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Labour Market Adjustment in the Irish Regions

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Abstract: The issue of how regional labour markets adjust to shocks has received increased attention in the context of EMU, yet relatively little is known about this aspect of the Irish economy. Using the methodology developed by Blanchard and Katz (1992) this paper explores the evolution of employment, unemployment, labour force participation rates and wage rates in the regions of the Republic. The extent to which regional employment growth is self-reinforcing, the degree of hysteresis in regional unemployment and the absence of convergence in regional wage rates is discussed. The response of regions to shocks in employment is explored by estimating a log linear system in region-specific employment growth, unemployment and labour force participation rates. The implications of the findings for Irish regional development are discussed.

Key words: Labour market adjustment; Regional shocks; Convergence; Irish economy.

Introduction.
The adjustment of regional labour markets to shocks is a topic that has been neglected by Irish economists. More attention has been paid to the broader issue of how the Irish and UK labour markets are linked (Honohan, 1992; Walsh, 1999) and indeed, in view of the smallness of the Irish labour market, the value of devoting much attention to sub-national adjustment may be questioned. None the less, regional issues continue to excite public interest, especially in the context of the desire to retain EU "Objective 1" status for parts of the country. Knowledge of how the regions of individual countries adjust to labour market shocks is also relevant to understanding how the eleven countries of Euroland will adjust to asymmetric shocks without recourse to exchange rate changes.

The way the US economy adjusts to shocks is often contrasted with the European situation. There is a tendency for employment in the regions of America to grow at different rates over long time periods, with shocks having more or less permanent effects. In Europe, on the other hand, regional changes in employment shares have been less dramatic. The situation is reversed for unemployment and participation rates, with regional shocks showing little persistence in the US but being notoriously long-lived in Europe.

Blanchard and Katz (1992) show that in the US the effects of changes in the regional demand for labour on unemployment and participation rates decay rapidly, disappearing after five to seven years. Replication of this analysis for the Canada, Italy, Germany and the UK confirms the low persistence of impact shocks on unemployment in North America compared with higher persistence in the EU (Obstfeld and Peri, 1998). In the US regional variations in real consumption wages were found to be relatively small and transitory. Unemployment differentials trigger migration flows and the propensity to migrate between regions is relatively high compared with that in Europe. It has been pointed out that this contrast does not bode well for the prospects of regional adjustment in Euroland. As Blanchard and Katz state "the adjustment to relative shocks in the European common currency area may turn out to be a painful and protracted process" (p. 56).

The aim of the present paper is to explore how Irish regional labour markets have adjusted to shocks over the past two decades. A consistent time series for the period 1977-97 is used to explore the effects of labour market shocks on employment, unemployment, and labour force participation. The limited available evidence on the behaviour of regional wage differentials is also examined.

The plan of the paper is as follows. The next section describes the data that are used. This is followed by an account of regional trends in employment, unemployment and wages since the 1970s. The links between regional employment and unemployment and the national aggregates are examined and the behaviour of regional employment shares documented. The next section of the paper presents the results of estimating a systematic model of fluctuations in employment, unemployment rates and labour force participation rates. This sheds light on how these variables respond to region-specific shocks in the demand for labour. The paper concludes with a discussion of the implications of the findings for regional policy.
The data.

Regional population and labour force data are available from the Labour Force Survey (LFS) for the period 1977-97. The breakdown was by “Planning Region” until 1995, when the switch to “Planning Authorities” occurred. The present analysis uses the old Planning Regions.

The only available regional wage information is contained in the Census of Industrial Production (CIP), where county data on annual wages and salaries per employee have been published since 1979. The latest Census returns available at the time of writing are for 1996.

In addition to the short time series available, the data suffer from the following limitations.

- The labour force variables are based on “Principal Economic Status” derived from the respondents’ description of their “usual situation with regard to employment”. It would be preferable to use the ILO labour force measures but these have been published on a regional basis only since 1995.

- The regional employment figures refer to place of residence rather than place of work. This could be a serious distortion in the case of the Dublin and Mid-East regions, for example.

