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Male-Female Wage Differentials in Ireland

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1. Introduction

The persistence of sizeable male-female earnings differentials despite the introduction of a range of anti-discrimination measures has been a focus of concern in many countries. In Ireland the ratio of female to male wage rates rose by about 8 percentage points between 1975 and 1980, following the implementation of equal pay legislation (1975) and anti-discrimination legislation (1977); but since that time the ratio has been approximately stable at about 68 per cent. The current situation is, therefore, not untypical of that in many other countries.

A natural first step in analysing the persistence of such overall differentials is to decompose the wage gap into portions due to differences in characteristics (such as education and experience) and a residual, possibly attributable to discrimination. There are many such studies in the international literature (see Gunderson, 1989 for a recent survey) but only a limited number of Irish studies, eached based on surveys of rather special populations: Walsh and Whelan (1976) analysed a sample of redundant workers; Reilly (1987 and 1990) examined differentials in the youth labour market; while Ruane and Dobson (1990) analysed the academic labour market. Until recently, an analysis of a more representative sample has not been possible because of the lack of suitable data. The present paper aims to fill this gap by analysing data from a large-scale national survey, which included detailed information on the employment, education and earnings of both men and women. Of particular note in this context is the fact that it included labour market histories for both women and men: this allows the effects of spells of men's unemployment on male wages to be taken into account, and compared with the effects of time spent out of the labour market in the child-bearing and child-rearing years on the wages of women.

The structure of the paper is as follows. The basic methods are set out, and the results of previous research on the Irish situation are reviewed in section 2. The empirical

specifications and data used in the present study are outlined in section 3. The results are presented and discussed in section 4, including some comparisons with the work of Wright and Ermisch (1990) in the UK. The main findings are drawn together in the concluding section.

2. Methods and Previous Research

The "standard procedure" for analysis of the determinants of the male-female wage gap may be summarised as follows.[1] First, wage equations are estimated for samples of individual men and women separately:[2]

(1) $$\log w_m = X_m \beta_m + \varepsilon_m$$

(2) $$\log w_f = X_f \beta_f + \varepsilon_f$$

The average differential between men and women can then be expressed as:[3]

(3) $$\overline{\log w_m} - \overline{\log w_f} = \hat{\beta}_m(\overline{X}_m - \overline{X}_f) + (\hat{\beta}_m - \hat{\beta}_f)\overline{X}_f$$

The first term on the right hand side represents that portion of the average differential which is explained by differences in average characteristics. The second term represents the portion which cannot be explained in those terms; this residual is due to differences in rates of returns to the characteristics. It is widely used to derive an index of the level of "discrimination":

(4) $$D_f = 100(\exp(\hat{\beta}_m - \hat{\beta}_f)X_f - 1)$$

This index measures how much higher the wages of females would be if their characteristics were rewarded in the same way as men's characteristics are currently rewarded.

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1 cf. Gunderson (1989), Wright and Ermisch (1990). The notation follows that of Wright and Ermisch.

2 w is the hourly wage rate, X a vector of characteristics such as educational levels and experience, and β the returns to those characteristics. Discussion of the precise specification of the vector of characteristics, X, is deferred until section 3.

3 An alternative decomposition based on $\hat{\beta}_f(\overline{X}_m - \overline{X}_f)$ and $(\hat{\beta}_m - \hat{\beta}_f)\overline{X}_m$ yields similar results, unless otherwise indicated, to those reported here.

As Wright and Ermisch point out, the index cannot be taken as either an upper or a lower bound on the extent of discrimination:

> If women's employment interruptions are exogenous, then $(\hat{\beta}_m - \hat{\beta}_f)\overline{X}_f$ represents an upper bound on the degree of direct discrimination, because the *expected* interruption reduces women's investment in human capital *before the interruption,* both in education and on-the-job. As a consequence, the coefficients associated with education and work experience would be lower for women even if they earn the same returns on human capital as men...But as Weiss and Gronau (1981) show, when the length (and existence) of employment interruptions is endogenous, discrimination in pay induces longer labour force withdrawals (less work experience, more home time), creating a tendency for $(\hat{\beta}_m - \hat{\beta}_f)\overline{X}_f$ to understate the full effect of discrimination on earnings differences. (Wright and Ermisch, 1990, pp. 5-6)

Despite these *caveats*, the index is widely used; but it should be interpreted with caution, as noted by Wright and Ermisch. For that reason, it is referred to as the "discrimination" index, or simply D_f, in this paper.

Walsh and Whelan (1976) analysed the difference between male and female *weekly* earnings along these lines, using a sample of redundant workers[4]. They found that less than 2 per cent of the total differential of over 50 per cent was due to differences in attributes. Thus, the implied "discrimination" index was itself above 50 per cent. While the authors cautioned that the sample was not a representative one, they pointed to factors which could tilt the estimated index above or below that which would be obtained from a representative sample.

