

The Real Wage Gap and its Development over Time: The Irish Experience 1960-1987*

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I INTRODUCTION

The high inflation and high unemployment occurring throughout the OECD in recent years have resulted from a complex interaction of contractionary supply and demand factors as outlined by Bruno and Sachs (1985). Their empirical work showed the "real wage gap" to be a very important supply side factor in determining unemployment since the late 1960s. In this paper we measure the real wage gap for Ireland, explain its development over time and compare results with the OECD experience.

The paper is broken into four sections. Section II explains the concept of the real wage gap and the theoretical underpinnings of the analysis. This section will also briefly outline the three major contributing factors that determine the size of the wage gap. Section III explains the methodology Bruno (1986) used to measure the real wage gap and the three major shortcomings in using it. As a result the size of the calculated real wage gap may be seriously understated or overstated. However, the general trend that emerges will be accurate.

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The Cobb Douglas technology is used to decompose the wage gap into its three contributing factors. This allows the explanation of the dynamics of the wage gap. Section IV outlines the data used, the estimation technique and the regression results. Using the methodology of Section III, the trend in the Irish wage gap is calculated from 1960 to 1987. The decomposition of changes in the Irish wage gap into its three contributing factors is also calculated for the same period. The development of the Irish wage gap over time is explained by breaking the period 1960-87 into three subperiods. The importance of the three contributing factors is then analysed. In Section V we compare the Irish results as estimated by us to those estimated by Bruno (1986).

II REAL WAGE GAP IN THEORY

The real wage gap is defined as the percentage deviation of the actual real wage prevailing in the economy from the warranted real wage that gives full employment. Assume a well behaved production function in value added:

$$V = F(L,K) \quad (2.1)$$

Where:

- (1) V = Value added as a measure of national income
- (2) L = The level of employment
- (3) K = The capital stock.

Assuming output market clearing and competitive firms, the real product wage equals the marginal product of labour:

$$MP_L = (W/P_v) \quad (2.2)$$

Where:

- P_v = A value added price index.

The warranted real wage that gives full employment is the marginal product of labour at full employment:

$$MP_L^f = (W/P_v)^f \quad (2.3)$$

The real wage gap in log linear approximation is defined as:

$$W^* = (w-p_v) - (w-p_v)^f \quad (2.4)$$

Bruno and Sachs (1985) outline three major contributing factors that determine the size of the real wage gap.

(1) *Excessive real wage demands above the marginal product of labour at full employment*: A period of high employment and tight labour markets can raise real wage aspirations and shift power to labour in wage bargaining. This could lead to excessive real wage demands above the marginal product of labour at full employment and create a wage gap.

(2) *A terms of trade shock*: During the 'seventies there were two major supply shocks which led to supply push inflation. This had the same effect on the economy as a technical regress. It was not widely understood by unions that terms of trade shocks cause a downward shift in the labour demand schedule. Labour was used to nominal wage increases in line with inflation which was demand pull by nature up to 1973. However, in the face of supply push inflation, labour would have to adjust real wages downwards to maintain the economy at full employment. Failure to do so was the failure of workers to recognise the origin and nature of inflation (what we call "inflation illusion"), thus generating a wage gap.

(3) *A low growth trap*: If adjustment of real wages in response to a terms of trade shock is not instantaneous, the existence of a wage gap can generate a bigger gap via the low growth trap. The following briefly outlines this process:

A wage gap → a reduction in profitability → a reduction in the growth of investment → a reduction in the growth of capital accumulation → a reduction in the growth of the capital stock → a reduction in labour productivity growth.

This shows how a wage gap can cause a productivity slowdown, making further real wage reductions necessary to maintain the economy at full employment. Therefore wage moderation can go hand in hand with an increasing wage gap.