- The wage data are restricted to manufacturing, which accounts for only about 20% of the employed labour force. The series refers to annual rates of pay, not hourly wage rates. Adjustment for the regional structure of manufacturing industry or for regional differences in the cost of living is not possible.

- The regions vary enormously in size. The population aged 15 and over of the North-East region was only 153,000 in 1997. On the other hand, that of the Greater Dublin region (Mid-East plus Dublin) was 1,114,300 – almost 40% of the national total.

- The analysis is conducted in terms of the total labour force – no attempt has been made to disaggregate by male/female or by sector of employment.

- Finally, it is widely recognised that regions defined in terms of administrative boundaries are losing their economic significance. But the geographical regions

Overview of regional labour market trends.

Table 1 provides an overview of the evolution of regional population and labour force over the past twenty years.

Population and employment increased in all regions but the rates of increase varied considerably. There was a 30% increase in employment in the Greater Dublin region (Dublin plus Mid-East) compared with only 6% in the North-West. At the end of the period unemployment rates were higher in all regions than in 1977 and the disparity between the regions had increased, with proportionately large increases in the South-West, North-East and West. The labour force participation rate fell in the Mid-west and West but rose markedly in the Greater Dublin region and in the Midlands. The end result was quite a varied pattern of change in the employment rate (that is, the proportion of the population in employment), which fell in Dublin, the South-West, the North-East, the Mid-West, the West and North-West, but rose significantly in the Mid-East and the Midlands.

Regional and national unemployment

The relationship between national and regional trends in unemployment is studied in Table 2, which shows the regression of (log) regional unemployment rates on the (log) national unemployment rate. The results suggest that the regional business cycle is synchronised. All regional unemployment rates are highly correlated with the national rate. For the larger regions - Dublin and Dublin plus Mid-East in particular – the $r$ is very high as would be expected in view of the large proportion of the national total they account for. Only three regional unemployment rates have elasticities with respect to the national rate significantly different from unity. The elasticities for the North-East and the Midlands are significantly greater than one, that for the North-West significantly less than one. In the North-West the relatively low $r$ and elasticity, and the significance of the trend variable, suggest that unemployment in this region has a life of its own.

Because the elasticities of the regional unemployment rates with respect to the national rate are close to one and the trend variable is significant in only two regions, it is to be expected that the regional pattern of unemployment rates would have remained stable over time. That this is the case is evident from Figure 1, which shows a clear positive correlation between relative unemployment rates in 1997 and 1977. (In this and several other Figure the situation is shown with Dublin and the Mid-East treated separately and combined.) A regression of relative unemployment rates (that is, regional minus national unemployment rates) in 1997 on the relative rates in 1977 yields the following results ($r$-ratio in parentheses):

Nine regions: $\alpha_{9} = 0.003 + 1.06 \alpha_{77}$, $R^2 = 0.78$

Eight regions: $\alpha_{8} = 0.003 + 0.97 \alpha_{77}$, $R^2 = 0.77$

(5.3)

(4.6)
The evidence of persistence is very strong. The contrast between European and North American countries in this regard has been much discussed. Blanchard and Katz (1992) emphasize the low persistence of US unemployment rates over time. They find no significant correlation between US regional unemployment rates in 1975 and 1985. However Obstfeld and Peri, 1998, report a significant positive correlation between US regional unemployment rates in 1985 and 1995, but conclude that there is "much less history-dependency" in the US than in Europe (p. 215). Clearly, Ireland fits the European and not the American model.

The persistence of a stable regional pattern of unemployment could be interpreted as showing that the regions have different equilibrium or "natural" unemployment rates that remain stable over time. Differences in natural rates might be attributed to factors such as size, population density, industry-mix, and so on, while deviations of regional unemployment rates from their natural rates would be due to the national business cycle. An alternative interpretation of the persistence of regional unemployment differentials is that it reflects varying speeds of adjustment to asymmetric shocks. According to this view, regions share the same equilibrium unemployment rate but some regions take much longer to return to it following a region-specific shock. Differential propensities to migrate, rather than differences in regional structures, give rise to regional unemployment differentials. These two accounts are not mutually exclusive and the explanation could lie in some combination of both.

