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NOTES and COMMENTS

Union and Gender Wage Gap Estimates for Young Workers in Ireland: A Note

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Abstract: This note exploits data from the YEA/ESRI Follow-Up Survey of School-Leavers from 1981 and 1982 to provide union wage gap estimates for young male and female workers. In contrast to the evidence available for the adult labour market in Ireland, the union wage effect for young male workers is found to be relatively small. Young female union members, on the other hand, fare considerably better. The union wage gap is seen to decline with employer size for both gender groups. In addition, the effects of unions on the size of the male/female gender wage gap is also assessed. In this regard, unions are seen to perform an important role in significantly reducing its magnitude.

I INTRODUCTION

This note exploits the 1987 Youth Employment Agency (YEA)/ Economic and Social Research Institute (ESRI) Follow-Up Survey of School-Leavers to provide estimates of union wage effects for a sample of young full-time employees. Recent studies by Freeman (1992) and Callan and Reilly (1993) provided estimates for adult workers in Ireland. In contrast, this note explicitly focuses on union wage effects for young workers and, in addition, examines the effect of unions on the size of the gender wage gap.

The findings of Freeman (1992) and Callan and Reilly (1993) suggest the existence of a sizeable union wage effect. However, due to data constraints,

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important variables in the wage determination process are omitted from their studies. A potentially crucial omission in both cases is employer size (as measured by total number of employees). Failure to control for employer size may lead to an upward bias in the estimated union wage effect if there exists a positive relationship between employer size and unionisation.[1] The availability of employer size information in the YEA/ESRI survey allows the possible extent of this particular bias to be explored.

The next section of this note describes the data set employed in the empirical analysis. Two subsequent sections provide a discussion of the empirical results and some conclusions.

II DATA DESCRIPTION

The data set employed in this analysis is derived from the YEA/ESRI Follow-Up Survey of 1981/82 School-Leavers carried out in the Autumn of 1987. This paper focuses on the sub-set of male and female employees who are in regular full-time non-agricultural jobs and who described themselves as working for payment or profit. It excludes individuals who classified themselves as either employers or self-employed. The respondents used in this note ranged in age from just under 20 years to just over 27 years of age. A fuller description of the survey from which this data are drawn is available in Breen (1991).

The variables to be used in the subsequent analysis are defined in detail in Table A1 of the Appendix to this note with summary statistics also provided in Table A2 of this Appendix.

III THE EMPIRICAL RESULTS

The sample used contained 609 individuals; 334 of whom are female. The proportion of females who are union members is nearly 44 per cent with the comparable figure for males of 33 per cent. The overall union density figure for both males and females is just under 39 per cent which is somewhat lower than the union density estimate for 1987 reported in Roche (1992). On the basis of our sample, therefore, young workers appear less likely than adult workers to be union members.

In this note no attempt is made to model econometrically either union membership or the female participation decision. Given the youth of the workers analysed, this latter omission is not viewed as important. The former

1. On the basis of the data employed in this study over 61 per cent of employees in firms with over 100 employees are union members. In contrast, only 16.6 per cent of employees in firms with less than 20 workers are union members.

omission is justified on the basis of an absence from the data set employed of appropriate variables for the purposes of identification.

The problem of identification in the union endogeneity model (as well as other important econometric issues relating to this model) continues to be the subject of much research (see for example, Heckman and Honoré (1990)). In a more recent paper Lanot and Walker (1993), using the United Kingdom Family Expenditure Surveys, attempt to resolve the identification problem by use of an unearned income variable in their union selection equation.[2] In addition, they suggest use of semi-parametric estimation procedures given the sensitivity of the two-step Heckman procedure to departures from the normality assumption in the selection or control equation. Lanot and Walker (1993) do however conclude that least squares procedures are likely to provide more robust estimates of the union wage differential than the more sensitive control function methods. For the purposes of this note we adopt Ordinary Least Squares (OLS) procedures throughout and do not examine any alternative estimation methods. Both the Heckman and the semi-parametric procedures require appropriate variables for identification. Given the absence of plausible identifying variables in our data set (for example, there is no unearned income variable) use of these procedures is avoided.