III MEASURING THE REAL WAGE GAP

Bruno and Sachs (1985) used the Cobb Douglas production function to estimate the real wage gap.

$$V_t = (e^{\lambda t} L_t)^\alpha K_t^{(1-\alpha)} \quad (3.1)$$

Where:

- (1) $e^{\alpha \lambda t}$ ensures V will grow over time even if K and L are fixed.
- (2) α = Labour share in value added.
- (3) $(1-\alpha)$ = Capitals share in value added.
- (4) $\alpha+(1-\alpha) = 1$ i.e., constant returns to scale.

From the Cobb Douglas:

$$MP_L = \alpha AP_L = \alpha V_t/L_t \quad (3.2)$$

At full employment:

$$MP_L^f = \alpha AP_L^f = \alpha V_t^f/L_t^f \quad (3.3)$$

Using (2.2) to (2.4):

$$W^* = (W/P_v)/\alpha V_t^f/L_t^f \quad (3.4)$$

Taking logs gives:

$$W^* = (w-p_v) - (v_t^f - l_t^f) - \text{Log } \alpha \quad (3.5)$$

With the Cobb Douglas the problem of estimating the marginal product of labour at full employment comes down to calculating the average product of labour at full employment.

Bruno (1986) assumes full employment, i.e., $(v_t - l_t) = (v_t^f - l_t^f)$ at the cyclical peaks of 1960, 1973 and 1985. He takes the average growth rates of $(v_t - l_t)$ during 1960-73 and 1973-85 to represent the respective full employment trend $(v_t^f - l_t^f)$. This assumes $(v_t^f - l_t^f)$ grows at a constant exponential rate between 1960-73 and a different constant exponential rate between 1973-85. This procedure yields an index for $(v_t^f - l_t^f)$. Bruno subtracts the log of α and an index for $(v_t^f - l_t^f)$ from the estimated MP_L to give a real wage gap index. He then normalises the resulting real wage gap to be zero on average during the low inflation-high employment period of 1965-69 for twelve OECD countries.

Note: When calculating the wage gap index from the Cobb Douglas technology the resulting index is independent of econometrics as α cancels out in the calculation of W^* .

$$W^* = \text{Log } \alpha + (v_t - l_t) - (\text{Log } \alpha + (v_t^f - l_t^f)) \quad (3.6)$$

$$W^* = (v_t - l_t) - (v_t^f - l_t^f) \quad (3.7)$$

There are three major shortcomings in using the above methodology:

- (1) There is an implicit assumption that the labour supply curve is perfectly inelastic. If this is not so, the wage gap will be *overstated*. This is important for a country like Ireland where the labour supply curve is believed to be relatively elastic. If the labour supply curve is perfectly

inelastic, the real wage must fall by exactly the same amount as the MP_L to maintain full employment response to a terms of trade shock. If the labour supply curve is not perfectly inelastic the fall in the real wage warranted to maintain full employment is less than the fall in the MP_L . If the real wage remains constant a smaller wage gap will result the more elastic the labour supply curve. Thus the implicit assumption that the labour supply curve is perfectly inelastic may overstate the calculated wage gap.

(2) The measurement of the wage gap is probably *understated* as it overstates $(v^f - l^f)$. Bruno assumes that at cyclical peaks $(v - l) = (v^f - l^f)$. While 1978 was a cyclical peak it was far from a full employment year with $l_{78} < l^f_{78}$. This would mean that the average product of labour in 1978 could be higher than full employment average product. Intuitively, excessive real wage demands will drive inefficient and labour intensive firms out of business, thus raising measured productivity of labour above the full employment level.

