Is There A Wage-Curve For Ireland?

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1 Introduction

Blanchflower and Oswald (1994a) claim to have found "an empirical 'law' of economics" (pg. 1), linking the level of pay and the local unemployment rate. Their 'wage curve' result appears to run contrary to some textbook ideas in macroeconomics, namely the Phillips curve and the Harris-Todaro model. The objective of this paper is to provide a further test of this empirical 'law' using data for Ireland.

The Blanchflower & Oswald (1994a) methodology or 'the wage curve' approach, combines the aggregate work begun by Phillips in 1958 and the earnings function approach of Mincer (1974). Wage equations are estimated using micro-data, controlling for measures of human capital such as education and experience and individual characteristics such as gender and marital status, as per the earnings function approach. However, as with Phillips the primary focus is on the relationship between wages and the unemployment rate. Thus the earnings function is modified to include an unemployment rate characteristic pertaining to the region and/or industry of the individual. Using micro data allows us to assess the impact on an individuals wages of the unemployment rate in the region in which the individual lives or the industry in which they work. Blanchflower & Oswald (1994a) (henceforth known as B&O) find a negative relationship between the wage level and the unemployment rate, which is quite steep at low levels of unemployment but which flattens out as the unemployment rate increases. They term this relationship a 'wage curve'.

Blanchflower and Oswald (1994a) estimate wage curves for twelve countries[1] on a total of three and a half million people. As stated above, they find a negative relationship between wages and the 'local' rate of unemployment; the higher the unemployment rate in a region or industry, the

[1] Australia, Austria, Canada, Federal Republic of Germany, Great Britain, Ireland, Italy, South Korea Norway, Switzerland, The Netherlands, USA.

lower are wages in that region or industry. This finding is contrary to the work of Harris and Todaro (1970) who postulate a positive relationship between regional wages and unemployment. However, the Harris-Todaro analysis deals with expected unemployment. The estimated elasticity of pay with respect to the unemployment rate in the B&O analysis is remarkably constant across countries at approximately -0.1, indicating that a hypothetical doubling of the unemployment rate is associated with a fall of ten percentage points in the level of pay. The similarity of these results across these different countries is striking, given differences in labour market institutions and labour market and economy wide performance, in a sample that ranges over highly corporatist Austria, the deregulated labour market of Britain and the fast growing Asian tiger of South Korea.

However, Ireland was found to be an outlier in this analysis. Using data from the International Social Survey Program with a total sample of 1,363 people, the coefficients on the unemployment rate were found to be unstable and abnormally large and "are best treated with suspicion" ((B&O, 1994a) pg. 327). We undertake a similar analysis using data from the 1987 ESRI Income Distribution, Poverty and Usage of State Services Survey providing a maximum sample of 1,802 people. Our unemployment rates were taken from the 1986 *Census,* in order to achieve the greatest possible level of disaggregation. We find evidence that a wage curve does indeed exist for Ireland, with a negative relationship between wages and county and industry specific unemployment rates[2]. Much to our surprise, our estimated elasticities of pay on county unemployment are close to -0.1. Our results are presented in section 4 below. In section 2, we describe the wage curve and address some theoretical issues. Section 3 briefly describes previous empirical research on wage determination in Ireland.

[2] To be precise: we will use the term county unemployment rate when referring to the unemployment rate by location variable used in our analysis. This is to avoid confusion between the different levels of regional aggregation when defining our unemployment rates and when controlling for regional fixed effects.

2 The Wage Curve

As stated above, the wage curve can be thought of as a combination of the Phillips curve and earnings function approaches. An earnings function is estimated with the commonly used measures of an individuals human capital such as education, skills and labour market history and controls for characteristics such as gender and marital status. The impact of the unemployment rate on the wage level is assessed by including the unemployment rate of the region in which each individual lives and/or the industry in which they work. Thus, an additional labour market characteristic, at the region or industry level is added to the earnings function, as follows.

(1) $w=f(x,u)$

where
w is the wage level
x is a vector of measures of human capital and individual characteristics and
u is the unemployment rate (across regions or industries)

The approach differs significantly from that of Phillips in that the wage and unemployment variables are not measured as changes. Instead, the wage level is regressed against the unemployment rate. As regions and industries are likely to differ along dimensions other than the unemployment rate, these regional and industry specific features, or fixed effects, are controlled for by including dummy variables for each region and industry. These capture regional differences in variables other than the unemployment rate, which is itself explicitly taken into account.