To shed light on this issue autoregressive models (AR2) of relative unemployment were estimated for each region separately. Once again the North-West region proved anomalous. It was the only region for which the hypothesis of a unit root could not be rejected. It was the case that when the Mid-East and Dublin regions were treated separately the results were less satisfactory than when these two regions were amalgamated. Accordingly, pooled data for the remaining seven regions were used to estimate the response of unemployment to a shock, with fixed effects for the regions. The results are shown in Table 3. The graph of the impulse response suggests a rapid adjustment of unemployment in the wake of a shock. After three years relative unemployment has returned very close to its original level. This adjustment is comparable to those reported for the UK, USA and Canada, and much faster that those for Germany and Italy (Obstfeld and Peri, 1998).

Regional and national employment

We have already noted that all regions enjoyed some increase in employment over the period 1977-97. Regional growth rates differed considerably, however, and it appears that the link between national and regional employment growth is weaker than that between unemployment rates. This is confirmed from the results of regressing regional employment growth rates on the national rate (Table 4). A high $R^2$ (0.5) is reported only for Dublin (and Dublin plus the Mid-East). For all the other regions the relatively low $R^2$ indicates a great deal of regional year-to-year movement in employment that is unrelated to national movements. Moreover, the association between regional and national employment growth does not follow any identifiable pattern. Relatively high $R^2$s were recorded for the West, the South-West and the Midlands and low values for the North-East and North-West (the new Border Planning Authority).

The weighted average of the $\beta$s in Table 4 (the elasticities of regional with respect to national employment) should be 1. In fact, none of the reported coefficients is significantly different from 1. The low value obtained for the North-East is further evidence that this region tends not to share in national labour market trends. On the other hand, the high and significant $\beta$s recorded for "peripheral" regions such as the West and the South-West suggest that their employment experience reflects national developments fairly closely.

The share of the regions in national employment provides a summary measure of regional fortunes with regard to employment. The trend in these shares is shown Figure 2a, which shows the cumulative percentage change in each region's employment share over the twenty-one year period. This is calculated as

$$\sum_{t} \Delta \ln E_t = \ln E_t$$

where $E_t$ is employment in the $i^{th}$ region in year $t$, and $E_t$ is national employment in year $t$

Trends in the Dublin area are summarised in Figure 2a. When the Mid-East is treated as a separate region it shows a steady and quite impressive gain, but Dublin on its own has just retained its share. The share of the Greater Dublin region (Dublin plus the Mid-East) has risen somewhat less than ten percent per cent over the period. This is not very dramatic by comparison with the gains recorded in US states such as California, Texas, Florida, Nevada and Arizona since the Second World War (Blanchard and Katz, 1992).

The employment shares of the regions along the western seaboard are shown in Figure 2b. These regions' share of national employment has declined. The 15 per cent cumulative loss in the North-West is the largest recorded for any region. This loss, although significant, is much less dramatic than those recorded in US states such as Massachusetts, Rhode Island, New York, Pennsylvania, West Virginia, Ohio and Illinois.

The shares of the South-East, North-East, Mid-West and Midlands in national employment are shown in Figures 2a and 2d. These regions all seen their employment share decline over the longer run, but not very markedly. The decline has been most pronounced in the North-East and least in the South-East. The behaviour of relative employment in the Mid-West has been quite erratic.

The picture that emerges from this analysis is not one of a massive redistribution of employment between the Irish regions since 1977. The most striking feature has been the impressive gain in the Mid-East region, but this appears to be mainly an overspill from Dublin. A less striking picture emerges when the Great Dublin region is considered as a whole. The share of all the other regions in the national total was lower in 1997 than twenty

$^4$ The positive correlation is strengthened by the North-West region, which is an outlier. When the NW is excluded the slope is 0.89 and the t-ratio 2.7.

$^5$ Blanchard and Katz report an average $R^2$ of 0.66 for the 50 US states.
years earlier, but most of them held their own until the late 1980s. The sharpest decline in
shares occurred in the 1990s and were due to the rapid growth of the Greater Dublin region
rather than to absolute setbacks elsewhere. The fact the North-West maintained its share
of national employment until the 1990s suggests that its fortunes have not been strongly
influenced by the Northern Ireland troubles.