Reilly (1987) analysed a sample of younger workers, where the observed wage gap was around 10 per cent. He found that about 30 per cent of this gap could not be explained by differences in attributes; the implied "discrimination index" of about 3 per cent was, although small, significantly different from zero. In a later paper (Reilly, 1990) it was shown that this aggregate discrimination index concealed quite large variations as between manual and non-manual occupations. There was no significant difference in the reward structures for

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4 Marital status was used as a proxy to capture the effects of part-time working, which was, in any case, quite limited in its extent at that time, and concentrated disproportionately among married women.

manual occupations. But, depending on the method used to control for occupational endogeneity, the point estimate of the "discrimination" index for non-manual workers varied from 6 per cent (and significantly different from zero) to 16 per cent (but insignificantly different from zero).

In Ruane and Dobson's (1990) sample of academics, average male income was 23 per cent higher than average female income; their analysis showed that measured attributes accounted for about half of this difference, yielding a "discrimination" index of about 11 per cent.

Each of the micro-level studies refers to a restricted sample (redundant workers; young workers; academics). The present paper provides more general estimates of the role of employment interruptions, differences in attributes, and differences in reward structures in the overall wage gap between men and women. US and UK results suggest that the size of the unexplained gap is lower in the academic market than in the wider labour market: on this basis, a somewhat higher estimate than Ruane and Dobson's 11 per cent would be expected here. The Walsh/Whelan estimates were bsed on data referring to 1972, before the introduction of the major anti-discrimination and equal pay acts. Since there is *prima facie* evidence that this legislation has had a significant impact, this factor may be the dominant one in explaining differences between the Walsh/Whelan estimates and those contained here.

There have also been a number of more descriptive studies focussing on the role of average pay rates within industry and occupational categories in the overall male-female wage gap, particularly in the context of the low pay issue. A common interpretation of these studies is that high risks of low pay rates are found in a small number of broadly classified occupations and industries; and that women's employment is concentrated in these categories, whereas male employment tends to be in higher paying occupations and industries. A more accurate reading of the studies may be that this is true only when occupations are classified at a very detailed level. Blackwell's (1986) conclusion that "the fact that women are a small minority in employment at the higher occupational levels, and are overrepresented in relatively low pay

segments of industry and in retail distribution has a powerful influence on their earnings relative to those of men, driving them lower", for example, is based on a detailed occupational classification. While this approach may be valuable in establishing the nature of the wage gap, it cannot be regarded as a satisfactory mode of explanation. It may be legitimate to regard differences in broad occupational grouping as reflecting voluntary choices, but differences in occupational attainment, particularly at a highly detailed level, may reflect discrimination. The analysis in this paper will suggest that the gap between male and female wage rates depends more on differences in pay *within* the broad occupational classification, and less on the distribution across the broad occupational classes, in contrast to a common interpretation of descriptive studies such as Blackwell (1986) and Nolan (1991).

3. Empirical Specification

Gunderson (1989) notes that the variables used to control for productivity-related differences in wages have varied quite widely from study to study. It is possible to distinguish between two broad approaches. The first of these may be called a strict "human capital" approach, which includes as control variables educational qualifications, labour market experience, and time spent unemployed or out of the labour market. The second approach is distinguished by its inclusion of occupational and/or industry variables in its controls: it will be labelled the "occupational" model here, and variants may range from those which include only occupational dummy variables to those which include experience and/or educational qualifications as well.[5]

Given that occupational attainment is often linked to educational qualifications, but has other dimensions, each of these approaches can claim certain advantages. The narrower human capital models can claim to give better estimates of the returns to educational qualifications: when occupations are included the estimates of returns to education are biassed downwards.

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5 Models which combine the human capital variables with occupational variables may often be described as human capital models; but this term is given a narrower interpretation here.

But models which do not take account of differences in wages across occupations may lead to estimates of "discrimination" which reflect not differences in pay between men and women in similar jobs, but differences in pay for different jobs. Such differences may reflect differences in access to occupations, or differences in choices. Neither the human capital nor the occupational models has resolved this issue satisfactorily: the strict human capital model can be seen as producing an index which includes occupational differences as if they were due to enforced segregation, while the broader models including occupational dummies can be seen as producing estimates which treat occupational differences as if they were either justified by qualifications and experience, or due to voluntary decisions.[6]

Since neither model has a unique claim to our attention, two basic empirical specifications are used here. The first uses just the narrower human capital variables, together with some other, mainly demand-side controls (regional, occupational and industry-specific unemployment rates, a regional dummy for the capital city which includes about one-third of the Irish population, and an urban/rural dummy). The second includes only dummies based on the broad occupational groups used by the Irish Central Statistics Office; in effect this also includes some key industry dummies. We examine the coefficient estimates of the human capital approach in some detail; the estimated "discrimination" indices are then compared with those derived from the simple occupational model, and some composite models. The alternative models with occupational dummies also allow some new light to be shed on the common interpretation of descriptive statistics based on these groupings.