The estimated elasticities of pay with respect to regional unemployment have been remarkably constant across countries. Blackaby and Manning (1987) was one of the earliest papers in the UK to estimate micro-econometric wage equations in levels, using data from the 1974 General

Household Survey. The sample was classified into ten regions and the coefficient on unemployment was -0.16. This is higher than the elasticity found by B&O (1994a) of close to -0.08. The preferred estimate for the unemployment elasticity of pay in the USA was similar at -0.1. Blanchflower and Oswald note that in the twelve countries studied the estimated elasticity was close to -0.1. However, as discussed below, their results for Ireland were unstable.

Theoretical Issues

What kind of theoretical model can explain a negative relationship between the wage level and the regional or industry unemployment rate? The supply and demand framework of the competitive labour market models predict a positive relationship between wages and unemployment. If wages rise above the equilibrium wage level, labour supply increases and unemployment results; higher wages are associated with higher unemployment. The competitive model, therefore does not provide a theoretical backing for the wage curve. However, it is possible that the wage curve is actually a mis-specified labour supply function and were this true, this would strengthen the case for a competitive labour market model. B&O (1994a) have found no evidence in favour of this hypothesis, which can be tested empirically by including the regional participation rate as an additional explanatory variable. We return to this issue later and test the hypothesis that the Irish wage curve is really a labour supply function mis-specified.

B&O (1994a) describe a number of non-competitive models which may provide the theoretical foundations for the wage curve. They suggest a bargaining framework where increasing unemployment frightens workers into reducing pay demands thus giving rise to a negative relationship between wages and unemployment. A variant of this model incorporates trade unions, who are assumed to consider the utility of both their employed and unemployed members.

In such a situation, rising unemployment may lead these unions to be more concerned with the number of jobs and less with pay whereas with low unemployment the trade union will push for higher wages. They note that although the bargaining model and its variant can provide a theoretical explanation for the wage curve, its applicability to many industrial economies and to the United States where union membership is much lower, is questionable.

The existence of a wage curve is congruent with efficiency wage models. Blanchflower and Oswald (1994a) postulate an efficiency wage model where employers in different regions offer pay-deals of equal expected productivity. Across regions, the wage level is positively correlated with the productivity of workers, by reducing shirking, absenteeism and the staff turnover rate, behaviour which may be particularly costly where job-specific training is necessary. The unemployment rate influences the expected ease with which the worker can obtain a new job. With high unemployment, the likelihood of obtaining alternative employment may be so low as to increase the job effort, reducing the need for employers to pay more to achieve desired productivity levels. When unemployment is low, employees can find new employment with relative ease and higher wages may be necessary to stimulate increased productivity. Thus efficiency wage models provide a theoretical explanation of the wage curve, with a negatively sloped locus between wages and unemployment in each region. Another possible theoretical background is a variant of the 'labour contract' model. Typically 'labour contract' models suggest a positive relationship between wages and unemployment; however if employers dislike risk, they may want the wage to increase when unemployment is low and decrease when unemployment is high.

What are the implications of these results and theoretical models for conventional theory such as the Harris-Todaro model and the Phillips curve? In terms of the Harris-Todaro model, B&O

(1994a) suggest that their results indicate that the Harris-Todaro relationship between local unemployment and the wage level is 'inherently wrong or irrelevant' (B&O (1994a) pg. 93), in the short-run. The Harris-Todaro model assumes that decisions to migrate are based on expected wage differentials, with the expected wage measured as the product of one minus the unemployment rate and the wage. In equilibrium, i.e., with no migration, expected wage differentials are equalised, implying a positive association between the regional unemployment rate and wages in that region. However, the Harris-Todaro model may still hold in the long run. If migration is viewed as a long term investment decision rather than a current consumption decision, there may be a positive relationship between any permanent regional differences in regional wages and unemployment, with a negative relationship between contemporaneous wage levels and unemployment.