Regional employment growth rates do not show strong persistence (Figure 3). There was
only a weak tendency for regions that experienced rapid growth in the first half of the period
to grow rapidly in the second half. It is noteworthy that Dublin and the Mid-East regions
grew more rapidly in the second half of the period than would have been expected on the
basis of their record over the first half, while the reverse was true of the Midlands, the West,
and the Mid-West. A regression of the regional employment growth rates in 1988-97 ($e_r$) on
those for 1978-87 ($e_{r0}$) yields the following results ($R^2$-ratio in parentheses):

| Nine regions: $e_r = 0.012 + 0.469 e_{r0}$ | $R^2 = 0.33$ |
| Eight regions: $e_r = 0.017 + 0.144 e_{r0}$ | $R^2 = 0.0$ |

The lack of persistence in regional employment growth rates contrasts with its presence in
regional unemployment rates. In the US the situation is reversed – regional employment
growth persists but regional unemployment rates do not.

Regional wage rates

The limited available regional information on wages may be used to gauge whether there has
been convergence over the years since 1979. Figure 4 plots the actual average growth rate of
wages (sag) against relative wages at the start of the period (relwage). If $\beta$-convergence exists
there would be a significant negative correlation between these two variables (Sala-i-Martin,
1997). This is clearly not the case – the estimate of $\beta$ is positive and statistically significant at
the 10% level for both the nine-region and eight-region case:

| Nine regions: $sag = 0.08 + 0.012 relwage$ | $R^2 = 0.31$ |
| Eight regions: $sag = 0.017 + 0.144 e_{r0}$ | $R^2 = 0.0$ |

The pattern of growth also led to an absence of $\sigma$-convergence. The coefficient of variation
of wages increased from below 11% in the early 1980s to over 13% in recent years (Figure 5).
Thus wages have been rising most rapidly in the already-rich regions and least rapidly in the
poorer regions. This record contrasts with the strong evidence of convergence reported for
the regions of the United States, Japan, and the regions of the EU (Barro and Sala-i-Martin,
1995).

The evidence on the divergence of wage rates should be interpreted with caution, however.
The wage data are unadjusted for possible changes in the relative cost of living between the
regions. It is likely that the cost of living in the Dublin area rose more rapidly than in the
more remote regions over the period. Furthermore, the wage data relate only to
manufacturing and it is possible, though unlikely, that wages in services rose more rapidly
outside Dublin. Finally, some of the change in industrial wages may be due to the changing
composition of industry in the regions, with the Dublin region enjoying more rapid growth of
relatively high wage sectors. The possibility cannot be ruled out that the net effect of
correcting for all these considerations would reverse the pattern revealed in Figure 4, but
none the less the prima facie evidence suggests a lack of convergence in earnings between the
Irish regions over the past twenty years.

Modelling labour market dynamics

We can use a simple supply/demand framework to organise our thoughts about how
regional labour markets adjust to such shocks. Figure 6 illustrates the standard model. The
initial equilibrium wage rate and employment are $E_0$ and $w_0$. The supply of labour is
inelastic in the short run. Initially unemployment (not shown) is at its "natural rate". An
adverse shocks to labour demand (a local employer announces a factory closure) shifts the
demand for labour to the left. If wages were flexible they would quickly fall to the new
equilibrium level, $w_1$, and full employment would be restored by a movement down along
the new demand curve – representing an expansion in employment in agriculture and
services. At this lower equilibrium wage two responses would be triggered: people have an
incentive to move out of the region and firms to move in – either of their own accord or as a
result of courting by the Industrial Development Authority. Wages should eventually return
to the pre-shock level but the implications for employment are ambiguous. If the out-
migration of people dominates then the supply of labour will shift to the left over time and
employment will end up close to $E_1$. If in-migration of firms is significant, then the demand
for labour will shift back towards its original location and employment will tend back to $E_0$.
The stability of regional wage differentials and unemployment rates favours the belief that
the demand curves shift, but the cumulative changes in employment shares that have
occurred suggest that shifts in the supply schedule have also been important.

