WAGE FORMATION AND THE LABOUR MARKET

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By John Fitz Gerald

1. Introduction

The Irish labour market over the last fifty years has enjoyed some unusual features; in particular the extent to which labour mobility was legally possible and culturally accepted. Ireland moved from having a very high level of protection at the end of the 1950s to being highly integrated into the wider European economy as a member of the EEC after 1973. While the goods market was very closed up to 1960, Ireland had been part of a wider labour market with the United Kingdom for over a century, with very limited restriction on the outward movement of labour to the UK over the 75 years since independence in 1922. This has made possible very considerable migration and, as a result, the supply of labour in Ireland has been unusually responsive to external circumstances, giving rise to a more elastic supply of labour than in many other EU countries.

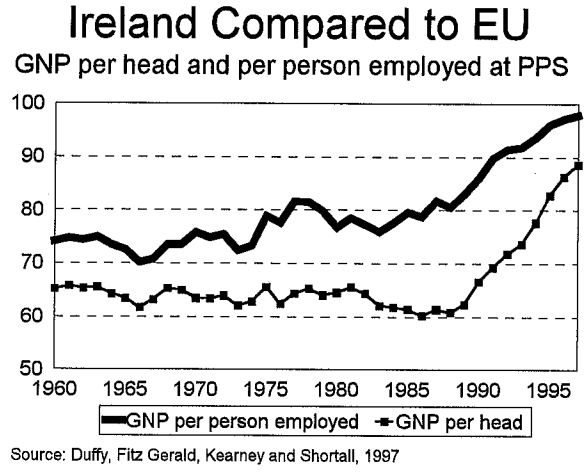
Over the last decade the economy has seen a rapid convergence in living standards towards the EU average. To what extent has this convergence been a product of a transformation in the operation of the labour market and to what extent is the labour market merely reflecting wider change in the economy? The evolving external environment and the changing structure of the domestic economy are all reflected in the evolution of the domestic labour market and, in particular, in wage formation. This chapter considers the changes in the wage formation process in Ireland since 1960; what are the forces which have produced this transformation and what these changes can tell us about the operation of the labour market as a whole.

Section 2 of this chapter examines the development of wage rates since the period of protection in the 1950s. They are considered in the context of the wider labour market of these islands and the EU. It also considers a number of factors which have been very important in affecting labour supply and demand over the period, in particular the role of migration. Section 3 sets out a framework, which helps in explaining the stylised data, described in section 2. This framework is considered in the context of the available data in Section 4 and conclusions concerning wage formation and the labour market are drawn in Section 5.

2. The Irish Labour Market since 1960

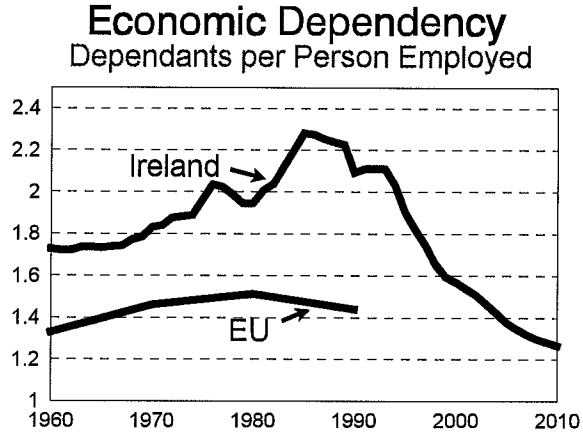
Ireland made relatively little progress in raising output per head (GNP) towards the EU average over the 30 years up to 1990. However, there has been a sudden transformation since that date as shown in Figure 7.1. As discussed elsewhere in this book (???) an important factor in the current rapid rate of economic progress is the changing pattern in economic dependency.