The data for the analysis is taken from the ESRI Survey of Income Distribution, Poverty and Usage of State Services. This was a national survey of 3,300 households, conducted in 1987. It gathered detailed information on gross and net earnings, hours of work and current or most recent occupation for both men and women. It also includes information on

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6 e.g., the model of Polachek (1981) suggests that women will choose occupations in which the rate of wage decline with respect to time spent out of the labour force are lower.

educational qualifications and the cumulative labour market experience of individuals since (first) leaving full-time education. The hourly wage is constructed from usual gross weekly or monthly pay and usual hours worked. A detailed description of the database is contained in Callan, Nolan *et al.* (1989).

The sample used in the present analysis consists of married women and their husbands. Married women aged 60 or over were excluded from the analysis. In the analysis of wages (and in the case of married women, of participation decisions) individuals who were self-employed, ill or disabled were also excluded. A small number of cases for which only limited information was available was also excluded, leaving a total of 1,712 married women in the sample, of whom 324 were currently working. This employment rate is not far from the current national average for married women. Similar exclusions led to a total of 1,019 married men, of whom 783 were employed at the time of interview.

4. Results

4.1 Human Capital Approach

We begin by considering estimates of wage equations for married men and married women based on the human capital approach (Table 1) together to the wage-gap decompositions and "discrimination" indices implied by these equations (Table 2). For men two specifications were used. The first uses potential experience (measured by years since first leaving full-time education) as the measure of labour market experience, while also including educational qualifications and a set of dummies reflecting, for the most part, the influence of labour demand. This specification is close to that employed by Wright and Ermisch (1990). The second specification for men (no. 4 in table 1 below) uses men's actual labour market experience instead, and also includes a measure of time spent unemployed or out of the labour market. For women, each of these two approaches was estimated using first

an OLS estimator, and second a Heckman two-stage estimator correcting for the influence of self-selection into the paid workforce[7]: this two by two schema gives specifications (2), (3), (5) and (6) in table 1 below.

7 The participation probits for this analysis are reported in Appendix B.

Table 1: Wage Equations for Married Men and Married Women, Ireland, 1987.

Eqn. No. *Sample* *Method* *Experience*	*(1)* *Males* *OLS* *Potential*	*(2)* *Females* *OLS* *Potential*	*(3)* *Females* *Heckman* *Potential*	*(4)* *Males* *OLS* *Actual*	*(5)* *Females* *OLS* *Actual*	*(6)* *Females* *Heckman* *Actual*
Years not worked/10				-0.52	-0.24	-0.28
				-3.86	*-2.72*	*-3.10*
$(\text{YrsNotWorked})^2/1000$				2.95	0.61	0.66
				2.55	*1.61*	*1.79*
Experience/10	0.32	0.33	0.30	0.34	0.41	0.38
	4.59	*2.72*	*2.40*	*5.16*	*3.13*	*2.92*
$(\text{Experience})^2/1000$	-0.41	-0.64	-0.62	-0.46	-0.50	-0.48
	-3.02	*-2.46*	*-2.38*	*-3.52*	*-1.34*	*-1.30*
Constant	1.02	1.27	1.26	1.04	1.07	1.05
	5.86	*4.69*	*4.77*	*6.22*	*4.23*	*4.26*
Educational level:						
Group Cert.	0.18	0.02	0.02	0.16	0.10	0.10
	4.46	*0.22*	*0.20*	*4.26*	*1.19*	*1.19*
Inter. Cert.	0.25	0.30	0.31	0.22	0.26	0.27
	4.93	*3.17*	*3.28*	*4.40*	*2.94*	*3.10*
Leaving Cert.	0.41	0.33	0.35	0.38	0.37	0.39
	8.75	*3.60*	*3.76*	*8.19*	*4.26*	*4.54*
Diploma/3rd level	0.52	0.77	0.79	0.52	0.72	0.74
	8.70	*6.47*	*6.65*	*8.88*	*6.48*	*6.81*
University	0.78	1.01	1.05	0.76	1.00	1.06
	13.33	*8.75*	*8.44*	*13.16*	*9.23*	*9.37*
Industry UE rate	0.00	0.00	-0.00	0.00	0.00	0.00
	2.86	*0.32*	*-0.01*	*2.41*	*0.97*	*0.46*
Occupation UE rate	-0.01	-0.02	-0.02	-0.01	-0.01	-0.01
	-4.92	*-2.10*	*-2.01*	*-4.22*	*-1.71*	*-1.64*
Regional UE rate	0.00	-0.02	-0.03	0.00	-0.02	-0.02
	-0.16	*-1.82*	*-1.97*	*-0.04*	*-1.50*	*-1.72*
Urban	0.07	-0.07	-0.07	0.07	0.00	0.01
	2.01	*-1.01*	*-1.02*	*1.94*	*0.07*	*0.08*
Dublin	0.02	0.13	0.14	0.02	0.08	0.09
	0.56	*1.48*	*1.67*	*0.44*	*0.93*	*1.13*
λ			0.07			0.10
			0.80			*1.41*
R^2	0.38	0.46	0.46	0.41	0.53	0.54
Sample size	783	324	324	783	324	324
SE	0.37	0.45	0.45	0.36	0.42	0.42