The implications of the wage curve results for the Phillips curve model are not straight forward, arising due to the difficulties associated with the interpretation and aggregation economic models across space. A Phillips curve can be thought of as a short-run adjustment mechanism around a long run equilibrium relationship between the wage level and unemployment. By contrast the wage curve is best thought of as an equilibrium relationship, not a transition mechanism. It may be that the wage curve provides the microeconomic foundations for the Phillips curve. B&O test for this by including the lag of the wage level in a wage curve equation estimated on US and UK data but find the coefficients on the lagged term to be close to zero and statistically insignificant. While B&O cautions that this provides definitive evidence for the irrelevance of the Phillips curve, we feel the words of Card (1995) are instructive when he cautions that "More evidence on the dynamic relation between wages and unemployment will probably be required before economists disavow Phillips hypothesis" (pg. 795).

3 Empirical research on the relationship between wages and unemployment in Ireland

Time-series studies

Most previous empirical research on the relationship between wages and unemployment in Ireland has been in the spirit of Phillips (1958), exploring at an aggregate economy-wide level the relationship between the rate of changes in wages and the unemployment rate. The results from these previous studies are mixed. Little evidence of a Phillips curve relationship is found by Geary and Jones (1975), Walsh (1987) and Curtis and Fitz Gerald (1993). In contrast, Barry and Bradley (1991), estimating a model of wage determination for the traded sector find a 1% rise in the unemployment rate leads to a 1% fall in the wage rate. Whelan (1995) however, finds no evidence of a simple Phillips curve relationship between wage inflation and unemployment for the traded sector but some evidence for the non-traded sector. Expanding this analysis, the author shows that this may be due to the high incidence of long-term unemployment in Ireland, i.e., the expected negative impact of our high unemployment rate is considerably offset by the high proportion of long-term unemployed who have little bargaining power in the labour market.

Micro studies

Recent micro-studies of the Irish labour market have focused on the labour market for young workers (Reilly, 1987, 1990), unions and wage distributions (Callan and Reilly, 1993) and male-female wage differentials (Callan and Wren, 1994). Unlike our analysis, this latter study concentrates on male-female wage differentials in the labour market and estimates earnings functions separately for males and females, using measures of human capital and controls for individual characteristics. The impact of industry and occupation unemployment rates on wages

is also assessed. For males, the industry unemployment rate was, surprisingly positive and significant, while the occupation unemployment rate was negative and more than offset the unexpected positive coefficient on the industry rate. For females, the occupation unemployment rate was insignificant and the industry unemployment rate was again, positive and significant. However, the overall results were not sensitive to the inclusion or exclusion of these variables.

B&O results for Ireland

Blanchflower and Oswald (1994a) measured unemployment over 7 regions across three years. Their results can be seen in Table 1 below, where *RU* refers to the regional unemployment rate.

Table 1: Blanchflower & Oswald (1995): Results for Ireland

Irish wage curve: 1988, 1989, and 1991 monthly earnings

	3.1	3.2	3.3	3.4	3.5
LOG U	-0.3633	-1.4307			
	(1.92)	(2.66)			
$1/RU$			26.6042		
			(2.38)		
RU				-0.0746	-0.1867
				(1.78)	(0.47)
RU^2					0.0029
					(0.28)
Regional Dummies	No	Yes	Yes	Yes	Yes
$\bar{R}^2$	0.4058	0.4326	0.4326	0.4326	0.4322
DF	1349	1341	1341	1341	1340
F	72.53	50.45	50.45	50.49	48.13

The dependent variable was the log of net monthly earnings and the following control variables were included; supervisor dummy, union membership dummy, three marital status dummies, gender dummy, age and its square, part-time working dummy, years of schooling and ten year dummies.

Without controls for regional fixed effects, the log of the unemployment rate was insignificant but became suspiciously large after controls were added. Measured in levels, the unemployment rate

was again insignificant while no evidence for non-linearities was found. According to the authors, "The data are suspect. Possible explanations for the unusually large coefficients include the small number of regional observations available and the fact that the unemployment rate in the Republic is high...." (pg. 327).