Figure 7.1: Output per head v per worker



Source: Duffy, Fitz Gerald, Kearney and Shortall, 1997

Figure 7.2: Economic Dependency Ratio



Source: Duffy, Fitz Gerald, Kearney and Shortall, 1997

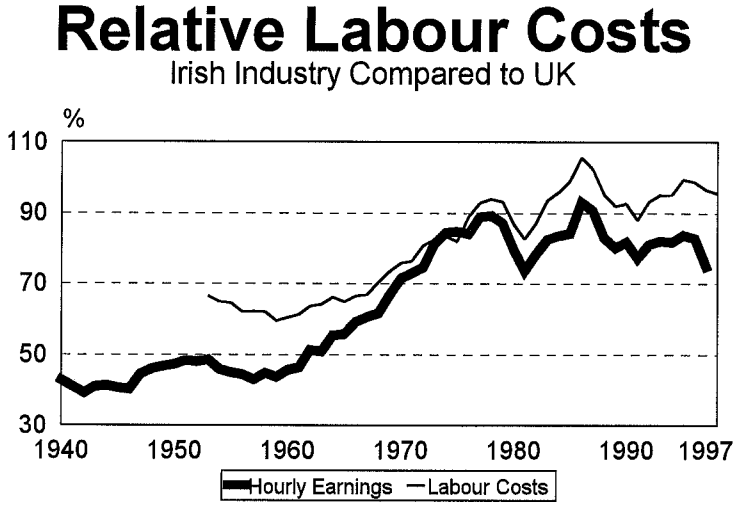
The economic dependency ratio (the population which is not in employment divided by the numbers employed) reached a peak in the mid 1980s and this put a major burden on the working population (Figure 7.2). The rise in dependency due to purely demographic factors was aggravated in the 1980s by the rise in unemployment. While output continued to increase, especially in the second half of the decade, the benefits had to be shared over an

increasing number of non-workers. Since the late 1980s the situation has reversed and now the dependency rate is falling, both because of the changing demographic structure and the fall in unemployment. The rise in dependency meant that, while output (and income) per person employed converged on the EU average gradually from 1970 onwards (from 76% in 1970 to 86% by 1990), measured as output per head there was little change between 1960 and 1990. Since 1990 both measures show a much more rapid rate of convergence.

The relatively steady convergence since 1960 in income per person employed was closely related to developments in the labour market and to movements in relative wage rates. These developments were affected by the openness of the labour market and it is important to consider them in the context of developments in the wider UK labour market.

When Ireland became independent in 1922 it still remained part of a common British Isles labour market with no restriction on movement between the two jurisdictions. With the exception of the years of the Second World War, this was to remain the case (for Irish citizens) right up to the present. By contrast, from the end of the 1920s tariffs were introduced in Ireland (and the UK) so that by the mid 1930s the goods market was subject to very considerable restrictions. The exceptionally high tariff barriers remained in place until the end of the 1950s, unlike the situation in most other European countries where trade barriers were rapidly reduced in the immediate post-war years.

Figure 7.3



Because of the historical ties with the United Kingdom, many of the institutional features of the Irish labour market were shared: many of the trade unions in Ireland were branches of UK trade unions and the approach to wage bargaining owed much to developments in Britain.

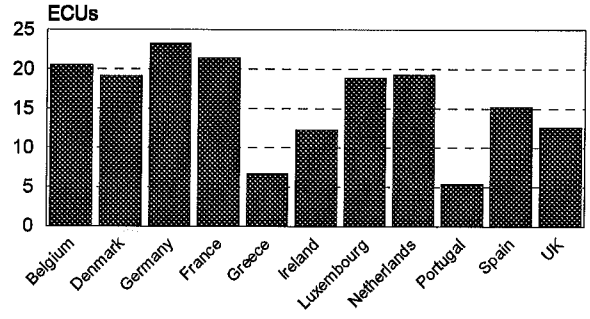
These common features were reinforced by the movement of many workers from Ireland to the UK, as well as through wider cultural influences, including the influence of shared media – newspapers, books, radio and, later, television.

This is the background to the main story of this Chapter, the development of wage formation and the labour market since 1960. As shown in Figure 7.3, wage rates in Ireland in the early 1940s were only around 40% of those in the UK.[1] They remained in the range 40% to 50% of the UK level until 1960. Between 1960 and the late 1970s there was a very sharp rise in wage rates in Ireland relative to those in the United Kingdom. However, from the end of the 1970s wage rates in Ireland fluctuated around 80% to 90% of the UK level. The fluctuations around this trend were largely due to changes in the bilateral exchange rate rather than to changes in the rate of growth of wage rates from one year to the next.

Figure 7.4

Hourly Labour Costs in Manufacturing

1992



If other labour costs, in particular employers' social insurance contributions, are taken into account, the pattern is very similar (Figure 7.3). In this case the stabilisation in the graph occurs around the level where Irish costs are 90% to 100% of the UK level, with them exceeding the UK level in years when sterling was abnormally weak. As shown in Figure 7.4, when viewed within a wider EU context in 1992, labour costs in Ireland and the UK were well below those in most other members of the EU (with the exception of Portugal and Greece). This relatively favourable position on labour costs has been true for at least the last decade.