The Cobb Douglas technology can be used to illustrate this point. Taking logs of (3.1), we get:

$$v_t = \lambda \alpha t + \alpha l_t + (1 - \alpha) k_t \quad (3.8)$$

Subtracting l_t from both sides:

$$(v_t - l_t) = \lambda \alpha t + (1 - \alpha) (k_t - l_t) \quad (3.9)$$

At full employment:

$$(v_t^f - l_t^f) = \lambda \alpha t + (1 - \alpha) (k_t - l_t^f) \quad (3.10)$$

Subtracting (3.10) from (3.9):

$$(v_t - l_t) = (v_t^f - l_t^f) - (1 - \alpha) (l_t - l_t^f) \quad (3.11)$$

Thus if $l_t < l_t^f$, then $(v_t - l_t) > (v_t^f - l_t^f)$ at cyclical peaks. Thus the methodology will overstate $(v_t^f - l_t^f)$ which will understate the real wage gap. However, Bruno proved that the trend in the wage gap is not affected.

(3) The assumption of unitary elasticity of substitution ($\sigma=1$) implicit in using the Cobb Douglas tends to *overstate* the wage gap if $\sigma < 1$. A rise in real wages then would also result in a rise in labour's share in value added for a given degree of capital deepening. Bruno (1986) recalculated $(v_t^f - l_t^f)$ under two alternative assumptions: $\sigma=0.5$ and $\sigma=0.7$ which

required knowledge of the capital stock. The smaller σ , the larger the reduction in the real wage gap, but Bruno proves that the general trend remains the same.

There are two assumptions which may *overstate* the wage gap and one which may *understate* it. The net effect on the size of the wage gap is therefore ambiguous. However, while the size of the wage gap may be over or understated, the general trend that emerges will be accurate. As a result of this, our paper will emphasise the dynamics of the real wage gap rather than its size in any year.

The Cobb Douglas allows the decomposition of the changes in the real wage gap into the contributing factors and the analysis of its development over time.

Using

$$W^* = (w-p_v) - (v_t^f - I_t^f) - \text{Log } \alpha \quad (3.5)$$

let

$$(w-p_v) = (w-p_c) + (p_c-p_v) \quad (3.12)$$

where:

- (1) p_v = a value added price index
- (2) p_c = a consumer price index
- (3) $(w-p_c)$ = real consumption wage

Substituting (3.12) into (3.5) gives:

$$W^* = w_c + (p_c-p_v) - (v_t^f - I_t^f) - \text{Log } \alpha \quad (3.13)$$

Taking first differences as a proxy for the percentage growth rate in each variable gives:

$$\dot{W}^* = \dot{w}_c + (\dot{p}_c - \dot{p}_v) - (\dot{v}_t^f - \dot{I}_t^f) \quad (3.14)$$

Equation (3.14) breaks the growth in the real wage gap into three factors:

- (1) \dot{w}_c : Real consumption wage growth is a function of unemployment. A rise in \dot{w}_c other things being equal will raise the wage gap.
- (2) $(\dot{p}_c - \dot{p}_v)$: The ratio of the growth in consumer to producer prices is a function of supply shocks. For a constant real consumption wage a rise in $(\dot{p}_c - \dot{p}_v)$ will cause growth in the wage gap. It will also cause a profit squeeze. Terms of trade shocks and tax changes can induce this effect.
- (3) $(\dot{v}_t^f - \dot{I}_t^f)$: The growth rate of full employment average labour produc-

tivity is a function of capital accumulation which is a function of profitability. Changes in $(\dot{v}_t^f - \dot{l}_t^f)$ also determine the growth in the real wage gap. Falling labour productivity is a sign that the economy has fallen into a "low growth trap".

IV IRISH EXPERIENCE

To calculate the wage gap for Ireland we estimate a Cobb Douglas production function. We assume that capital grows at a constant exponential rate. Our functional form is given as:

$$V_t = AL_t^\alpha e^{\lambda t} \quad (4.1)$$

Where:

- (1) V = Value added as a measure of national income which is defined as the volume of GDP (National Income and Expenditure Accounts).
- (2) L = Employment. This comes from the labour force survey which relates to the 5th of April each year and is available on an annual basis from 1971 onwards. We generated an index of employment using the above data since 1971. For 1960-71 Sexton's estimates of the labour force (in Conniffe and Kennedy (1984)) were used. We then used linear interpolation to bring the estimates to an end year basis.