4 Estimation and results

Data

Our data were taken from the 1987 ESRI Income Distribution, Poverty and Usage of State Services Survey, with a maximum sample size of 1,802 observations. A description of the background to these data is given in the Appendix. We noted above that this survey provides a richer data set for the wage curve analysis for Ireland. This dataset allowed us to control for measures of human capital such as experience, years not worked and number of periods of unemployment, which are not available in the B&O dataset. In addition, it was possible to use a greater degree of disaggregation across regions, explore the role of industry unemployment and examine whether the relationship stemmed from a mis-specified labour supply function. Our unemployment rates were taken from the 1986 *Census* and are defined for a total of 32 county and county boroughs while the industry unemployment rates[3] are defined over 21 industries. A lower level of regional aggregation provides two advantages: more variation in the unemployment rates and a greater number of degrees of freedom for the coefficient on the unemployment rate[4]. Unemployment rates by county varied significantly in 1986, ranging from a

[3] The industry unemployment rate is defined as total industry employment relative to the industry labour force. The industry labour force comprises industry employment and those unemployed who were previously employed in each particular industry. First job seekers are excluded.

[4] For the B&O study, the degrees of freedom for the unemployment rate coefficient was 21, the number of observations, 7, times the number of years, 3. In our case it is 32, the number of observations.

low of 9.27% in Roscommon to a high of 23.13% in Donegal while the industry unemployment rate ranged from 4.23% in Professional Services to 44.03% in other industries (see Tables A and B in the Appendix).

Model Specification

Our starting point is due to the specification of Callan and Wren (1994) whose dataset we employ. Their study included controls for years worked, years worked squared, years not worked, years not worked squared, five dummies for highest education level attained (measuring the additional impact of having education beyond primary level), a dummy "served your time", representing having acquired a trade or craft, two dummies depending on whether the individual lived in Dublin or another urban area (rather than in a rural area), the industry unemployment rate and occupation unemployment rate. Our dependent variable is the hourly wage. B&O used monthly wages in their study, which may have biased their results. Monthly wages, a product of the hourly wage and hours worked, will vary if hours worked changes but the wage stays constant. If hours worked and unemployment are correlated the results will be biased. Using the hourly wage overcomes this shortfall. There are a number of key differences between our specification and that of Callan and Wren.

While Callan and Wren estimated separate equations for males and females, further disaggregated into married and unmarried, we have defined four dummies: married men, single men, married women and single women and have estimated a single equation. Callan and Wren found significant wage gaps between men and women with larger wage gaps between married men and women. We use married men as our reference group and the coefficient estimates on each of the

dummies for the other three groups are expected to be negative, following the Callan and Wren study.

We have included a dummy to control for union membership. Union membership was expected to have a positive effect on wages. Callan and Reilly (1993), using the same dataset, found union membership produced a 20% mark-up on wages. While having acquired a trade or craft, i.e., "served your time" would be thought to have a positive impact on wages, this was insignificant in the Callan and Wren study. "Served your time" was found to be insignificant and it was therefore omitted. A variable measuring the number of spells of unemployment representing, like years not worked, lost opportunities to acquire human capital or even reductions in the stock of human capital, was included in our study and is expected to have a negative relationship with wages.

As we wished to include regional dummies, we have not defined dummies for Dublin and urban areas in the same way as Callan and Wren. As referred to earlier, we have defined Dublin as one of our seven regional areas, therefore the Dublin dummy is only included when all regional dummies are included. Urban is then redefined to measure the impact of living in an urban region including Dublin, over living in a rural region.

As we had only one year of data, it was not possible to include county-level regional dummies while county unemployment rates were a regressor. Regional fixed effects were thus controlled for using 7 regional dummies[5], i.e., at a higher level of aggregation than the unemployment rates. The unemployment rate is best measured at as disaggregated a level as possible, to capture the

[5] The regions were as follows: **West**: Donegal, Galway, Leitrim, Mayo, Sligo; **Mid-West**: Clare, Limerick, Tipperary North Riding, Llimerick County Borough; Midland: Cavan, Laois, Longford, Louth, Monaghan, Offaly, Roscommon, Westmeath; **South-West**: Cork, Kerry, Cork County Borough, **South-East**: Carlow, Kilkenny, Tipperary South Riding, Waterford, Wexford, Waterford County Borough; **East**: Kildare, Meath, Wicklow; **Dublin:** Dublin and Dublin county Borough.

immediate influences on wage determination. We believe that, given the small size of the country, 7 areas is a reasonable spectrum over which distinctive regional characteristics, other than the unemployment rate, might be expected to exist. 8 industry dummies, by the same logic, were used. We also attempted to capture the impact of county specific effects by including employment on small farms of less then 50 acres as a proportion of total employment in each county or county boroughs, given the proliferation of small farms of less than 50 acres in Ireland which might represent a form of disguised unemployment. This was found to be insignificant in all specifications.