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[1] The first series in Figure 7.3 compares hourly wage rates in Ireland with those in the UK. This takes no account of labour taxes and other costs of employment. The second series takes account of differences in labour costs by using national accounting series for the wage bill (divided by employment). This latter series is used later in the Chapter when estimating different models.

Questions to be answered

The timing and pattern of the convergence of Irish wage rates to UK wage rates over the last 40 years raises a number of interesting questions about the Irish labour market. Is it an accident or, as seems more likely, are there economic forces that can explain the convergence? What economic mechanisms could have given rise to the process and how can the timing of the convergence throw light on the underlying factors?

On the supply side there has been free movement of labour over a very long period so, on its own, it can not explain the convergence in factor prices. However, if the costs of migration had changed over time this factor could have resulted in a shift in the equilibrium gap in unemployment rates (or expected earnings) between Ireland and the UK.[2] Falling travel and communications costs have undoubtedly made the decision to emigrate much less traumatic than in the era of the "American wake". In addition, the falling cost of labour mobility has made possible the situation where much of the emigration since 1960 has been temporary in character.

If the explanation for the convergence lay in reduced costs of migration it should be evident in the modelling of the migration decision or, equivalently, of the equilibrium difference in unemployment rates (Honohan, 1992). However, due to data problems, most of the studies of the migration decision use data from the post 1960 period, after the convergence process had begun, which makes it difficult to identify a change in behaviour.

A second possible supply side explanation for the convergence is the effect of the opening up of the economy and society to the outside world from the late 1950s onwards, typified by EU entry in 1973. In earlier decades expectations in Ireland were much lower relative to those in the UK reflecting, among other things, a more closed society. The opening up of the economy, the impact of radio and television and foreign travel, may all have served to raise expectations of the labour force. If they could not get a satisfactory standard of living at home they had the option of moving.[3]

A third supply side factor might be the investment in human capital resulting in rising earnings per person. However, as discussed in Chapter 3, the investment began in the late

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[2] The differential in expected earnings between Ireland and the UK at which emigration would be expected to be zero. See Harris and Todaro, 1970, for a model of migration decisions.

[3] Another aspect of this convergence was the development of the Irish social welfare system, from a situation where it was very much inferior to that of the UK in 1960, to one where benefit rates are more generous in Ireland in the 1990s (Callan and Sutherland, 1997).

1960s, long after the convergence in wage rates had begun, and its full effects on the labour market are only maturing in the 1990s. As a result, the timing of this factor tends to rule it out as a major force in the convergence process.

The opening up of the goods market post 1960 provides a fourth possible mechanism whereby the convergence in wage rates took place. The coincidence of the rapid growth in wage rates in Ireland post 1960, commencing at the same time as the goods market was liberalised, may be just that – a coincidence. However, there remains the possibility that the entry of many multinationals into the Irish market, investing in new sectors of manufacturing, may have had a direct influence on the domestic labour market (Barry and Hannan, 1996).

Prior to 1960 Irish firms were producing small production runs for a limited domestic market with a low marginal productivity of labour; the freeing of trade and the introduction of new technology in firms producing for a wider European market greatly increased labour productivity. As a result, foreign firms could afford to pay much higher wage rates than in the past (and higher rates than in existing domestic firms). The resulting upward pressure on wage rates undoubtedly contributed to the demise of much of the traditional manufacturing sector of the 1950s (see Barry and Hannan, 1996).

A final factor, which may have played a role in the stabilisation of labour costs in Ireland around the UK level after 1980, may have been the development of a "partnership approach" to incomes policy. While Irish labour costs rose continuously compared to costs in other EU countries over the 1960-80 period there appears to have been a stabilisation since then. The new more consensual approach to wage bargaining could have played a role in this development; by changing expectations and bringing order to the labour market it may have resulted in a more moderate growth in wage rates in recent years.

The rest of this Chapter considers the evidence on the combination of factors which explains the pattern of growth in Irish labour costs over the last 40 years.

3. Framework for Analysis

Observed wage rates over the last 40 years represent the outcome of a complex interaction between forces driving the supply and demand for labour. On their own these data can not explain the behaviour of the labour market as they represent the reduced form of a complex set of relationships. In this section we consider the factors driving the structural model – the supply and demand for labour in Ireland. This analysis gives some clues as to how the questions, set out above, may be answered.

Labour Supply

There is a wide range of factors, which have affected the supply of labour and its price over the years, the most obvious being the rate of inflation in consumer prices. Taxation also affects labour supply, both through the effects of indirect taxes on consumer prices, and also through taxes on labour income, which affect the spending power of wages.