A log linear approximation of (4.1) is estimated by GLS:

$$v_t = a + \alpha l_t + \lambda t \quad (4.2)$$

Results from the GLS estimation are given in Table 1. These regression results give a statistically significant labour share in value added of 0.57.

Table 1: *Regression Results*

a	α	λ	R^2	DW	Rho
3.214 (0.66)	0.56791 (2.02)	2.6878 (18.08)	0.9962	1.8356	0.81 (7.31)

t statistics in parentheses.

To calculate the wage gap we used the definition in (3.5):

$$W^* = (w - p_v) - (v_t^f - l_t^f) - \text{Log } \alpha$$

As outlined in Section III, the problem of estimating the marginal product of labour at full employment comes down to estimating the full employment average product. Following Bruno's methodology, but using cyclical peaks more appropriate to the Irish experience, we take the average growth rates of $(v_t - l_t)$ during 1960-69, 1969-78 and 1978-87 to represent the respective full employment trend $(v_t^f - l_t^f)$. This assumes that $(v_t^f - l_t^f)$ grows at a constant exponential rate between 1960-69 and at different constant rates between 1969-78 and 1978-87, i.e., between the cyclical peaks 1960, 1969, 1978 and 1987.

This procedure yields an index for $(v_t^f - l_t^f)$. Given this index and an estimate of α , we subtract both from the actual marginal product of labour to give us a real wage gap index. We normalise the resulting index to equal zero during 1964-67 which was a period of low unemployment and inflation in Ireland.

The following trends emerge from Figure 1 which gives the results of the Irish real wage gap.

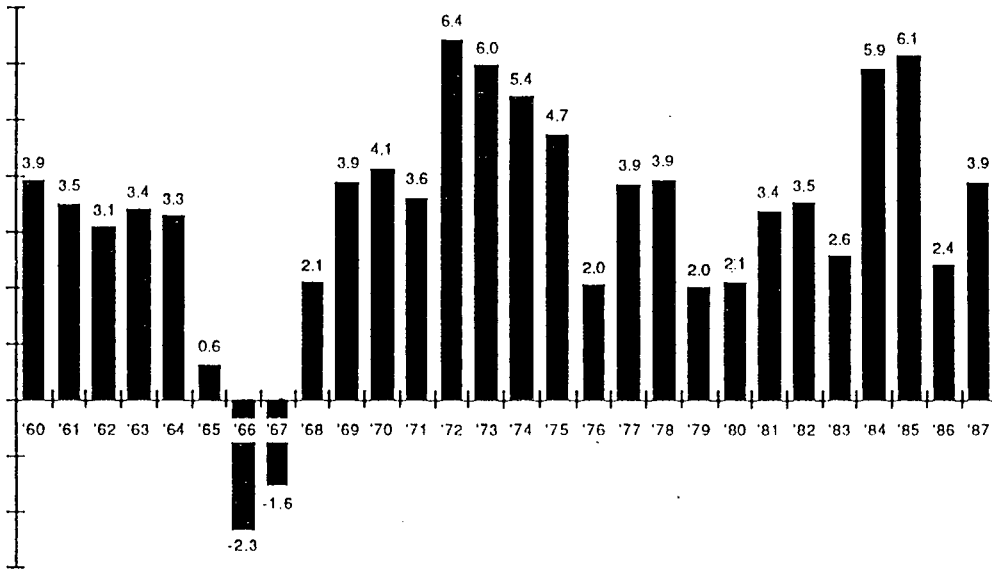
- (1) The wage gap was on a downward trend in the early and mid-60s, declining sharply between 1964-67.
- (2) Between 1967 and the first oil shock in 1973 the wage gap was on a sharp upward trend.
- (3) Surprisingly, the first oil shock in 1973 was followed by a fall in the wage gap which continued up until 1976. After this the wage gap began to rise again leading up to the second oil shock.
- (4) Immediately following the second oil shock the wage gap fell again but began rising after 1979. Since then its behaviour has been mixed but overall it has been on an upward trend.