Notes: (t-statistics in small type, *italicized*)

The general pattern of the coefficient estimates in both male and female wage equations is as expected. Experience has a positive but declining effect, with the reverse applying to time spent out of the labour market. Higher educational qualifications are consistently associated with higher wage rates. For example, the predicted hourly gross wage for a married woman with the average characteristics of a participant is about £3.50 if she has an Intermediate Certificate and £4.00 if she has a Leaving Certificate. These figures rise to £5.60 if she has a diploma or other third level qualification, and £7.70 if she has a university degree. Taken as a group, the effects of industry-, occupation- and region-specific unemployment rates on wages is negative; overlap between the industry and occupational classifications may be responsible for some positive coefficients. Effects of the urban and Dublin dummies are weaker, particularly for women. Overall, about 40 per cent of the variance in male wage rates is explained, and about 50 per cent of the variance in the case of married women.

We can now decompose the average (logarithmic) gap between male and female wages along the lines described in Section 2. The decomposition is extended to take account of time out of the labour force, and possible self-selection effects, following Wright and Ermisch:

$$\overline{\log w_m} - \overline{\log w_f} = \hat{\beta}_m(\overline{X}_m - \overline{X}_f) + (\hat{\beta}_m - \hat{\beta}_f)\overline{X}_f - (\hat{\alpha}_m H_m - \hat{\alpha}_f H_f) - \beta^{\lambda}\overline{\lambda}$$

where $\hat{\alpha} = (\hat{\beta}^{ynw}, \hat{\beta}^{ynw^2})$

$H = (\overline{ynw}, \overline{ynw^2})'$

ynw = years not worked

λ = inverse Mills ratio (self-selection term)

Table 2: Decomposition of Wage Differential between Married Men and Married Women, Ireland, 1987

Decomposition	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Male equation[a]	*OP*	*OP*	*OP*	*OP*	*OA*	*OA*
Female Equation[a]	*OP*	*HP*	*OA*	*HA*	*OA*	*HA*
Observed wage gap (logs)	0.296	0.296	0.296	0.296	0.296	0.296
Wage offer gap (logs)	0.296	0.365	0.296	0.398	0.296	0.398
of which % due to:						
Years not worked	≡ 0	≡ 0	32.5	28.8	21.8	20.9
Other attributes	-18.6	-14.9	14.5	10.7	12.7	9.3
Residual ("discrimination")	118.6	114.9	53.0	60.5	65.6	69.8
$\overline{X}_f(\hat{\beta}_m - \hat{\beta}_f)$	0.347	0.420	0.155	0.241	0.192	0.278
ASE[b] of $\overline{X}_f(\hat{\beta}_m - \hat{\beta}_f)$	0.031	0.096	0.044	0.075	0.043	0.074
D_f	41.5	52.2	16.8	27.3	21.1	32.0

Notes: a. Acronyms for equations: Method: O=OLS, H=Heckman
Experience: P=potential, A=actual
b. Calculated as per Stewart (1987).

The wage equations based on women's potential experience lead to high estimates of the "discrimination" index: they suggest that women's wages would be up to 50 per cent higher if women's characteristics were remunerated at the same rate as men's. This is unsurprising. By definition, no account is taken of home time or unemployment experience; and Irish women have tended to have education levels as high, or higher, than men's. The sample proportions shown in Appendix A are for employees only, and so do not correspond exactly with the population proportions estimated from Labour Force Survey and reported by Breen and Shortall (1991); but those figures show women having educational qualifications at least as high as men, except for third level qualifications in the older age groups. The other estimates, based on actual experience for women, and either actual or potential experience for men, span

a somewhat wider range than those of Wright and Ermisch; but they show a similar central tendency (about 20-25 per cent). Thus, it estimates of D_f for Ireland in 1987 resemble those for Great Britain in 1980.