Wald tests were initially employed to establish the extent to which the data support splitting of the overall sample into a number of different sub-samples, Given the presence of severe heteroscedasticity, Chow tests (based on the assumption of homoscedastic error variances) are invalid (see Greene (1992, Ch.14)). The adoption of the White (1980) corrected variance-covariance matrix requires use of the Wald testing principle to test restrictions of interest.

In the first instance a wage equation was estimated for the full sample of 609 individuals with a full set of gender dummy interactions. The null hypothesis of common effects across the two gender groups was decisively rejected with a Wald value of 71.1 (distributed as χ^2 with 18 degrees of freedom). The data thus support the bifurcation of the sample into male and female sub-samples. These sub-samples were then used to estimate male and female wage equations each with a full set of union membership dummy interactions. The null hypothesis of common effects across the union and non-union sectors was upheld for the male sub-sample with a Wald value of 18.3 (distributed as χ^2 with 17 degrees of freedom). The comparable null hypothesis for the female sub-sample was, however, rejected by the data with a Wald value of 154.1 (distributed as χ^2 with 16 degrees of freedom).

2. Lanot and Walker (1993) include non-labour income in their union selection equation arguing that union supplied services (including psychic ones such as job security) are normal goods. Their reported estimate (see p.19) is consistent with this rationalisation.

The foregoing results, therefore, suggest the estimation of separate union and non-union female wage equations. Although the results do not support similar treatment for the male sub-sample, a number of interactions were found to be individually statistically significant. These were the union interactions with the two employer size dummies and the union interaction with the third-level educational qualification dummy.[3] These three interactions were also found to be jointly statistically significant with a Wald value for these three interactive terms of 13.5 (distributed as χ^2 with 3 degrees of freedom). The reported male equation, therefore, includes the estimated effects for these three interactive terms.[4]

Table 1 contains OLS estimates for a full-sample male equation (with the additional interactions that were found to be individually significant) and two separate female equations for the union and non-union sectors respectively. Given the presence of heteroscedasticity in all three equations as confirmed by the calculation of a Breusch-Pagan test (see Breusch and Pagan (1979)), the White (1980) correction for heteroscedasticity is again adopted.

In terms of the male equation, the variables capturing age and experience[5] on the current job are both found to be statistically insignificant. Residing in the Greater Dublin area has a predictably well determined positive effect on the net hourly wage as does the possession of either a leaving certificate or a third level educational qualification. A further premium attaches to a third-level qualification for those who are also union members. The variable capturing the effects of currently undertaking on-the-job training adopts a sign consistent with firm specific human capital investment, although the estimated effect is not that well determined.

The estimated employer size coefficients (interpreted here, given the union employer size interactive terms, as the size effects for the non-union workers) both register well determined effects. Non-union employees working, for example, in firms of more than 100 workers earn a net hourly wage which is, on average, nearly 32.4 per cent more than that earned by non-union employees working in firms of less than 20 workers. In contrast, the employer size wage effect declines with employer size for union members thus implying a declining union wage gap with increased employer size. The union wage

3. The employer size categories adopted are derived from a survey question which presented the individual with a limited number of possible size responses. For the purposes of this study some categories were aggregated up to those used in estimation. The empirical findings of this note are not sensitive to alterations in the categories adopted in estimation.

4. The estimated coefficients of these interactive terms now represent the differential in coefficients between union members and non-members.

5. Given the youth of the workers in the sample, the experience and age variables enter the specification linearly. Use of quadratic terms in experience and age proved, not surprisingly, unsatisfactory both in terms of significance and sign.