Calculating the decomposition of the wage gap (results presented in Table 2) allows us to explain the trend observed in Figure 1.

To analyse the decomposition of the wage gap we have broken the results into three distinctive subperiods.

- (1) The period leading up to the first oil shock in 1973.
- (2) The inter oil shock period.
- (3) The period since the second oil shock in 1979.

Figure 1: *The Irish Real Wage Gap 1960-1987*



(1) 1960-73

In this period, the gradual dismantling of protectionism, the subsidisation of foreign capital intensive industry and the decline of agricultural employment led to steady strong growth in productivity as is seen by the size of $(\dot{v}_f - \dot{l}_f)$ in Table 2. This was the main contributing factor to the sharp decline in the wage gap in the mid-60s. The terms of trade also moderated the wage gap, reflecting the ending of protectionism (see Figure 2 below). Real consumption wage growth at an average rate of 3.3 per cent from 1960-66 was not strong enough to lead to a rise in the wage gap.

The wage gap grew strongly in the late '60s. While productivity growth and the terms of trade followed the trend of previous years, real consumption wages accelerated sharply (see \dot{w}_c Table 2). This was a reflection of rapidly rising employment,¹ industrialisation and unionisation. This upward trend continued up until the first oil shock.

An interesting feature of the trend in the wage gap is the decline which took place immediately preceding the first oil shock despite the large increases

1. The upward trend in employment in the face of a real wage boom has been attributed to the expansionary fiscal policies followed in the period by Kennedy and Dowling (1975) in their study.

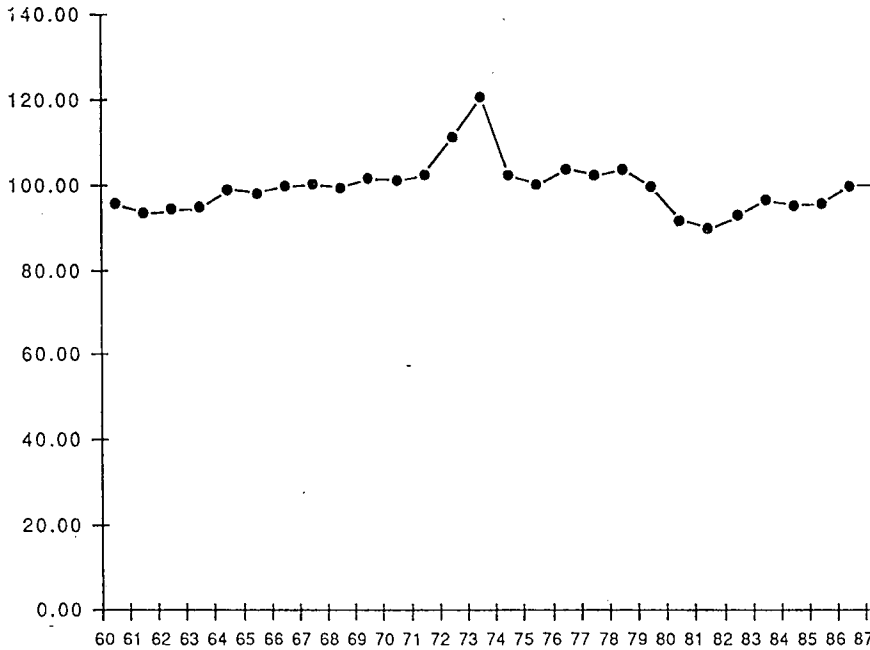
Table 2: *Decomposition of Changes in the Irish Wage Gap*