The self-selection term in the female wage equation has quite a strong upward impact on the point estimate of D_f in every case, in contrast to the British estimates. (41 to 52 per cent, 17 to 27 per cent, 21 to 32 per cent). This arises from the fact that the analysis suggests women who can command high wages (relative to their characteristics) are more likely to participate. However, the fact that the λ coefficient is significant only at the 10 per cent level is reflected in the increased standard error on the "discrimination" estimate, which rises from 0.04 to 0.07.

Decompositions (3) and (4) are closest to the methods preferred by Wright and Ermisch (1990), given that their data did not include men's actual labour market experience to date. The analysis here shows that the effects of men's unemployment experience on their wages is significant. Comparison with decompositions (5) and (6) respectively show the effects of taking men's actual unemployment experience into account. The proportion of the wage offer gap attributable to years of unemployment or non-employment falls from about 30 per cent to something closer to 20 per cent. The estimate of D_f increases by 4 or 5 percentage points. These changes are within the margins of estimation error.

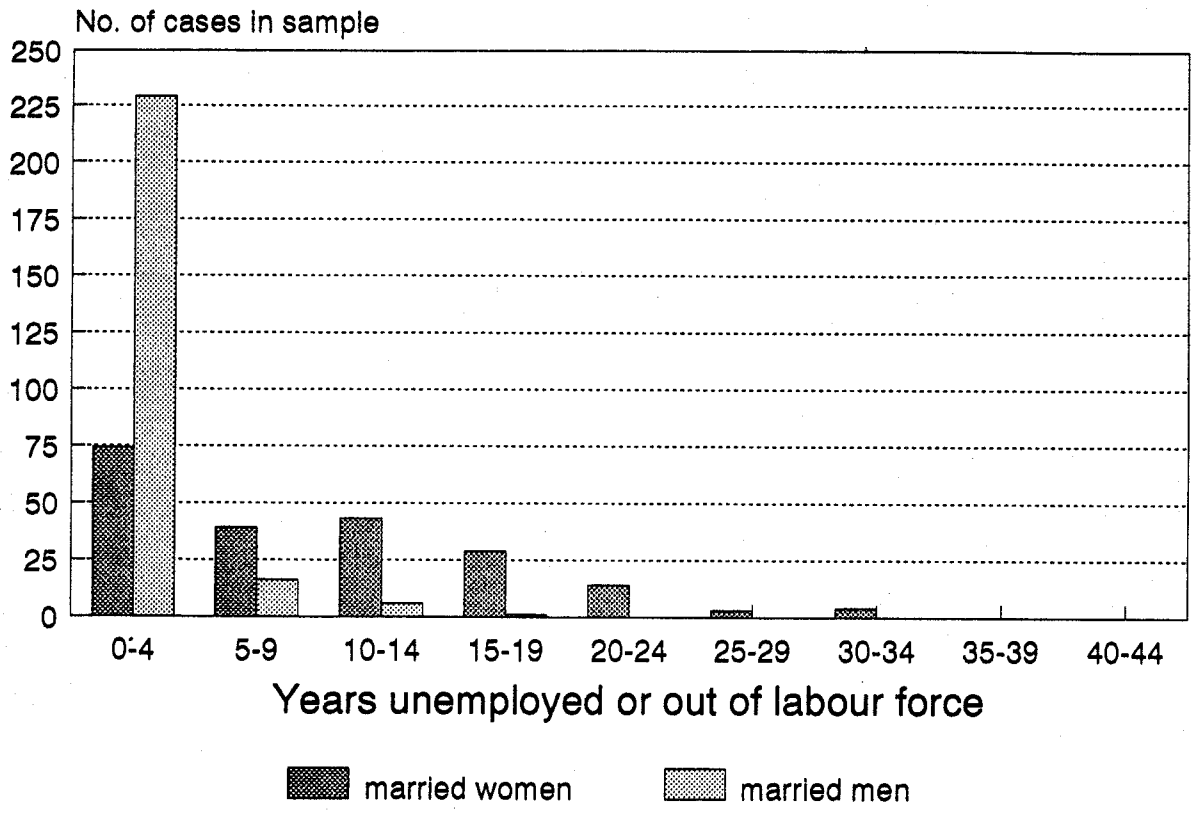
The reasons for concentrating on the net effect of employment interruptions on the male-female wage differential should, perhaps, be clarified. This net effect could be decomposed into a portion based on differences in the lengths of the interruptions, and a residual based on differences in the estimated coefficients attaching to the interruptions. The standard method of doing so would be to calculate

$$\beta_m^{ynw}(\overline{ynw}_m - \overline{ynw}_f) + \beta_m^{ynw^2}(\overline{ynw^2}_m - \overline{ynw^2}_f)$$

as the portion of the differential explained by differences in attributes, evaluated at the coefficients from the male equation. These coefficients, which are almost entirely based on unemployment of between 1 and 5 years, show a sharp initial effect, reaching a maximum at

about 7 years. When applied to women's wages, where longer employment interruptions are more typical, the effect of the quadratic term tends to dominate, so that interruptions of longer than about 15 years would have positive effects on wages. As a result, differences in the length of interruptions, using this technique, make no contribution to explaining the differential.