Results

Our analysis begins by examining the relationship between the log of hourly pay and the county and industry unemployment rates individually. We examine the impact of the level and the log of these unemployment rates and also explore the possibility of a non-linear relationship between wages and unemployment. Table 2 below presents the results using county unemployment rates. Without controls for either county or industry fixed effects, the level and the log of the unemployment rate are just insignificant, as can be seen from equations 2.1 and 2.2. (The critical t value for the coefficient on the county unemployment rate is 2.03.) Controlling for industry fixed effects the log of the unemployment rate remains insignificant. However, once we control for regional fixed effects, we find that the county unemployment rate is negative and significant. A series of F-tests indicates that the superior model is one which includes controls for both regional and industry fixed effects, i.e., equation 2.5.[6] The estimated coefficient on the county unemployment rate is -0.119, suggesting that a doubling of county unemployment rate is associated with a decrease in wages of 12%, i.e., a wage curve does indeed exist for Ireland.

[6] Table 6 repeats these results and includes the coefficient estimates on all other variables in this model

This estimate is well within B&O's range of estimated regional unemployment elasticity of pay but is marginally above their preferred estimate of 10%.

Table 2: County Unemployment Rates

	2.1	2.2	2.3	2.4	2.5
RU	-0.006				
	(-2.03)				
LOG RU		-0.105	-0.097	-0.121	-0.119
		(-2.01)	(-1.88)	(-2.27)	(-2.27)
Industry dummies	No	No	Yes	No	Yes
Regional dummies	No	No	No	Yes	Yes
$\bar{R}^2$	0.5538	0.5537	0.5705	0.5560	0.5739
DF	1795	1795	1787	1789	1781
F	141.457	141.44	105.536	104.084	85.077
RRS	259.197	259.211	248.488	257.029	245.676

The dependent variable is the log of the hourly wage. The same control variables are included in all equations:, a constant, years not worked and its square, experience and its square, a marital status by sex dummy, five education level dummies, number of times unemployed, a dummy for union membership and a dummy for living in an urban area.

In table 3, we show the results when we substitute the industry unemployment rate for the county unemployment rate. In this case we find a significant negative coefficient on both the level and the log of the industry unemployment rate. Comparison of equations 3.2 with 3.3 and 3.4 with 3.5 shows that the estimated influence of the industry unemployment rate on wages is greater once we control for industry fixed effects, with an estimated decrease of 5% in the wage level from a doubling of unemployment without industry dummies, compared with an estimated decline of 17% when industry specific effects are taken into account. Again, as before, F-tests show that equation 3.5 provides the better model.[7] On the whole, table 3 can be considered to provide strong evidence in favour of an industry wage curve for Ireland.

[7] These results with all other coefficient estimates are repeated in Table 6.

Table 3: Industry Unemployment Rates

	3.1	3.2	3.3	3.4	3.5
IU	-0.003 (-3.1)				
LOG IU		-0.055 (-4.06)	-0.177 (-6.02)	-0.056 (-4.101)	-0.174 (-5.93)
Industry dummies	No	No	Yes	No	Yes
Regional dummies	No	No	No	Yes	Yes
$\bar{R}^2$	0.5553	0.5569	0.5782	0.5589	0.5810
DF	1794	1794	1787	1788	1781
F	142.244	143.154	108.887	105.259	87.539
RSS	258.313	257.393	244.025	255.329	241.015

The dependent variable is the log of the hourly wage. The same control variables are included in all equations:, a constant, years not worked and its square, experience and its square, a marital status by sex dummy, five education level dummies, number of times unemployed, a dummy for union membership and a dummy for living in an urban area.