<i>Period</i>	\dot{W}^*	=	\dot{W}_c	+	$(\dot{P}_c - \dot{P}_v)$	-	$(\dot{V}^f - \dot{L}^f)$
1960-61	-0.4		2.9		0.3		-3.6
1961-62	-0.4		3.3		0.0		-3.7
1962-63	-0.3		4.6		-0.4		-3.8
1963-64	-0.1		6.0		-2.2		-3.9
1964-65	-2.7		1.0		0.3		-4.0
1965-66	-2.9		2.1		-1.0		-4.0
1966-67	-0.7		5.6		-0.7		-4.2
1967-68	3.6		7.8		0.1		-4.3
1968-69	1.8		7.5		-1.3		-4.4
1969-70	0.2		4.4		-0.7		-3.5
1970-71	-0.5		4.4		-1.3		-3.6
1971-72	2.8		10.6		-4.0		-3.7
1972-73	-0.5		6.9		-3.6		-3.7
1973-74	-0.5		-6.1		9.4		-3.8
1974-75	-0.6		4.6		-1.3		-3.9
1975-76	-2.7		3.9		-2.6		-4.0
1976-77	1.8		5.5		0.4		-4.1
1977-78	0.1		6.9		-2.6		-4.2
1978-79	-1.9		1.0		-0.4		-2.6
1979-80	0.1		-0.3		3.0		-2.6
1980-81	1.3		1.4		2.5		-2.6
1981-82	0.1		1.2		1.6		-2.7
1982-83	-0.9		2.0		-0.2		-2.7
1983-84	3.3		4.6		1.4		-2.7
1984-85	0.2		2.7		0.3		-2.8
1985-86	-3.7		0.8		-1.7		-2.8
1986-87	1.5		3.7		0.6		-2.8

in real consumption wages. During this period the terms of trade grew rapidly under an international commodity price boom (see Figure 2) and this exerted significant downward pressure on the wage gap as shown by a 3 per cent average annual decrease in $(\dot{p}_c - \dot{p}_v)$ between 1970-73.

(2) 1973-79

1973-74 saw the first oil shock which caused a severe worsening of the terms of trade reflected in $(\dot{p}_c - \dot{p}_v) = 9.4$ per cent in Table 2. Ireland's reaction to this first oil shock was very unusual in that the wage gap actually fell up to 1976. There is strong evidence of short-run nominal wage stickiness in

Figure 2: *The Irish Terms of Trade 1960-87*

response to terms of trade shocks in Ireland. Real consumption wages fell immediately following both oil shocks, i.e., by 6.1 per cent in 1973-74 and by 0.3 per cent between 1979-80. These were the only two years in the entire sample that they did fall. The fact that real consumption wages continued on a strong upward path the following years also suggested that the fall was not part of any deliberate adjustment. Productivity growth remained strong with a new round of rationalisation in Irish industry in the wake of EEC entry. Our terms of trade were also improved by EEC entry.

The late '70s saw the beginning of an international recovery which was added to by a major domestic fiscal expansion. This significantly reduced unemployment. A tightening of labour markets and a rise in real consumption wages resulted. This caused a rise in the wage gap coming into the second oil shock. The reduction of international interest rates following the first oil shock enabled countries like Ireland to borrow cheaply abroad. The subsidisation of private investment as well as the acceleration of public sector investment during this period make the low growth trap analysis less relevant for Ireland. The rate of investment growth from 1976-79 was on a sharply rising trend with an average growth rate of almost 12 per cent. This maintained productivity growth at a high level in Ireland and thereby moderated the rate of growth of the wage gap.

(3) 1979-87

The impact of the second oil shock on the terms of trade was less severe than the first shock. In response real consumption wages fell slightly by 0.3 per cent indicating short-run nominal wage stickiness. Real consumption wages have been on a lower trend since. The rise in unemployment from 5.5 per cent of the labour force in 1971 to 17.7 per cent in 1987 may be partially responsible in the light of growing sensitivity of wages to unemployment (see OECD report on Ireland 1988).