Table 1: *OLS Wage Equation Estimates for Young Workers*

	Male	*Female*	
	Full-Sample	*Union*	*Non-Union*
Constant	0.483	–1.421	0.295
	(0.598)	(1.405)	(0.441)
Age	0.010	0.111*	0.002
	(0.026)	(0.065)	(0.020)
Experience	0.007	0.004	0.020*
	(0.010)	(0.015)	(0.010)
Married	0.145*	0.022	0.003
	(0.049)	(0.084)	(0.043)
Dublin	0.093*	0.068	0.269*
	(0.038)	(0.048)	(0.053)
Promotion	–0.008	0.066	0.001
	(0.032)	(0.059)	(0.045)
Size2	0.122*	0.010	0.107*
	(0.048)	(0.075)	(0.048)
Size3	0.281*	0.006	0.219*
	(0.061)	(0.068)	(0.056)
Current Training	–0.061	0.142*	–0.286*
	(0.045)	(0.063)	(0.123)
Past Training	0.004	0.113	0.071*
	(0.038)	(0.082)	(0.044)
Primary	–0.264*	–0.071	0.064
	(0.120)	(0.087)	(0.120)
Leaving Certificate	0.088*	–0.202	0.230*
	(0.044)	(0.202)	(0.059)
Third Level	0.183*	0.193	0.364*
	(0.067)	(0.203)	(0.076)
Manual	–0.007	–0.120*	0.013
	(0.043)	(0.056)	(0.058)
Relation	–0.363*	—	–0.279*
	(0.094)	—	(0.112)
Industry1	0.028	–0.159*	0.054
	(0.045)	(0.056)	(0.055)
Industry3	–0.176*	0.048	0.237*
	(0.066)	(0.115)	(0.065)
Union	0.177*	—	—
	(0.091)	—	—
Third × Union	0.207*	—	—
	(0.104)	—	—
Size2 × Union	–0.184*	—	—
	(0.108)	—	—
Size3 × Union	–0.253*	—	—
	(0.105)	—	—
R2 (Adjusted)	0.338	0.383	0.336
Breusch-Pagan (Chi-Squared)	145.44*	391.35*	29.98*
Observations	275	146	188

Standard errors in parentheses.
* Denotes statistical significance at the 5 per cent level or better using a two-tailed test.

gap for workers in the smallest sized category is 19.3 per cent in contrast to –7.3 per cent for union members in the largest sized category. Similar evidence on the union-employer size wage relationship is reported for the United Kingdom (see for example, Main and Reilly (1993) and Green, Machin and Manning (1992)).

It is also evident from column one of Table 1 that a significant wage disadvantage attaches to working for either one's father or a close relative. On average, the net hourly wage for such workers is just over 30 per cent lower when compared to males not working under similar circumstances.

The estimates for the female wage equation for union members are reported in column two of Table 1. Most of the estimated coefficients are individually insignificant with exceptions provided by the age variable, the current training variable, the manual occupational category, and the broad manufacturing industry category. The positive sign on the current training variable appears somewhat counterintuitive. It is also noteworthy that both employer size effects in this equation are statistically insignificant. The poorly determined nature of these estimates may be attributable to the relatively small sample of 146 individuals used in estimation here.

Column three provides the wage equation estimates for the female non-union sector. In contrast to the female union wage equation most of the estimated coefficients are statistically significant at a conventional level. The experience variable has a significant positive effect as does residing in Dublin. The current training variable registers a sign consistent with the predictions of human capital theory, and the leaving certificate and the third level qualification variable both register well determined positive effects. The firm size effects are also well determined. Non-union females working respectively in the medium sized and large sized firms earn, on average, 11.2 per cent and 24.5 per cent higher wages than similar workers employed in the small sized category. A comparison of the estimated size effects for female workers between union and non-union sectors confirms an inverse relationship between the union wage gap and employer size. This was also a feature of the results reported above for the male workers. Finally, as also noted in the case of the male workers, females working for relatives experience a wage disadvantage estimated, on average, to be about 24 per cent.

Table 2 reports the estimates for the union wage gaps based on the wage equations of Table 1. In all cases the union wage gaps are calculated on the basis of the mean characteristics of the union sector.[6] The first row of Table 2 reports estimates based on the inclusion of the employer size dummies (i.e., the wage equations of Table 1). The male union wage gap is

6. The standard errors for these estimates are calculated in the usual way (see for example, Reilly (1987)).

Table 2: *Union Wage Gap Estimates*

Union Wage Gaps	*Male*	*Female*
Including Employer Size	0.008	0.199*
	(0.037)	(0.037)
Excluding Employer Size	0.095*	0.253*
	(0.033)	(0.035)

Standard errors in parentheses.
*Denotes statistical significance at the 5 per cent level or better using a two-tailed test.

found to be negligible and statistically insignificant[7] in contrast to the the statistically significant female estimate of 22 per cent.[8, 9]

A comparison with estimates derived from different samples of workers is, of course, fraught with difficulty. However, this negligible male estimate is dramatically at odds with the 20 per cent estimate reported for adult male workers in Callan and Reilly (1993). Given that their data relate to the same year as this study, it could be argued that unions exert more influence in the male adult labour market than in the market for young male workers. The result reported in this note also contrasts with the findings of Freeman and Medoff (1984, p. 48), who suggest that young workers, relative to their adult counterparts, generally enjoy significant wage benefits from the exercise of union power. For the Irish labour market, this appears valid only for young female members.