Figure 1: Distribution of years unemployed or out of labour force for current employees



An alternative decomposition, based on the female wage coefficients, would attribute all of the non-employment effect to differences in the lengths of non-employment spell. i.e., the decomposition based on

$$\beta_f^{ynw}(\overline{ynw}_m - \overline{ynw}_f) + \beta_f^{ynw^2}(\overline{ynw^2}_m - \overline{ynw^2}_f)$$

The decomposition is, therefore, extremely sensitive to the standardisation chosen. This sensitivity arises from the fact that the estimated coefficients reflect the very different patterns of male and female employment interruptions, which can be seen in Figure 1. Even if being unemployed and being out of the labour force have similar effects[8], the fact that male workers have very few employment interruptions longer than 5, or at most 10 years, can explain this sensitivity. Many of the female non-employment spells are, in effect, outside the range over which the male coefficients are estimated. As a result, therefore, we concentrate on the *net* effect of employment interruptions on the male-female wage differential, which is not influenced by these problems.

4.2 Analysis for full-time workers

In order to examine whether these decompositions were attributable to differences in the rewards to full-time and part-time employees, the analysis was replicated on full-time male and female employees. The survey did not include a question on self-reported part-time/full-time status. Thus, full-timers had to be defined on the basis of reported usual hours of work. A cut-off of 30 hours per week was used, except for teachers where 24 hours per week was used: it seems likely that this differs very little from self-report classification.[9]

Selection into full-time employment for women was controlled for by a bivariate probit, estimate over all the women in the sample (i.e., including non-participants and part-time workers). As noted by Ermisch and Wright (1988), this is sufficient to yield consistent estimates of the reward structure for married women who are full-time employees.

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8 Alternative perspectives would be that unemployment spells and spells out of the labour force have differential effects; and that the quadratic specification is not adequate.

9 Ermisch and Wright (1988) note that self-report classifications are consistent with the standard hours cut-off in over 90 per cent of cases, with most of the exceptions being teachers.

The decompositions based on these estimates are reported below. The D_f estimates based on potential experience have fallen considerably, to about 30 per cent. The other estimates have fallen by about 4 percentage points. A similar small fall was found by Wright and Ermisch (1990).

Table 3: Decomposition of Wage Differential between Full-Time Workers: Married Men and Married Women, Ireland, 1987

Decomposition	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Male equation[a]	*OP*	*OP*	*OP*	*OP*	*OA*	*OA*
Female Equation[a]	*OP*	*HP*	*OA*	*HA*	*OA*	*HA*
Observed wage gap (logs)	0.202	0.202	0.202	0.202	0.202	0.202
Wage offer gap (logs)	0.202	0.256	0.202	0.305	0.202	0.305
of which % due to:						
Years not worked	≡ 0	≡ 0	24.8	21.7	10.5	12.2
Other attributes	-16.6	-12.9	14.5	9.6	10.7	7.1
Residual ("discrimination")	116.6	112.9	60.7	68.7	78.9	80.8
$\overline{X}_f(\hat{\beta}_m - \hat{\beta}_f)$	0.235	0.293	0.122	0.210	0.159	0.247
ASE of $\overline{X}_f(\hat{\beta}_m - \hat{\beta}_f)$	0.034	0.106	0.043	0.082	0.043	0.082
D_f (full-time workers)	26.5	34.0	13.0	23.4	17.3	28.0
D_f (all workers)	41.5	52.2	16.8	27.3	21.1	32.0

Notes: a. Acronyms for equations: Method: O=OLS, H=Heckman
Experience: P=potential, A=actual

4.3 Occupational approach

To what extent can wage differentials be explained by the distribution of men and women over broad occupational categories? And can the occupational categories add to the explanation of wages and wage differentials offered by a narrower human capital model? These questions were investigated here, using the Irish Central Statistics Office's broad

classification of occupations[10], with two amendments: separate identification of the nursing and teaching occupations. This yields ten occupational categories: producers, makers and repairers; labourers and agricultural workers; transport and communication workers; clerical workers; commerce, insurance and finance; teachers; nurses; professional and technical; other service workers; and others.

We may report the results briefly here. A model using simply the 10 occupational dummies[11] can provide a wage equation with a similar fit to that of the human capital model. However, it yields a much higher estimate of the "discrimination" index, as shown in Tables 4 and 5 below. In effect, this result suggests that the male-female wage gap has more to do with differences *within* these broadly defined occupational categories than with differences in the distribution of men and women across them.