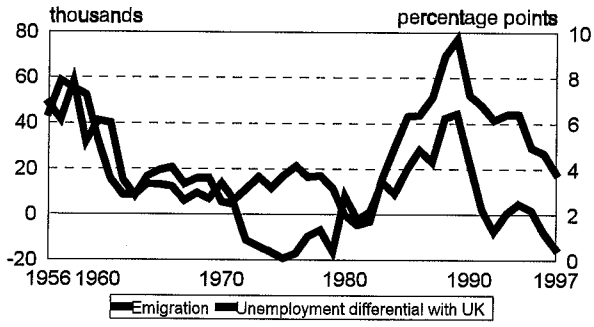
A second set of variables which affects labour supply is the natural increase in the labour force, migration, and changing patterns of female participation. A third set of factors operates through the productivity of labour. Among the latter are the changing level of education and training of the labour force, which affects its productivity. A final set of factors broadly affects labour's expectations in terms of living standards. These include the degree of unionisation, which also influences market power, and external factors, such as the standard of living available elsewhere, and incomes policy initiatives.

In a world with perfect competition, rational individuals will make their decisions on labour supply on the basis of the real wage rate. This implies that in the long run, unless individuals suffer from money illusion, there will be a unitary elasticity with respect to consumer prices. In addition, the level of taxation on labour may well affect labour supply. If labour sees the availability of publicly provided goods as representing "good value" for taxes paid, then changes in taxation might not necessarily be seen as representing changes in the reward to labour. However, if these benefits are discounted by labour, so that changes in labour taxation impact on the perceived return to work, then such taxes can be expected to affect the supply of labour, affecting wage rates. It remains an empirical question how taxes on labour affect wage rates in individual countries. The evidence from Drèze and Bean, 1990, for a number of European labour markets, is mixed, though a series of studies of the Irish labour market suggest that the tax wedge exerts a significant influence on wage bargaining (Bradley, Whelan and Wright, 1993, and Curtis and Fitz Gerald, 1994).

Because of a high birth rate in the 1960s and the 1970s, which only went into serious decline in the 1980s, the numbers of young potential labour market emigrants each year substantially exceeds the numbers retiring. This has the effect of shifting outwards the supply curve for labour in the Irish economy.

Figure 7.5

Emigration and Unemployment



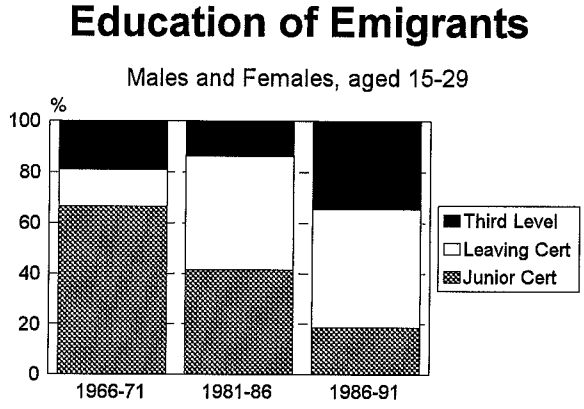
The second demographic variable influencing the supply of labour is migration. The free movement of labour has resulted in a huge outflow of Irish-born young adults over the last 200 years. Since the Second World War the numbers leaving Ireland have varied greatly from year to year (Figure 7.5, left scale). In the late 1950s net emigration reached 60,000 a year, roughly equal to the annual number of births, and again in the late 1980s emigration reached 40,000 a year. By contrast, in the 1970s and again in the late 1990s there has been some net immigration. The potential importance of this mechanism is illustrated by recent research which examines the convergence in wage rates and living standards between the Irish and the British economies over the second half of the 19th century and the early years of the 20th century. O'Rourke and Williamson, 1995, show that migration, by reducing the supply of labour in Ireland and increasing it in Britain, played a key role in promoting this convergence.

A number of studies of the factors driving emigration in Ireland in the post-war period have found that it is significantly affected by the differential in unemployment rates between Ireland and the UK (Walsh, 1968, Honohan, 1992). Honohan found that the equilibrium gap in unemployment rates between Ireland and the UK was around 4 percentage points; at that difference in unemployment rates there would be no net flow of migrants out of (or into) the country. Figure 7.5 shows both emigration in recent years (left scale) and the actual gap in unemployment rates between Ireland and the UK (right scale), which reached a peak in the late 1980s, around the time that the latest bout of emigration was at its maximum.