If wages remain stuck at $w_1$, and no out-migration takes place, persistent excess
unemployment equal to $AB$ emerges. Gradually this high unemployment leads to out-
migration and falling labour force participation rates. The supply of labour shifts leftwards
and AB shrinks. This combination of events would lead to more pronounced regional
changes in employment shares than the alternative adjustment through migration of firms
and people.

A simple approach to trying to understand the adjustment process on the basis of
correlations between relative wages, unemployment, and employment growth is not
rewarding. The correlation between relative wages and unemployment, and relative wages
and employment growth, were essentially zero. There is some evidence of a negative
correlation between the change in unemployment rates ($\Delta u$) and employment growth rates
($\Delta y$):

| Nine regions: $\Delta w = 0.39 - 0.08 e_{r0}$ | $R^2 = 0.21$ |
| Eight regions: $\Delta w = 0.42 - 0.01 e_{r0}$ | $R^2 = 0.11$ |

(0.9)
This provides some support for importance of demand-side shocks, but obviously other factors have played a role. Possible additional influences are the structure of employment, in particular the share of agriculture and the growth of women's labour force participation rates.

To gain further insight into the adjustment process we need to look more formally at the impact of how employment shocks. It is proposed to do so by estimating a system of equations in three variables. Denoting employment, unemployment and the population by E, U and P, the variables are defined as:

- \( q^e = \Delta \ln E - \Delta \ln E, \) that is, the relative employment growth rate or the difference between the \( p \) region's employment growth rate and the national growth rate.
- \( a^u = \ln (U/E+U) - \ln (U/E+U), \) that is, relative unemployment rates or the difference between the log of the \( p \) region's unemployment rate and the log of the national rate.
- \( \ln F^p = \ln (E/U - P) - \ln (E/U - P), \) that is, the relative labour force participation rate or the difference between the log of the \( p \) region's labour force participation rate and the log of the national rate.

The model estimated is:

\[
q^e = a^e + a_0(L) q^{e}_{t-1} + a_0(L) a^u_{t-1} + a_0(L) \ln F^p_{t-1} + e^e
\]

\[
a^u = a^u_0 + a^u_0(L) q^{u}_{t-1} + a^u_0(L) a^u_{t-1} + a^u_0(L) \ln F^p_{t-1} + e^u
\]

\[
\ln F^p = \ln F^p_0 + \gamma_0(L) q^{p}_{t-1} + \gamma_0(L) a^u_{t-1} + \gamma_0(L) \ln F^p_{t-1} + e^p
\]

Where \( L \) is the lag operator.

The specification of the lag structure allows for current changes in \( q^e \) to affect current values of \( a^u \) and \( \ln F^p \) but not the other way round. This restriction implicitly assumes that disturbances to the system are mainly due to shocks to the demand for labour, manifested in \( q^e \). The goal now is to trace out the dynamic effects of innovations in labour demand, \( e^e \), on employment, unemployment and labour force participation.

Based on the descriptive account of how relative employment shares and unemployment rates have behaved, the model was estimated by pooling seven regions (that is, treating the Greater Dublin as a single region and omitting the North West) and including region-specific intercepts. Two lags appeared to be sufficient to capture the influence of the past behaviour of the variables. Figure 7 plots the response of the unemployment rate, the participation rate and the growth rate to a (positive) shock to relative employment growth.

The impact of a rise in the relative employment growth rate is an immediate fall in the unemployment rate and a rise in the labour force participation rate. Both effects quickly die away quickly, however. By the third year both the unemployment and participation rates are back close to the pre-shock levels. Six or seven years out the remaining effects are negligible. The effect on employment itself is also very short-lived. In fact, after the initial increase, the relative employment growth rate falls below its previous level and by the third year the effect is negligible. In the equation for \( q^e \) the only significant coefficient is that on one-period lagged unemployment and the \( R^2 \) is only 0.2. It is tempting therefore to treat relative employment growth as exogenous and to study how unemployment and participation respond when no feedback to employment is allowed. When this is done the impulse responses are initially larger and die away more slowly than is shown in Figure 7, but none the less after ten years these variables have virtually returned to their pre-shock levels.