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10 The CSO occupational classification also captures some key distinctions as regards industry. composite classification. Most notably, the two industries which stand out as having the highest risks of low pay in Nolan's (1991) analysis (retail and personal services) have closely corresponding occupational classifications (commerce and services).

11 Excluding a constant so that the estimate can be interpreted as the average wage rate within each category.

Table 4: Decomposition of Wage Differential Based on Occupational Distribution: Married Men and Married Women, Ireland, 1987

	Average (log) wage in occupation		*Proportion of men or women in occupation*		*Contribution to "explained" gap*	*Contrib'n to "unexplained" gap*
	β_m	β_f	$\bar{x}_m$	$\bar{x}_f$	$\beta_m(\bar{x}_m - \bar{x}_f)$	$(\beta_m - \beta_f)\bar{x}_f$
Agriculture/ labourer	1.36	0.88	0.07	0.01	0.09	0.00
Transport/ communications	1.58	1.29	0.12	0.03	0.15	0.01
Production	1.61	1.22	0.36	0.10	0.42	0.04
Services	1.62	0.98	0.08	0.20	-0.20	0.13
Retail	1.70	0.99	0.06	0.12	-0.11	0.09
Nurse	1.77	1.60	0.01	0.10	-0.15	0.02
Clerical	1.91	1.45	0.04	0.22	-0.33	0.10
Others n.e.s.	1.97	1.65	0.12	0.02	0.21	0.00
Professional	2.18	1.90	0.09	0.06	0.05	0.02
Teacher	2.32	2.29	0.03	0.15	-0.26	0.01
Total explained and unexplained contributions					-0.12	0.41
Estimated D_f					50.9%	

Notes: 1. The coefficients show the average (log) wage for men and for women in the relevant occupational group.

2. The above presentation makes the decomposition algebra transparent, but not much emphasis should be placed on individual occupational groups "contributions to the explained gap": if all of the gap was explained by the distribution of men and women across occupations, some occupations would still make negative contributions.

A wage equation which combines the occupational dummies with experience, and/or the other human capital attributes and demand yields estimates of the discrimination coefficient which are much closer to those reported earlier, though clustered about a somewhat higher central tendency (25 to 30 per cent). There is, however, a good deal of collinearity in the

combined models, particularly between the educational and occupational dummies. As a result, the individual coefficients are less well determined and the overall fit of the equation improves only slightly.

Table 5: Estimates of "Discrimination" Index: Alternative Approaches, Ireland, 1987

Decomposition	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Male equation[a]	*OP*	*OP*	*OP*	*OP*	*OA*	*OA*
Female Equation[a]	*OP*	*HP*	*OA*	*HA*	*OA*	*HA*
Human capital+demand						
D_f (full-time workers)	26.5	34.0	13.0	23.4	17.3	28.0
D_f (all workers)	41.5	52.2	16.8	27.3	21.1	32.0
Occupations only					50.9	44.1
Occupations, experience					31.5	28.7
Occupations, experience, education, demand					25.0	33.9

Notes: a. Acronyms for equations: Method: O=OLS, H=Heckman
Experience: P=potential, A=actual

5. Conclusions

Male and female wage equations were estimated for a sample of married women and married men, using data from a 1987 survey. This allows a decomposition of the overall male-female wage gap in Ireland based on a more general sample than has hitherto been possible.

The results using a human capital framework, controlling for educational qualifications, labour market experience, time spent unemployed and out of the labour market, and self-selection of women into the paid labour market suggested that female wage rates would be between 15 and 30 per cent higher if these attributes were remunerated in the same way as men's. Slightly lower figures were obtained when the analysis was restricted to full-time

workers. This is similar to the estimates of Wright and Ermisch (1990) for Great Britain in 1980. It is somewhat higher than the estimates of Reilly (1987, 1990) for the youth labour market in Ireland; it is also higher than the estimate of Ruane and Dobson (1990) for the academic labour market, as might be expected. It is substantially lower, however, than the estimate of Walsh and Whelan (1976) which was based on data collected before the introduction of equal pay and anti-discrimination legislation.

The gap between male and female wages cannot be wholly accounted for by differences in educational qualifications, past labour market experience, or time spent out of the labour market. What factors might account for the substantial unexplained gap still remaining? It is important to realise that current discriminatory practices represent only *one* of a number of possible explanations, which may each have a role to play.

The analysis indicated that differences in hourly wage rates for part-time and full-time jobs may play a part; but that a substantial gap would still remain. Occupational effects, whether caused by segregation or voluntary choices, constitute another possibility. The analysis suggested that the distribution of men and women across broad occupational groupings added little to the explanation. Investigation using finer occupational classifications would be useful, and may well show that men and women are paid more similar rates within narrowly defined occupations, with much of the gap being attributable to differences in the distribution across finer occupational classifications. Such investigation is valuable in identifying the nature of the gap. But it is not wholly satisfactory as an explanation: it risks becoming tautologous.