The propensity of Irish citizens to migrate changes the nature of the labour supply curve in Ireland, making it more elastic. Changes in domestic economic circumstances, through their effect on migration, directly influence the domestic labour force. In addition, the important role of migration makes the unemployment rate a poor indicator of tensions in the Irish labour market. When economic circumstances are particularly unfavourable in Ireland this may not be reflected in unemployment if there are simultaneously good job opportunities outside the

country. As a result, the Irish unemployment rate may not be the appropriate variable to include in a wage rate equation. The UK unemployment rate may prove at least as good an indicator of domestic labour market tensions in Ireland if, as Honohan and others suggest, it ultimately drives the Irish rate through the migration mechanism.

Figure 7.6



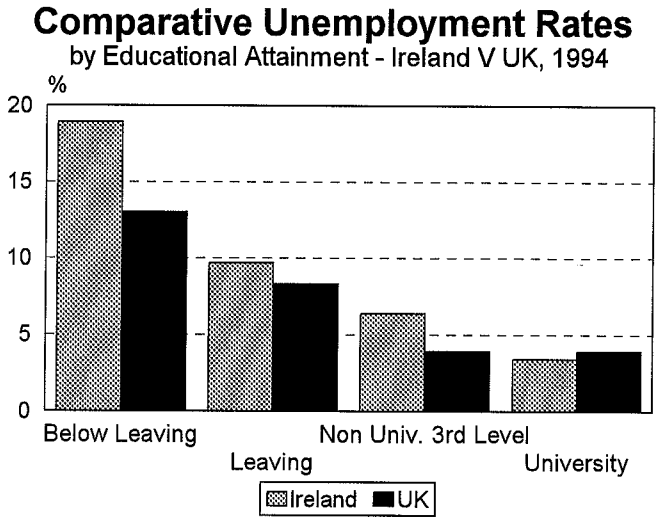
There must be some uncertainty about the stability of the past relationship between unemployment rates in Ireland and the UK. In the 1950s the emigrants from Ireland were predominantly unskilled; by emigrating to the UK or the US they escaped an environment where unemployment was higher than in the destination country, wage rates lower and a welfare system which was much less developed. Since the early 1980s the emigrants have shifted from being predominantly unskilled to being largely skilled (Figure 7.6) (Fahey and Fitz Gerald, 1998). If they remained at home they would be unlikely to have faced unemployment[4], though their earnings might have been somewhat lower than if they moved to the UK (or elsewhere in the EU). It is only if the unemployment rate continues to reflect tensions in the market for skilled labour that it will be a good predictor of future migration. In addition, in recent years when there has been significant immigration, some of those entering the Irish labour market were not returning Irish citizens. Instead a significant minority were skilled workers from other EU countries and the factors driving their entry into the Irish labour market may well prove different from those which drove migration by Irish citizens in the past.

In the 1980s there was a big shift in the educational attainment of those who emigrated. By the second half of the decade at least two thirds of emigrants had at least a leaving certificate level of education. The improvement in the education of the young labour force entrants

[4] Instead, they might have taken less skilled jobs at home squeezing the least skilled out of work into unemployment.

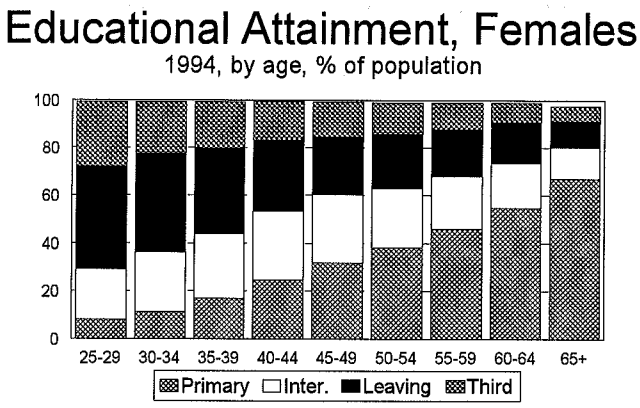
enhanced their mobility. This was reflected in a very small gap in the unemployment rates for skilled workers between Ireland and the UK while there was a much bigger gap for unskilled workers (Figure 7.7). The improved educational attainment of the labour force made individuals more mobile, increasing the elasticity of labour supply.