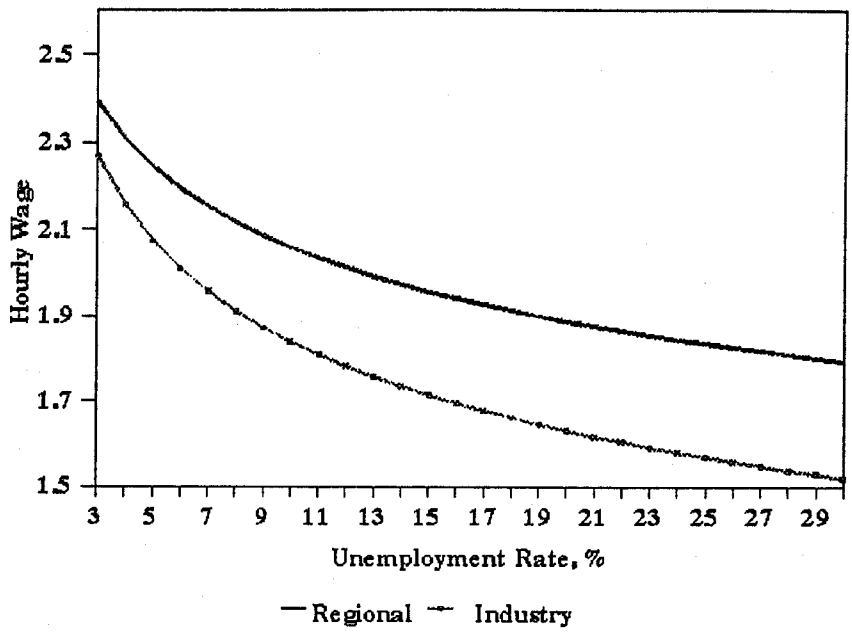
We can therefore conclude that we have found some evidence of a downward sloping wage curve for Ireland in both industry and region space. These relationships can be written as follows:

(2) *County Unemployment Rate :* $\log W = 0.96 - 0.119 \log U$

(3) *Industry Unemployment Rate :* $\log W = 0.95 - 0.174 \log U$

and are plotted in Figure 1. These curves are very similar in shape to those found by B&O for many countries in their study, with a steep decline in the wage level when outside unemployment, i.e., unemployment in the region or industry to which the individual belongs, increases at low levels of unemployment. At higher levels of unemployment, the impact on the wage level of a decrease of a percentage point increase is much less. In the case of Ireland, higher unemployment in an individual's industry has a more negative impact on the level of wages.

Figure 1: Wage Curve for Ireland



These results contrast to some extent with those found by B&O (1994a) using the General Social Survey data for the US. They found, without controls for regional and industry specific effects, that the estimated industry unemployment elasticity was -0.10, double our comparable estimate, while the regional unemployment rate was insignificant. Once they controlled for regional and industry fixed effects, the industry unemployment rate was insignificant while the elasticity on the regional unemployment rate was -0.12. Using the linear and log-linear models for the General Social Survey data, they found only weak evidence for the existence of a wage curve, however, they found strong support for non-linear effects. Our next set of results, given in table 4, explore the possibility of non-linear relationships between the unemployment rates and the wage level.

Blanchflower and Oswald (1994) could not include industry unemployment rates in samples with recent data as they are no longer published by the British government. Using British Social Attitudes Survey data for Britain over the period 1983-87 and 1989, they found a coefficient of

-0.15 on the regional unemployment rate, which was highly significant, when controlling for just regional fixed effects. Further controlling for regional fixed effects, the coefficient fell to -0.1232 and remained highly significant. Their preferred dataset, however, was the General Household Survey dataset, covering the period 1973 to 1990. Without controls for regional fixed effects, the regional unemployment rate was highly significant with a coefficient of -0.1283. Controlling for regional dummies, the coefficient fell to -0.0822.

Thus far we have estimated just two possible wage curve specifications. While B&O's preference is for the log model, where the log of the wage level written as a function of the log of the unemployment rate (plus other control variables) they also estimated some non-linear models. Table 4 presents the results from estimation of non-linear models for Ireland. Equations 4.1 and 4.3 include the level and its square of the county and industry unemployment rates respectively and equations 4.2 and 4.4 include the log and its square for the county and industry unemployment rates respectively. All equations control for regional and industry fixed effects, as F-tests indicated that their inclusion represented an improvement in the overall fit of the model in each case. In the case of county unemployment rates no evidence was found for any non-linear effects. Some evidence was found in the case of the industry unemployment rates, with the level and its square significant in equation 4.3 and the log and its square significant in equation 4.4. Similar results were found by B&O using both the Current Population Survey data and the General Social Survey data where they found little evidence of non-linearities in the case of regional unemployment rates but strong evidence in the case of industry unemployment rates.