This analysis of the dynamic responses of Irish regional labour markets supports the view, already inferred from the earlier less formal analysis, that Irish regions (excluding the North-West) adjust relatively quickly to shocks. The responses seem closer to those reported for North America than for continental European countries in other studies. The relatively high propensity of Irish people to move, both within the country and externally, is undoubtedly an important reason for the faster adjustment of Irish regional labour markets. A study of Irish regional migration flows in the 1960s concluded that differentials in regional income and rates of employment growth were a stronger influence than unemployment differentials and that "there was no tendency for migration to remove differentials in measured unemployment" (Hughes and Walsh, 1980, p. 71). This is consistent with the findings reported in the present paper.

An optimistic interpretation of these results is that no change in regional policy is warranted. The effects of innovations to employment die away quickly. In particular, unemployment rates return quickly to their "natural" levels. While these levels differ considerably from region to region, the appropriate way to tackle these differentials is by addressing the factors that account for high natural rates. Further research on these factors is warranted.

A less complacent view would point to the role played by migration in the adjustment process. Undoubtedly the main reason why regional unemployment rates tend to return to their equilibrium levels is because of the relatively high Irish propensity to migrate both to other Irish regions and externally. This may be illustrated by the very high rates of net migration recorded during the second half of the 1980s, when the Irish economy was still in the doldrums and the UK economy boomed. Table 5 shows that the annual net out-migration rate among of young adults was close to 5% in several regions over the period 1980-91. Migration on this scale is a politically sensitive issue.

Conclusion

This paper contains a detailed description of the changing regional patterns of employment and unemployment over the period since 1977. While the changes in the regions' employment shares were not as dramatic as those recorded in the US, there was none the less a significant redistribution of economic activity over these years. Even though employment grew in all regions the Greater Dublin area increased its employment share relative to the rest of the country, especially the western and northern regions. On the other hand the pattern of relative unemployment rates remained fairly stable, while wage rates displayed no tendency towards convergence.
The analysis suggests that employment growth rates and relative labour force participation and unemployment rates return quickly to their equilibrium level following a shock. In this regard, Ireland resembles the US more than the continental European economies where adjustment is notoriously slow. Significant net migration plays an important part in this adjustment, but the resilience of employment is also striking. The findings could be interpreted as evidence either that Irish regional policy has been relatively successful or that Irish labour markets are relatively flexible or some combination of the two.

### References


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### Table 1: Summary of Regional Trends, 1977-97

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<thead>
<tr>
<th>Population aged 15+</th>
<th>Employed</th>
<th>Labour Force Participation</th>
<th>Unemployment rate (%)</th>
<th>Employment Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dublin</td>
<td>560.7</td>
<td>666.8 26.2</td>
<td>32.8 26.2</td>
<td>26.2 26.2</td>
</tr>
<tr>
<td>Mid-East</td>
<td>166.3</td>
<td>270.5 62.7</td>
<td>32.6 26.2</td>
<td>26.2 26.2</td>
</tr>
<tr>
<td>Dublin plus Mid-East</td>
<td>833.1</td>
<td>1,114.3 33.8</td>
<td>33.8 26.2</td>
<td>26.2 26.2</td>
</tr>
<tr>
<td>South-West</td>
<td>352.3</td>
<td>421.2 29.9</td>
<td>34.1 26.2</td>
<td>26.2 26.2</td>
</tr>
<tr>
<td>South-East</td>
<td>243.7</td>
<td>298.6 25.9</td>
<td>33.7 26.2</td>
<td>26.2 26.2</td>
</tr>
<tr>
<td>North-East</td>
<td>128.1</td>
<td>153.6 23.8</td>
<td>32.7 26.2</td>
<td>26.2 26.2</td>
</tr>
<tr>
<td>Mid-West</td>
<td>202.0</td>
<td>242.9 21.4</td>
<td>32.3 26.2</td>
<td>26.2 26.2</td>
</tr>
<tr>
<td>Midlands</td>
<td>202.0</td>
<td>242.9 21.4</td>
<td>32.3 26.2</td>
<td>26.2 26.2</td>
</tr>
<tr>
<td>North-West</td>
<td>141.8</td>
<td>150.0 6.5</td>
<td>32.1 26.2</td>
<td>26.2 26.2</td>
</tr>
<tr>
<td>Ireland</td>
<td>2,266.8</td>
<td>2,815.3 21.1</td>
<td>33.8 26.2</td>
<td>26.2 26.2</td>
</tr>
</tbody>
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Note: Unemployment rate = unemployed / (employed + unemployed); Labour Force Participation rate = (employed + unemployed) / population; Employment rate = employed / population.
The Planning Regions