The wage gap increased in the '80s despite the fall in real consumption wages due to the lower trend of productivity growth and the mixed pattern of the terms of trade. In contrast to the period following the first oil shock international interest rates rose sharply following the second. With a rising wage gap and high cost of investment, the low growth trap analysis becomes more relevant in this period. The rate of growth of investment was on a downward trend. Investment fell at an annual average rate of 3.6 per cent between 1982-87. This is reflected in the slowdown of productivity growth.

In summary, there were three important factors which served to moderate the effects of the terms of trade shocks on the wage gap in Ireland: (1) short-run nominal wage stickiness in response to terms of trade shocks; (2) exceptional productivity growth up to 1978; (3) favourable terms of trade developments.

V COMPARISON OF IRISH AND OECD RESULTS

Table 3 shows the decomposition of the real wage gap for five major subperiods for the UK and the US (two countries with very different labour market structures), and for the OECD as a whole (estimated by Bruno, 1986) and for Ireland as estimated by us. This allows us to put the Irish experience into an international context.

The trend for the OECD countries studied by Bruno was best captured by the five subperiods 1964-70, 1970-74, 1974-78, 1978-80 and 1980-83 as given in Table 3. In order to allow a comparison we averaged our estimates over the periods used by Bruno. However, some of the characteristic features of the trend in the Irish wage gap, as shown in Table 2, are thus less obvious.

Considering each subperiod in Table 3 in turn we see that the Irish wage gap and its components did not follow the trend of the OECD from 1970 onwards.

Table 3: *Decomposition of Changes in the Wage Gap*
Annual Percentage Rates of Change

	\dot{W}^*	=	\dot{W}_c	+	$(\dot{P}_c - \dot{P}_v)$	-	$(\dot{V}^f - \dot{L}^f)$
<i>1964-70</i>							
UK	0.6		3.8		1.0		-4.3
US	-0.8		1.5		1.2		-3.5
OECD Av.	0.1		4.9		1.0		-6.0
Ireland	0.1		4.9		-0.8		-4.0
<i>1970-74</i>							
UK	2.2		5.0		1.0		-3.8
US	0.9		1.1		2.9		-3.1
OECD Av.	1.8		5.5		1.8		-5.4
Ireland	0.3		4.0		0.1		-3.7
<i>1974-78</i>							
UK	-2.2		2.3		-1.9		-2.6
US	-0.1		2.0		-0.1		-1.9
OECD Av.	0.3		3.1		0.9		-3.7
Ireland	-0.4		5.2		-1.6		-4.0
<i>1978-80</i>							
UK	4.2		5.0		1.9		-2.6
US	1.7		-1.5		5.3		-1.9
OECD Av.	1.0		1.1		3.6		-3.7
Ireland	-0.9		0.4		1.3		-2.6
<i>1980-83</i>							
UK	1.4		2.7		1.3		-2.6
US	-0.2		0.6		1.1		-1.9
OECD Av.	-1.1		1.4		1.1		-3.7
Ireland	0.1		1.5		1.3		-2.7
<i>1983-87</i>							
Ireland	0.3		3.0		0.1		-2.8

(1) *1964-70*

In this period, the Irish experience is in line with the average OECD trend. Rising wage demands were counteracted by strongly growing productivity. Ireland's productivity growth, however, was less than in the OECD on average, but an improvement in our terms of trade (-0.8 per cent) due to the opening of the economy kept real wage gap growth in check.

In the US, the wage gap fell due to modest wage demands of 1.5 per cent compared to OECD average of 4.0 per cent. On the other hand, the UK experienced high wage growth of 3.8 per cent which, together with below average productivity growth, caused the wage gap to grow above the average.

(2) 1970-74

High rates of consumption wage growth, inherited from the previous period did not slow down in the face of the first oil shock in the OECD as a whole. A deceleration in productivity growth due to the low growth trap and the terms of trade shock caused the wage gap to accelerate in the OECD countries. It grew at 1.8 per cent p.a. as against 0.1 per cent in 1964-70. These trends are particularly evident in the UK with wage growth at 5.0 per cent p.a. and productivity growth slowing down from 4.3 per cent to 3.8 per cent. Wage gap growth in the US at 0.9 per cent was well below the OECD average, but had still increased compared to the previous period.