Estimation of wage equations that exclude the size dummies (not reported here) are used to calculate the wage gap estimates of row two of Table 2. Both gender groups register increases in their respective union wage gap estimates. The male effect now rises to a statistically significant 10 per cent with the female estimate rising to an even more significant 29 per cent. The positive relationship between union membership and employer size explains the upward movement in the union wage gap and points to the serious bias induced by their exclusion from wage equations. The magnitude of the increase reported here suggests that failure to account for employer size may

7. The raw (unadjusted) differential in mean wages between male union members and non-members is 15.5 per cent. The estimated male union wage gap suggests that little of this raw differential is accounted for by union power.

8. The raw (unadjusted) differential in mean wages between female union members and non-members is nearly 43 per cent. On the basis of our female union wage gap estimate, over half of this raw differential is accounted for by the exercise of union power.

9. This union wage gap for female workers is considerably higher than the selectivity corrected union wage gap estimate of nearly 15 per cent reported for full-time female workers in Great Britain by Main and Reilly (1992). Nevertheless, in agreement with the British evidence, it does suggest that female union members fare considerably better than male union members.

lead to a considerable overstatement of the estimate for the union wage gap. As Callan and Reilly (1993) admit, their 20 per cent estimate for the male adult union wage gap in Ireland may be the subject of an upward bias given the omission of a firm size variable from their study.[10]

Finally, attention turns to Table 3 and the gender wage gap estimates. The gender wage gaps are calculated on the basis of the mean characterisitics of the females in the sectors in question. Since the gender wage gap estimates are seen to be insensitive to the exclusion of the employer size dummies, we focus only on row one of Table 3. Although the t-ratio for the union members' gender wage gap exceeds unity, it is not significant at a conventional level. The point estimate does suggest, however, a wage advantage in favour of the females. In contrast the gender wage gap for the non-union sector is reported at a statistically significant 17.8 per cent in favour of males. The only other estimates on the gender wage gap for young workers in Ireland is provided in Reilly (1987, Table 9) who, using a sample of young workers from 1982 (without a control for union membership), detected a gender wage gap of 7.5 per cent.[11] The evidence presented in Table 3 suggests that, at least in the case of young workers, unions perform an important role in reducing the magnitude of the gender wage gap.

Table 3: *Gender Wage Gap Estimates*

Gender Wage Gaps	*Union*	*Non-union*
Including Employer Size	–0.041	0.164*
	(0.039)	(0.031)
Excluding Employer Size	–0.048	0.165*
	(0.040)	(0.033)

Standard errors in parentheses.
*Denotes statistical significance at the 5 per cent level or better using a two-tailed test.

IV CONCLUSION

This note has presented estimates of union and gender wage gaps for a 1987 sample of young full-time workers in Ireland who left school either in 1981 or 1982. Recent evidence on the union wage gap for Ireland suggests a

10. It is worth noting in passing that attenuating the Callan and Reilly (1993) estimate by the percentage points' differential observed between rows one and two of Table 2 does yield an adult estimate for the union wage gap which is less inimical to estimates generally reported for the United Kingdom union wage gap. This, of course, should be interpreted as a purely suggestive exercise.

11. A weighted average of these two gender wage gaps provides an overall gender wage gap of 8.8 per cent which is dimensionally comparable to the estimate of 7.5 per cent reported in Table 9 of Reilly (1987) using a sample of young workers from 1982.

relatively large effect. The union wage gap estimate presented here for young full-time male workers was not found, however, to be statistically different from zero at a conventional level of significance. This is a relatively surprising result given the view expressed, for example, by Freeman and Medoff (1984) that the union wage effect should be largest among young workers. Their contention is supported, however, by an estimate of slightly over 22 per cent obtained for young female workers in the sample.

For both males and females the union wage gaps were seen to decline with employer size, with union wage effects weakest in the largest sized employer categories. This is in agreement with the recent findings of Main and Reilly (1993) and Green *et al.* (1992) for the United Kingdom.