Figure 7.7



Source: OECD Education at a Glance, 1996

Figure 7.8



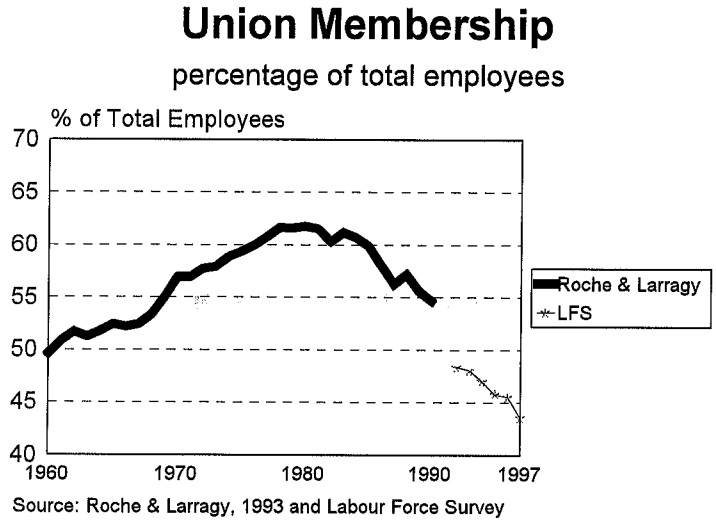
Source: Labour Force Survey

As discussed in Chapter 3, Ireland in recent decades has made a rather belated investment in human capital. While much of the rest of Northern Europe improved their educational systems in the immediate post-war years, it was not till the end of the 1960s that Ireland followed suit. The impact of the investment since the late 1960s has taken many years to trickle through into the labour market. However, in the late 1980s and the 1990s the impact of past investment in education on current productivity is probably at its peak (Chapter 3 and Bradley, Fitz Gerald, Honohan and Kearney, 1997). Figure 7.8 shows the educational

attainment of the female population by age.[5]

The rising educational attainment of the female population has had a direct effect on labour supply through its effects on the female labour force. Labour force participation by women is highly correlated with educational attainment and the rising average level of education probably accounts for up to a third off the rise in the participation rates in recent years (Fahey and Fitz Gerald, 1997). The effect has been to shift outwards the supply curve for labour, especially for skilled labour. In addition, female labour supply is more elastic than male labour supply (Callan and Wren, 1994, and Walsh, 1993) so that the changes which have taken place in female participation have probably made the supply of labour, especially of skilled labour, more elastic than in the past.

Figure 7.9



Source: Roche & Larragy, 1993 and Labour Force Survey

Many of the models of wage behaviour assume that individuals, or groups of individuals, bargain for a share of the output they produce. If, for example, labour were to obtain a constant share of productivity growth (output per person), then labour's share of value added would remain constant over time. As discussed in Chapter3, the gradual replacement of unskilled workers in the labour force by those with a good education has enhanced the productivity of labour and of the economy as a whole. In a competitive labour market where labour was paid its marginal product this would be reflected in rising earnings per hour and rising output per head. The effect of this boost to productivity from investment in education probably played a small part in the convergence in average earnings in the 1970s. By the time

[5] The picture for males is very similar to that for females.

the rising human capital was having its biggest impact on productivity, after 1980, the process of convergence in wage rates was largely completed.

A further major factor in determining the outcome of wage bargaining is the impact of unionisation. By raising the bargaining power of labour, unionisation can be expected to raise wage rates above the level they might reach in a perfectly competitive market. A popular model for understanding labour market outcomes is one where unions may be viewed as bargaining in terms of wage rates while employers set employment conditional on agreed wage rates. To the extent that unions' primary concern is their employed members, the bargaining process may attenuate the impact of unemployment on wage inflation. In particular, where a limited subset of the labour force experiences most of the unemployment, often because they have been failed by the education system, changes in unemployment may not affect the expectations of those who are already employed. This is particularly true of the Irish labour market since 1980; successive studies have shown that those with a very limited education face a very high probability of unemployment while those with a good education generally experience few, if any, spells of unemployment (Sexton and O'Connell, 1996).

The effect of rising unionisation in the 1960s and the 1970s (Figure 7.9) may be expected to have affected the supply of labour, both through modifying its responsiveness to changes in unemployment, and also through changing union members' expectations about future earnings. All individuals, to a greater or a lesser extent face a trade-off between leisure and work and their preferences in this regard will be conditioned by cultural factors, and by what return they expect to get from employment. Murphy and Thom, 1987 considered labour supply in the context of just such a model. It is possible that these expectations could be directly affected by changes in external circumstances, such as the opening up of the Irish economy and society. Knowledge of the standard of living obtained abroad by relatives and friends may well directly affect expectations of domestic labour market participants.

