X_i is the vector of characteristics for individual i and β is the vector of parameters derived from the OLS procedure. The numbers are the percentage of individual differential estimates in the different interval categories.

Table 3B: *Distribution of OLS Based T-Ratios for Wage Gaps*

T-Ratios	*All*	*Union*	*Non-union*
Intervals		*Percentages*	
≤ 0	7.7	7.1	8.5
> 0 ≤ 1.64	41.3	43.5	38.7
> 1.64 ≤ 1.96	8.7	7.5	10.0
> 1.96 ≤ 2.58	15.2	17.1	13.0
> 2.58	27.1	24.8	29.8
Total	100.0	100.0	100.0

Notes: The T-ratios are calculated as $[X_i'(\hat{\beta}_u - \hat{\beta}_n)] / [X_i'VX_i]^{0.5}$ where V is the difference in the union and non-union variance-covariance matrices which are assumed independent. The numbers are the percentages of t-ratios falling into the relevant interval categories. 1.64, 1.96 and 2.58 are the critical values for significance at the 10 per cent, 5 per cent and 1 per cent levels respectively using a two-tailed test.

to union jobs. In addition, the results of Tables 3A and 3B also support the view that the characteristics of non-union members are as likely as union members to command a significant wage premium in the union sector. The view that unionised employers select higher quality workers is, thus, not supported by the data.

Although inter country comparisons are difficult, it is clear that our estimate is considerably higher than those quoted in many individual level studies for Britain (see, for example, Stewart (1983), Shah (1984), Green (1988) and Symons and Walker (1990)). Our relatively high union wage gap estimate, however, is in line with Freeman's (1992) reported estimate for Ireland of 23.4 per cent. This latter estimate was larger in magnitude, not only to his British estimate of over 14 per cent but also, to the estimates for all the other countries he examined with the notable exception of the United States.[9] Indeed, the estimate we obtain for Ireland appears more in line with estimates available for the United States (as cited in Lewis (1986)) than to estimates from the other economically developed European countries cited in Freeman.

There may be grounds for believing that our estimate for the union wage gap may be subject to omitted variable bias. Recent studies (see Brown and Medoff (1989), Main and Reilly (1993) and Green, Machin and Manning (1992)) have explicitly examined the effects of employer or plant size on the wage. These effects are usually very well defined in wage equations[10] and failure to account for their presence may assign a larger effect to the union mark-up than is actually the case. Given the limitations of our data set in this regard, we can only speculate as to the magnitude of this potential bias. Nevertheless, this issue will form the basis for further research using alternative micro-level data sets.

V UNION EFFECTS AND THE VARIANCE IN WAGES

The balance of evidence available appears to suggest that unions reduce wage dispersion. Freeman and Medoff (1984, p.92) provide a selective summary of US work in this area and Freeman (1992) provides cross-country evidence of the dispersion reducing effects of unions. Metcalf (1989) also provides evidence of an equalising union wage effect in Britain. Blackaby *et al.*(1991) and Murphy *et al.* (1992), using individual level British data sets, also detect a lower dispersion in wages for covered and union workers respectively. This has been termed the "sword of justice" effect where unions

9. The countries examined by Freeman (1992) were the United States, United Kingdom, West Germany, Austria, Australia, Italy, Ireland, The Netherlands and Norway.

10. See Reilly (1987) for an example using a survey of young workers in Ireland from 1982.

are seen to cut a swathe through the wage distribution and reduce wage inequality. Webb and Webb (1902) anticipated this effect in observing the prominence of the trade union objective of payment in accordance with a uniform standard rate. Blanchflower and Oswald (1988), using the British Workplace Industrial Relations Survey (WIRS) for 1984, confirmed the continued role played by collective goals in the wage determination process in the union sector.

Table 4 provides a decomposition (based on Equation (3)) of the log wage variance differential into a part attributable to a difference in structure (for example, wage setting policies being different from those obtaining in the non-union sector) and a part attributable to differentials in the dispersion of worker characteristics between the two sectors. In addition, Table 4 also contains a similar decomposition into two parts (based on Equation (2)) of the mean log wage differential. The difference in mean wages between the two sectors is statistically significant on the basis of a t-statistic and suggests that union members earn, on average, 30.3 per cent more than non-members. Less than a third of this mean wage differential is explained by differences in worker characteristics with the residual assumed to capture, among other things, the effects of the union wage structure.

The bottom panel of Table 4 contains the results of the variance decomposition. On the basis of the F-statistic, the non-union sector is seen to have a significantly higher variance in the log wage than the union sector. Nearly 58 per cent of this differential is due to structural differences between the two sectors as mediated through, among other things, the setting by unions of standardised wage rates. Only 36 per cent of the variance differential is attributable to differences in the dispersion of worker characteristics.

As a complementary exercise, if non-members were paid according to the union wage structure, the standard deviation in log wages for these individuals would fall from 0.5963 to 0.3746. This is even lower than the standard deviation in log wages of 0.4058 reported for the union members. The effects of imposing the union pay structure on non-members leads to an estimated reduction in the standard deviation in the log of wages of 59.2 per cent.