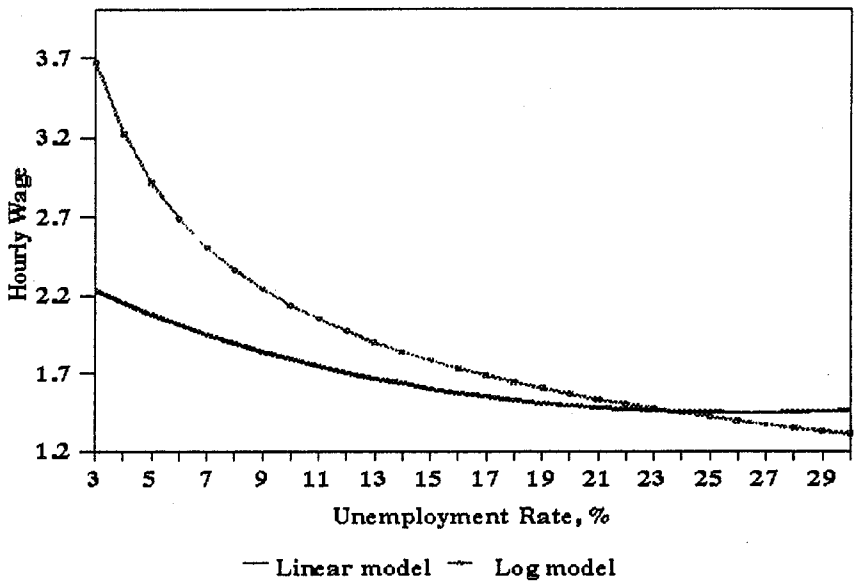
Table 4: Testing for non-linear effects

	4.1	4.2	4.3	4.4
RU	-0.036			
	(-0.98)			
RU^2	0.001			
	(0.79)			
LOG RU		-1.32		
		(-0.92)		
LOG RU^2		0.22		
		(0.84)		
IU			-0.042	
			(-7.78)	
IU^2			0.0008	
			(7.13)	
LOG IU				-0.872
				(-5.45)
LOG IU^2				0.1407
				(4.44)
Industry dummies	Yes	Yes	Yes	Yes
Regional Dummies	Yes	Yes	Yes	Yes
$\bar{R}^2$	.5738	0.5739	0.5866	0.5880
DF	1780	1780	1780	1780
F	82.215	82.25	86.61	86.169
RSS	245.642	245.57	238.245	238.967

The dependent variable is the log of the hourly wage. The same control variables are included in all equations:, a constant, years not worked and its square, experience and its square, a marital status by sex dummy, five education level dummies, number of times unemployed, a dummy for union membership and a dummy for living in an urban area.

The interpretation of these non-linear effects is problematic so Figure 2 illustrates the relationship between industry unemployment and wages emerging from this model. Focusing on the log of the industry unemployment rate, there is a negative relationship between the wage level and the unemployment rate, with the impact of a doubling of the employment rate resulting in smaller reductions in the wage level as the unemployment rate increases.

Figure 2: Wage curves with non-linear unemployment effects



Returning to linear and log-linear models, Table 5 presents the results when we include both the industry and county unemployment rates into our model. Without controlling for either regional or industry fixed effects, the county and industry unemployment rates are both significant when entered either in logs or levels (equations 5.1 and 5.2). If we allow for just industry fixed effects, only the industry unemployment rate is significant. However, both unemployment rates are significant controlling for regional fixed effects. As in the previous models, including both regional and industry fixed effects represents an improvement on those models which exclude these variables. Equation 5.5 is therefore our preferred equation and the coefficient estimates obtained are similar to those obtained earlier. A doubling of the industry unemployment rate is associated with a decline in the wage level of 17% and a doubling of the county unemployment rate is associated with a decrease in the wage level of 12%.