ME = Mid-East = Kildare, Meath, and Wicklow
DUB = Dublin
GD = DUB+ME = Dublin, Kildare, Meath, and Wicklow
SW = South West = Cork and Kerry
W = West = Galway and Mayo
NW = North West = Cavan, Donegal, and Sligo
SE = South East = Carlow, Kilkenny, Tipperary SR, Waterford, Wexford
NE = North East = Cavan, Louth and Monaghan
ML = Midlands = Laois, Longford, Offaly, Roscommon, Westmeath
MW = Mid-West = Clare, Limerick, Tipperary NR, Limerick

Table 2: Regressions of regional unemployment rates on national unemployment rate and trend

\[ \ln U_i = \alpha + \beta \ln U + \gamma \text{Trend} \]

Annual data 1977-97
(t-ratios in parentheses)

<table>
<thead>
<tr>
<th>Region</th>
<th>Constant</th>
<th>Unemployment Rate</th>
<th>Trend</th>
<th>( \hat{R}^2 )</th>
<th>D.W.</th>
</tr>
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<tr>
<td>Dublin</td>
<td>0.11</td>
<td>1.04</td>
<td>0.002</td>
<td>0.98</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>(1.0)</td>
<td>(23.3)</td>
<td>(1.1)</td>
<td></td>
<td></td>
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<tr>
<td>Mid-East</td>
<td>0.35</td>
<td>1.17</td>
<td>-0.006*</td>
<td>0.84</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>(1.9)</td>
<td>(15.1)</td>
<td>(2.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South-West</td>
<td>0.08</td>
<td>1.09</td>
<td>0.002</td>
<td>0.95</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>(0.5)</td>
<td>(16.3)</td>
<td>(0.6)</td>
<td></td>
<td></td>
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<tr>
<td>South-East</td>
<td>-0.10</td>
<td>0.92</td>
<td>0.001</td>
<td>0.96</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>(0.8)</td>
<td>(17.1)</td>
<td>(0.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-East</td>
<td>0.55</td>
<td>1.28*</td>
<td>0.001</td>
<td>0.95</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>(2.8)</td>
<td>(15.6)</td>
<td>(0.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-West</td>
<td>-0.28</td>
<td>0.89</td>
<td>-0.003</td>
<td>0.92</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>(1.7)</td>
<td>(13.0)</td>
<td>(0.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midlands</td>
<td>0.4</td>
<td>1.30*</td>
<td>0.001</td>
<td>0.93</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>(1.8)</td>
<td>(13.5)</td>
<td>(0.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>West</td>
<td>0.56</td>
<td>0.86</td>
<td>0.010</td>
<td>0.84</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>(2.1)</td>
<td>(7.2)</td>
<td>(1.8)</td>
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<td></td>
</tr>
<tr>
<td>North-West</td>
<td>-0.21</td>
<td>0.69*</td>
<td>-0.005*</td>
<td>0.80</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>(1.1)</td>
<td>(8.4)</td>
<td>(2.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dublin plu</td>
<td>0.16</td>
<td>1.07</td>
<td>-0.0002</td>
<td>0.99</td>
<td>1.7</td>
</tr>
<tr>
<td>Mid-East</td>
<td>(1.9)</td>
<td>(30.4)</td>
<td>(0.1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* = significantly different from 1.
* = significantly different from 0.
Table 3: AR(2) model of relative unemployment