Wage differentials may also be compensating for differences in working conditions; but the non-pay aspects of jobs may reinforce rather than compensate for wage differentials.

Current discriminatory practices, which might be subdivided into those which are implicit and legal, and those which are outlawed, constitute another possible explanation. But a large part of the unexplained gap may reflect *past* discrimination, in terms of promotions and career opportunities.

Appendix A: Means and Standard Deviations of Variables used in Wage Equations: Employees Only

Variable	*Means*		*Standard Deviations*	
	Men	*Women*	*Men*	*Women*
Potential experience	24.4	20.2	9.9	10.1
Square of potential experience	694.2	507.6	512.5	458.9
Years not worked	0.9	6.4	1.9	7.8
Square of years not worked	4.5	101.8	21.8	178.1
Years worked	23.6	13.7	9.9	6.9
Square of years worked	652.6	235.1	495.7	235.8
Educational qualifications:				
Some 2nd level/Group Certificate	0.24	0.14	0.43	0.35
Intermediate Certificate	0.11	0.16	0.31	0.36
Leaving Certificate	0.19	0.29	0.39	0.45
Diploma/Other third level	0.08	0.10	0.27	0.30
University degree	0.10	0.15	0.30	0.36
Industry unemployment rate	13.2	9.3	9.2	8.0
Occupational unemployment rate	11.8	7.3	6.4	4.5
Regional unemployment rate	17.4	17.1	2.1	2.3
Urban	0.55	0.47	0.50	0.50
Dublin	0.36	0.31	0.48	0.46

Appendix B: Participation Equations

Variable	*Instrumented experience* *Coefficient*	*t-statistic*	*Potential experience* *Coefficient*	*t-statistic*
Years not worked	-0.61	-1.48		
(Years not worked)^2	-1.62	-1.92		
Years worked	0.90	1.55	-0.40	-0.66
(Years worked)^2	-5.52	-2.17	0.09	0.08
Constant	2.35	2.07	0.84	0.57
Educational level				
Group Cert./2nd level	-0.09	-0.69	0.05	0.36
Intermediate Cert.	0.00	0.00	0.25	1.68
Leaving Cert.	0.02	0.12	0.38	2.32
Diploma/3rd level	0.06	0.23	0.57	2.67
University	0.89	2.77	1.47	5.13
Unemployment rate by:				
Industry	-0.03	-4.10	-0.04	-5.69
Occupation	0.01	0.92	0.03	2.30
Region	-0.01	-0.47	-0.03	-1.32
Urban (=1)	0.02	0.15	0.08	0.73
Dublin (=1)	0.04	0.26	0.14	1.04
Age	-1.17	-1.81	0.17	0.18
Age squared	1.94	2.57	-0.37	-0.34
Owner-occupier (=1)	0.13	0.90	0.14	0.94
Mortgage (=1)	0.22	2.15	0.25	2.43
Husband not working (=1)	0.10	0.67	-0.06	-0.40
Husband unemployed (=1)	-0.20	-1.08	-0.03	-0.16
Caring for special need (=1)	0.07	0.44	-0.01	-0.07
Chronic illness (=1)	-0.27	-1.93	-0.25	-1.79
Youngest aged 0-4 (=1)	-0.55	-3.81	-0.51	-3.57
Youngest aged 5-12 (=1)	-0.20	-1.72	-0.24	-2.07
N of other aged 0-4	-0.73	-5.01	-0.74	-5.02
N of other aged 5-12	-0.14	-2.52	-0.20	-3.74
N aged 13-18	0.03	0.43	-0.03	-0.49
Non-employment income (including husband's earnings)	-0.15	-3.66	-0.16	-3.96

Exogeneity of women's past work experience in the participation equation is rejected using a Hausman specification test: instrumented variables are used at this stage, and yield the results shown above. A similar specification test suggests that actual work experience is not exogenous in the wage equation. But estimates of the wage equation using the instrumented

variables are not credible: in particular, the wage first rises sharply with additional experience and then falls equally sharply at quite an early stage. After 10 years of work experience (the mean for participants) the wage rises by 3.4 per cent for an additional year's experience; but after 20 years it falls by 1.5 per cent, and after 30 years by 6.5 per cent with an additional year spent in the labour market. Low correlations between the instruments and actual work experience, coupled with low sample numbers with long work experience may be contributing to this difficulty. While actual work experience may suffer from problems with endogeneity, the use of the instrumented variables in the wage equations appears fraught with even graver difficulties; as a result actual work experience is used in the wage equations.

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