Table 5: Industry and County Unemployment Rates

	5.1	5.2	5.3	5.4	5.5
RU	-0.007				
	(-2.16)				
IU	-0.003				
	(-3.24)				
LOG RU		-0.109	-0.097	-0.129	-0.121
		(-2.11)	(-1.91)	(-2.42)	(-2.33)
LOG IU		-0.056	-0.177	-0.057	-0.175
		(-4.10)	(-6.03)	(-4.178)	(-5.95)
Industry dummies	No	No	Yes	No	Yes
Regional dummies	No	No	No	Yes	Yes
$\bar{R}^2$	0.5562	0.5577	0.5789	0.5601	0.5820
DF	1793	1793	1786	1787	1780
F	134.426	135.255	104.659	101.214	85.013
RSS	257.642	256.755	243.52	254.49	240.88

The dependent variable is the log of the hourly wage. The same control variables are included in all equations:, a constant, years not worked and its square, experience and its square, a marital status by sex dummy, five education level dummies, number of times unemployed, a dummy for union membership and a dummy for living in an urban area.

In table 6, we show the full results for equations 2.5, 3.5 and 5.5, our preferred equation when we only include county unemployment rates, industry unemployment rates or both, respectively. Looking briefly at the coefficient estimates of our other variables, we have, not surprisingly, similar results to those of Callan and Wren (1994). Years worked has a positive effect which decreases gradually as the number of years worked increases. The impact of years not worked behaves in a non-linear quadratic fashion, but with a negative impact. Increments in educational attainment have a larger impact the higher is the educational level attained. As expected, the dummies for both married and single females had negative coefficients with single males also earning less than married men. Number of times unemployed had the expected negative sign, reflecting the decline in human capital as a result of being unemployed. Union membership has a

positive impact, in line with Callan and Reilly (1993). Living in an urban area has a positive significant effect on wages. These coefficient estimates were not sensitive to the various specification changes which we have made.

Looking across the first and second rows of table 6, it is striking that the coefficient estimates on the county and industry unemployment rates are almost identical regardless of whether we include them individually or whether we include both. A doubling of the county unemployment rate is associated with a reduction in wages of 12%, while a doubling in the industry unemployment rate is associated with a decline in wages of 17%. Using both data sets for the USA, Blanchflower and Oswald also found that these two measures of outside unemployment were orthogonal to one another. Our elasticity estimates are larger in absolute value that B&O's preferred estimates, which in the case of both industry and regional unemployment rates was 10%.

Table 6: Summary Results

	2.5	**3.5**	**5.5**
LOG RU	-0.119		-0.121
	(-2.27)		(-2.33)
LOG IU		-0.174	-0.175
		(-5.93)	(-5.95)
Females - married	-0.134	-0.14	-0.140
	(-4.07)	(-4.32)	(-4.289)
Females - single	-0.21	-0.22	-0.213
	(-6.79)	(-7.24)	(-6.98)
Males - single	-0.06	-0.06	-0.580
	(-2.06)	(-2.13)	(-1.99)
Years Not Worked/10	-0.232	-0.23	-0.226
	(-4.56)	(-4.53)	(-4.48)
(Yrs Not Worked)^2/1000	0.0007	0.0007	0.0007
	(3.813)	(3.85)	(3.79)
Experience/10	0.529	0.519	0.515
	(16.49)	(16.27)	(16.16)
(Experience)^2/1000	-0.88	-0.87	-0.861
	(-12.07)	(-11.99)	(-11.85)
Constant	0.96	0.959	1.27
	(6.45)	(11.97)	(8.12)
Educational Level:			
Group Cert.	0.129	0.132	0.128
	(4.18)	(4.31)	(4.20)
Inter. Cert.	0.16	0.167	0.162
	(4.85)	(5.02)	(4.87)
Leaving Cert.	0.376	0.364	0.358
	(11.82)	(11.52)	(11.30)
Diploma/3rd Level	0.57	0.555	0.548
	(13.71)	(13.38)	(13.19)
University	0.840	0.815	0.809
	(19.99)	(19.45)	(19.31)
No. of times unemployed	-0.011	-0.01	-0.0118
	(-2.27)	(-2.66))	(-2.57)
Union Member	0.206	0.189	0.189
	(10.73)	(9.83)	(9.82)
Urban	0.116	0.086	0.107
	(4.38)	(3.38)	(4.07)
Industry dummies	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes
R^2	.5739	0.5810	0.57
DF	1781	1781	1773
F	85.077	87.53	86.139
RSS	245.676	241.61	

Estimation is by OLS. The dependent variable is the log of the usual hourly wage.