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
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</thead>
<tbody>
<tr>
<td>SEg</td>
<td>0.505</td>
<td>-0.1437</td>
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<tr>
<td></td>
<td>(5.7)</td>
<td>(1.6)</td>
</tr>
</tbody>
</table>

Annual data 1977-97 for seven regions (GD, SW, SE, NE, MW, ML, W)
Separate intercepts estimated for the regions (t-ratios in parentheses)

Table 4: Regressions of regional employment growth on national employment growth

\[ \Delta \ln E_i = \alpha + \beta \Delta \ln E \]

Annual data 1977-97 (t-ratios in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>(R^2)</th>
<th>D.W.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dublin</td>
<td>0.0003</td>
<td>1.07</td>
<td>0.71</td>
<td>2.5</td>
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<tr>
<td></td>
<td>(0.1)</td>
<td>(6.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-East</td>
<td>0.01</td>
<td>1.13</td>
<td>0.38</td>
<td>3.0</td>
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<tr>
<td></td>
<td>(2.0)</td>
<td>(3.6)</td>
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</tr>
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<td>South-West</td>
<td>-0.003</td>
<td>1.00</td>
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<tr>
<td></td>
<td>(0.5)</td>
<td>(4.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South-East</td>
<td>0.001</td>
<td>0.85</td>
<td>0.26</td>
<td>3.4</td>
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<td></td>
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<td>(2.7)</td>
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</tr>
<tr>
<td>North-East</td>
<td>0.001</td>
<td>0.57</td>
<td>0.10</td>
<td>2.6</td>
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<tr>
<td></td>
<td>(0.1)</td>
<td>(1.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-West</td>
<td>-0.002</td>
<td>0.89</td>
<td>0.24</td>
<td>2.5</td>
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<tr>
<td></td>
<td>(0.3)</td>
<td>(2.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midlands</td>
<td>-0.003</td>
<td>1.09</td>
<td>0.49</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>(0.5)</td>
<td>(4.4)</td>
<td></td>
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</tr>
<tr>
<td>West</td>
<td>-0.005</td>
<td>1.12</td>
<td>0.34</td>
<td>2.3</td>
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<tr>
<td></td>
<td>(0.7)</td>
<td>(3.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-West</td>
<td>-0.006</td>
<td>0.86</td>
<td>0.14</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>(0.6)</td>
<td>(2.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dublin plus</td>
<td>0.003</td>
<td>1.09</td>
<td>0.71</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>(0.9)</td>
<td>(6.9)</td>
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<td></td>
</tr>
<tr>
<td>Mid-East</td>
<td>0.003</td>
<td>1.09</td>
<td>0.71</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>(0.9)</td>
<td>(6.9)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Average growth rate, 1979-96

Average employment growth rate, 1988-97

Relative wage in 1979

Figure 3: The Persistence of Employment Growth

Figure 4: Wage Divergence
Table 5: Regional Migration Rates, 1986-91
Population aged 15-24 in 1986

<table>
<thead>
<tr>
<th>Region</th>
<th>Proportion surviving in region from 1986 to 1991</th>
<th>Annual net out-migration rate, 1986-91</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater Dublin</td>
<td>88.6</td>
<td>2.1</td>
</tr>
<tr>
<td>South West</td>
<td>82.6</td>
<td>3.3</td>
</tr>
<tr>
<td>South East</td>
<td>80.9</td>
<td>3.7</td>
</tr>
<tr>
<td>North East</td>
<td>80.0</td>
<td>3.8</td>
</tr>
<tr>
<td>Mid-West</td>
<td>79.1</td>
<td>4.0</td>
</tr>
<tr>
<td>Midlands</td>
<td>74.4</td>
<td>5.0</td>
</tr>
<tr>
<td>West</td>
<td>76.1</td>
<td>4.6</td>
</tr>
<tr>
<td>North West</td>
<td>72.9</td>
<td>5.3</td>
</tr>
<tr>
<td>Ireland</td>
<td>83.1</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Note: Net migration rate estimated after allowing for mortality over period.

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