Ireland was sheltered from the full impact of the first oil shock by a number of factors, in particular by very favourable terms of trade (0.1 per cent as compared to 1.8 per cent for the OECD on average) and lower than average wage growth. Wage growth had actually slowed down as compared to the pre-shock period (4.0 vs. 4.9 per cent). Irish productivity growth improved contrary to the OECD experience. This reflects the absence of the low growth trap in Ireland. Ireland thus experienced a very small increase in the wage gap growth at 0.3 per cent, well below the OECD average of 1.8 per cent.

(3) 1974-78

In the period between the first and second oil shock, the real wage gap fell in many countries, as wage demands moderated from 5.5 per cent to 3.1 per cent for the OECD on average. The benefit of this was offset by declining productivity. As a result the wage gap in the OECD did not return to its pre-shock growth rate of 0.1 per cent.

The Irish wage gap fell in the inter-shock period due to exceptional productivity growth and favourable terms of trade movements. This cancelled the fact that wages grew more strongly than in the OECD on average and faster than in the previous period.

(4) 1978-80

In response to the second shock, wage demands in the UK accelerated dramatically, causing its wage gap to surge ahead, growing at 4.2 per cent which was well above the OECD average of 1.0 per cent. In the US, by contrast, wage demands decelerated, but a severe terms of trade worsening to 5.3 per cent from -0.1 per cent made the wage gap rise more than on average

in the OECD. Wage moderation in the OECD as a whole helped to keep wage gap growth at bay at 1.0 per cent, which was none the less higher than in the previous period. Productivity growth was still slow in that period for the OECD at 3.7 per cent as against 6.0 per cent in the late 1960s.

Ireland's wage gap fell again in this period (-0.9 per cent) when wages grew at a very modest level at 0.4 per cent as compared to 5.2 per cent in the inter-shock period. Productivity growth for Ireland at 2.6 per cent was slower than in any period discussed in Table 3.

(5) 1980-83

The slowing down of relative import prices was a main factor in the deceleration of the wage gap in the early 1980s. In particular, the real appreciation of the US\$ in the early 1980s sharply improved American terms of trade from 5.3 per cent to 1.1 per cent p.a. and had a major impact on relative import prices in the US as compared to Europe. Productivity growth still had not reached pre-shock levels in all countries except Ireland where it picked up again from 2.7 per cent compared to 2.6 per cent previously. Real wages in Ireland accelerated in this period leading to a rise in the wage gap contrary to the OECD experience.

(6) 1983-1987

Bruno's estimates of the real wage gap cover the period up to 1983. However, the OECD in a labour market study (*Economies in Transition*, 1989) shows that overall, the "real labour cost gap" was reduced in most OECD countries during the period 1975-1987.

Our estimates for Ireland show an increase in wage gap growth between 1983 and 1987 of 0.3 per cent as against 0.1 per cent previously. This was fuelled by faster wage growth and the fact that productivity growth was still slow.

VI CONCLUSION

Our work shows that the trend in the Irish real wage gap has been different to the OECD experience. The three main reasons for this are:

- (i) Nominal short-run wage stickiness in response to terms of trade shocks.
- (ii) Exceptionally good productivity growth up to 1978.
- (iii) Favourable terms of trade developments.

Compared to the general OECD experience, growth in the Irish real wage gap has been moderate, yet Ireland experienced very high unemployment. Therefore, further research is warranted into the relationship between unemployment and the wage gap in order to establish how much unemployment

the real wage gap can actually explain. It is unlikely that the wage gap can account for total unemployment in Ireland over the period analysed.

We therefore believe that world aggregate demand is an important contributing factor to the unemployment equation. The inclusion of this variable would, however, break the assumption of perfect competition implicit in the model used by Bruno and Sachs (1985).

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