These expectations may also be affected by institutional changes and incomes policy initiatives. 1987 saw the introduction of the Programme for National recovery (PNR), where employers, trade unions and the government bargained simultaneously about national wage rates and taxes on labour. The inclusion of taxes (and other public services) in the national bargaining process gave recognition to the fact that labour was concerned with after tax wage rates. This was the first of a series of agreements which developed what is referred to as a "partnership approach" to wage bargaining (Sexton and O'Connell, 1996). These agreements may well have had an impact on expectations and, therefore, on the wage bargaining process. It is a widespread perception that the change in industrial relations procedures, occurring at a time of serious economic difficulty for the economy, did contribute significantly to the

resolution of those problems. This partnership approach has been pursued up to the present day, with a series of multi-year agreements covering not only wage rates, but also a range of other matters, such as the rate of taxation on labour.

Demand for Labour

In a standard neo-classical world, where firms are maximising their profits, the demand for labour is a function of the price of labour, the price of other inputs, and the price of output. The prices of the other factors of production will be relevant arguments in the firm's demand for labour where labour is substitutable by these factors. If there is very limited substitutability between factors of production they may not prove significant. In a competitive labour market the result will be that wages are equal to the marginal product of labour. Where firms are maximising profits the demand for labour will be a function of the relevant prices and technical progress, with technical progress affecting the productivity of individual factors of production.

For firms it is the price of output, not consumer prices, which represents their reward for output and the driver of labour demand. The difference between consumer prices and output prices reflects the impact of indirect taxes and changes in the terms of trade, driving a wedge between the prices faced by the two parties to the bargaining process. For example, in the case of rising indirect tax rates, labour will try to protect its purchasing power by raising nominal wage rates while firms, facing unchanged prices for their output, will be very reluctant to concede such a wage rise. In this case the outcome, in terms of wage inflation, must depend on the strength of the different parties to the bargaining process.

Taxation also drives a wedge between the price of labour paid to the employer and the disposable wage received by the employee. Thus the measure of the real cost of labour to the employer and the real return to the employee is affected by a tax wedge that consists of both direct and indirect taxes (as well as the effects of the terms of trade). In the late 1970s and the first half of the 1980s rates of taxation rose rapidly in Ireland, greatly increasing this tax wedge. Its importance in the wage bargaining process was recognised in the development of the "partnership approach" in the late 1980s where employees and employers sought to influence the tax wedge.

Over the last 40 years the Irish economy has been subjected to a series of shocks which have potentially affected the demand for labour. The opening up of the economy after 1960 had a major impact on labour demand. Between the early 1930s and 1960 Irish firms had a highly protected home market. Many firms had grown up just to serve that market. Typically they

were very small-scale producers with no exports to the more competitive outside world. Due to limited scope for exploiting scale economies and the absence of external stimuli, the marginal productivity of labour was probably quite low, helping explain the low wage rate compared to the UK.

The removal of trade barriers effected a radical transformation of the economy over the following 20 years with many of the older low productivity firms closing. Simultaneous with the removal of trade barriers a long-term policy of encouraging foreign multinational investment in manufacturing was introduced. This relied on a zero or low rate of corporation tax to attract foreign firms. These firms brought new technologies to the manufacturing sector, substantially raising labour productivity.

For many businesses today, both Irish and foreign, the major competition comes from outside Ireland. In particular, for the very important multinational sector the decision facing the firm is first and foremost what country is likely to prove the most competitive in which to locate production. For smaller Irish owned firms the question is whether they or foreign competitors will serve the same EU market. Under these conditions it might be expected that, as well as the cost of domestic factors of production, the representative firm would take into account the expected cost of production elsewhere. For such firms the demand for labour will be a function of both the cost of labour in Ireland and the cost of labour in competing countries, in particular in the UK (Bradley and Fitz Gerald, 1988 and Bradley, Fitz Gerald and Kearney, 1993).

Technical progress over the years has enhanced the productivity of business so that the marginal product of labour, and other factors, has been increased. In recent years there is evidence that in the developed economies technical progress has enhanced the demand for skilled labour. This has been reflected in countries, such as the US and the UK, by an increasing differential in wage rates payable for skilled labour compared to unskilled (Nickell and Bell, 1995). Operating in a global market Ireland has not been immune to this factor. In fact, the very important role played by foreign multinationals in the economy has been a significant factor in shifting the demand for skilled labour through the introduction of new products and new technologies.