The gender wage gap estimates reported in this note do serve to highlight the important role played by unions in reducing its size. Indeed, the gender wage gap for union members was found to be statistically insignificant from zero. In contrast, a statistically significant gender wage gap for the non-union workers of approximately 18 per cent was detected. An important issue worthy of further investigation, therefore, is the extent to which this salutary effect of unions on the gender wage gap is also a characteristic feature of the adult labour market.

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APPENDIX

Table A1: *Variable Description*

Variable	*Description*
ln(Wage)	The natural logarithm of an individual's usual net of tax hourly wage.
Age	The age of the individual in years.
Experience	The amount of time spent in the current job in years.
Married	A binary variable adopting a value of 1 if the individual is currently married; otherwise zero.
Dublin	A binary variable adopting a value of 1 if the individual resides in Greater Dublin (including Dun Laoghaire); otherwise zero.
Promotion	A binary variable adopting a value of 1 if the individual has received promotion in the current job; otherwise zero.
Size1	A binary variable adopting a value of 1 if the individual works in a firm employing between 1 and 20 workers; otherwise zero.
Size2	A binary variable adopting a value of 1 if the individual works in a firm employing between 21 and 100 workers; otherwise zero.
Size3	A binary variable adopting a value of 1 if the individual works in a firm employing over 100 workers; otherwise zero.
Current Training	A binary variable adopting a value of 1 if the individual is currently undergoing training on-the-job; otherwise zero.
Past Training	A binary variable adopting a value of 1 if the individual has received on-the-job training in the current job in the past; otherwise zero.
Primary	A binary variable adopting a value of 1 if the individual's highest educational qualification is Primary Level; otherwise zero.
Intermediate Certificate	A binary variable adopting a value of 1 if the individual's highest educational qualification is Intermediate/Group Certificate level; otherwise zero.
Leaving Certificate	A binary variable adopting a value of 1 if the individual's highest educational qualification is Leaving Certificate level; otherwise zero.

Table A1: *Variable Description*

Third Level	A binary variable adopting a value of 1 if the individual's highest educational qualification is a third-level qualification; otherwise zero.
Manual	A binary variable adopting a value of 1 if the individual works in a manual occupational category; otherwise zero.
Works for Relation	A binary variable adopting a value of 1 if the individual works for his/her father or a close relative; otherwise a value of zero.
Industry1	A binary variable adopting a value of 1 if the individual works in industry divisions 1-5 (extractive and manufacturing industries); otherwise zero.
Industry2	A binary variable adopting a value of 1 if the individual works in industry divisions 6-8 (distribution, hotels and catering industries); otherwise zero.
Industry3	A binary variable adopting a value of 1 if the individual works in industry division 9 (public administration, health, education etc.); otherwise zero.
Union	A binary variable adopting a value of 1 if the individual is a member of a trade union; otherwise zero.

Table A2: *Summary Statistics for Variables Used in Analysis*

	Union		*Non-Union*	
	Male	*Female*	*Male*	*Female*
Ln(Wage)	1.0497	1.1197	0.9056	0.7634
Age	23.2200	23.2400	23.0980	23.3180
Experience	3.6663	3.7611	2.8442	3.2663
Married	0.0889	0.1233	0.0919	0.2021
Dublin	0.4111	0.2945	0.2945	0.2181
Promotion	0.3667	0.3219	0.3219	0.2925
Size1*	0.1444	0.1712	0.4865	0.5374
Size2	0.2667	0.1986	0.2432	0.2394
Size3	0.5889	0.6301	0.2703	0.2232
Current Training	0.1222	0.1027	0.2054	0.0532
Past Training	0.2778	0.3082	0.2324	0.2394
Primary	0.0111	0.0479	0.0270	0.0266
Intermediate Certificate	0.2667	0.1781	0.2757	0.0904
Leaving Certificate	0.5778	0.5274	0.3622	0.6436
Third Level	0.1444	0.2466	0.3351	0.2394
Manual	0.4778	0.2808	0.4108	0.1117
Relation	0.0222	0.0000	0.1351	0.0585
Industry1	0.5333	0.3836	0.5081	0.2500
Industry2*	0.1333	0.1575	0.0757	0.0957
Industry3	0.3334	0.5411	0.4162	0.6543
Observations	90	185	146	188

*Denotes omitted in estimation.