It can, therefore, be concluded that, although, union work-forces are somewhat less heterogeneous than their non-union counterparts, the greater part of the differential in the log wage variance is not explained by a differential in the dispersion of worker characteristics. However, our results are somewhat in conflict with those reported for Ireland in Freeman (1992) where the implied raw differential in the variance of log of annual earnings between the non-union and the union sector is 0.0652 (as compared to our estimate, based on hourly wages, of 0.1909). In addition, Freeman's (1992) estimates also suggest that unions in Ireland raise the dispersion in annual earnings for

Table 4: *Decomposing the Mean and Variance of the Log Wage*

		Mean	*t-statistic*
Total Differential			
$\overline{W}_u - \overline{W}_n$	=	0.2649	8.9876** (DF=1165)
Of which:			
Differences in Structure —			
$(\hat{\beta}_u - \hat{\beta}_n)'\overline{X}_u$		0.1862	
Differences in Characteristics —			
$\hat{\beta}_n'(\overline{X}_u - \overline{X}_n)$		0.0787	
		Variance	*F-statistic*
Total Differential			
$\hat{s}_n^2 - \hat{s}_u^2$		0.1909	2.1594** (DF=636,529)
Of which:			
Differences in Structure —			
$\hat{\sigma}_n^2 - \hat{\sigma}_u^2 + (\hat{\beta}_n - \hat{\beta}_u)'\Omega(X_u)(\hat{\beta}_n - \hat{\beta}_u)$		0.1101	
Differences in Characteristics —			
$\hat{\beta}_n'[\Omega(X_n) - \Omega(X_u)]\hat{\beta}_n$		0.0683	

Notes: The t-statistic is calculated as:

$$\frac{(\overline{W}_u - \overline{W}_n)}{(\hat{s}_u^2(N_u - 1) + \hat{s}_n^2(N_n - 1))^{0.5}} \times (N_u N_n (N_u + N_n - 2) / (N_u + N_n))^{0.5}$$

The F-statistic is calculated as:

$$\hat{s}_n^2 / \hat{s}_u^2$$

where the subscripts are as in the text and N is the number of observations.

manual workers. This contrast in results may be explained by the fact that we focus exclusively on male workers whereas Freeman includes male and female workers (full and part-time) in his analysis. Furthermore, it is not altogether clear that the use of annual earnings provides the appropriate basis for examining the effects of union standardised wage rate policies on dispersion.

VI CONCLUSIONS

This paper presents estimates of the union membership mark-up for Ireland using data from 1987. The average estimate obtained for a sample of male workers was over 20 per cent. Some evidence of variation in this mark-up across industries was also detected. The membership mark-up is relatively high by both British and European standards and appears more in line with estimates provided for the United States in, for example, Lewis (1986). One possible explanation is that our estimate of the union wage gap is capturing the wage effects of multinational corporations who were, certainly in the 1970s, strongly encouraged by the Industrial Development Authority (IDA) to recognise unions. Although, as Roche (1992) points out, this policy of encouraging recognition has softened recently, its historical consequences may be reflected in our large union wage gap. This again highlights the potential problem omitted variables pose for our estimates. Providing a fuller explanation for the relatively large Irish union wage gap suggests an important direction for future research in this area.

The results of this paper also confirm the effect that unions have on the dispersion of wages. A smaller variance in wages is observed for union members. The differential in variances between union members and non-members is statistically significant. The decomposition of the variance differential in this paper suggested that most of it was due to differentials in the wage structure between the two sectors with a smaller proportion of the differential explained by the fact that union members possess less dispersed characteristics than non-members. Thus, in regard to the former, it could be concluded that unions have been successful in achieving one of their primary goals of standardised wage rates.

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Table A1: *Summary Statistics for Wage Equation Variables*

	Union	*Non-union*
Log (Hourly Wage)	1.6872	1.4223
Union Membership	0.5458	0.4541
Experience	22.2630	16.2850
Experience Squared	647.7600	421.9700
Unemployment	0.9053	0.8958
Unemployment Squared	5.1909	7.5007
Urban Resident	0.5432	0.5132
Dublin Resident	0.3407	0.3604
Trained for Trade or Craft	0.2527	0.2868
Disability	0.0738	0.0641
Educational Qualifications:		
Group Certificate	0.2261	0.2472
Inter Certificate	0.1429	0.1566
Leaving Certificate	0.2166	0.2698
Diploma/Third Level	0.0518	0.0660
University Degree	0.0706	0.1019
Industry Dummies		
Building and Construction*	0.0345	0.0982
Other Production Industries	0.3878	0.3509
Wholesale	0.0126	0.0547
Retail	0.0345	0.1528
Insurance	0.0424	0.0396
Transport	0.1790	0.0585
Professional,Teaching/Health	0.0958	0.0604
Public Administration	0.1899	0.1075
Personal Services	0.0141	0.0623
Others	0.0094	0.0151
Occupation Dummies		
Labourers and Unskilled	0.0754	0.0698
Producers, Makers & Repairers	0.3987	0.3585
Transport, Commun. & Storage	0.1570	0.0849
Clerical	0.0691	0.0453
Commerce, Insurance & Finance	0.0361	0.1434
Service Workers	0.0973	0.0547
Professional, Technical/Others	0.1664	0.2434
Observations	637.0	530.0

*omitted in estimation.