Labour Market Outcomes

The discussion of the factors affecting the supply of labour indicated that there has been a major outward shift in the supply of labour, especially skilled labour, over the last 30 years. This increase is ascribable to a number of factors, some of which are specific to Irish

circumstances. The fact that the vast bulk of new labour force entrants now have at least a leaving certificate, compared to the 1960s when only a minority did so, has also probably changed the shape of the supply curves for both skilled and unskilled labour. However, the ultimate impact of this major investment in human capital also depends on the demand for both kinds of labour.

As shown in Figure 7.10 such an outward shift in the supply curve from S^0 to S^1, in the absence of a shift in the demand curve D^0, could be expected to lead to a fall in wage rates from W^0 to W^1. In addition, if, as suggested above, there has been structural change in the labour market, making the supply of labour more elastic (S^2), then the expected reduction in wage rates could be even greater to W^2.

Figure 7.10

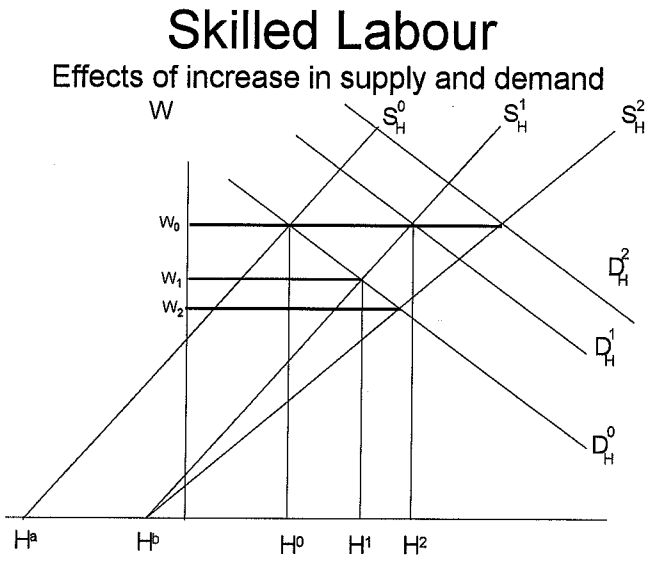
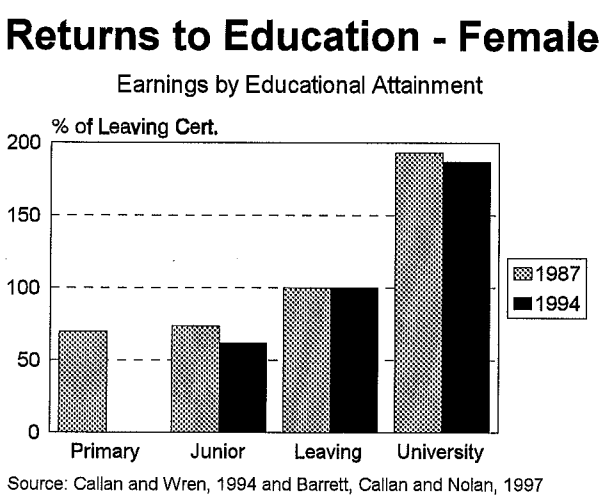


Figure 7.11



Source: Callan and Wren, 1994 and Barrett, Callan and Nolan, 1997

If the demand curves for the two kinds of labour had remained unchanged over time, the wages of skilled employees relative to unskilled would have fallen. This fall would have been particularly acute if many of the skilled were unable to find skilled employment and were forced to work in unskilled jobs. However, Barrett, Callan and Nolan, 1997, have examined the effect of increasing human capital on earnings for 2 years, 1987 and 1994. This study shows that the returns to education for the individual, as reflected in their earnings, are considerable and that the average differential in earnings for different educational levels for men and women in 1987 and 1994 showed little change (Figure 7.11). When other factors are controlled for they actually find that the returns to education increased.[6] In the light of the outward shift in the supply curve, this indicates that the demand curve must also have shifted out from D^0 to D^1 or D^2.

The impact of the investment in education was also to reduce the supply of unskilled labour. By changing the composition of the labour force, with unchanged returns to education, the investment in human capital will have raised average earnings. The very big increase in the supply of skilled labour, and the big shift in demand for such labour, which is consistent with the observed behaviour of skilled wage rates, is also consistent with the very big increase in employment of skilled labour which is apparent in recent years.

4. Modelling Wage Determination

In seeking to understand the behaviour of the labour market in Ireland there are a range of possible behavioural models, some of which have been applied in the past. Certain elements are common to all of them. Three studies, which adopted a bargaining model, maintained rather different assumptions about the factors driving supply and demand in the Irish labour market. In Bradley, Fitz Gerald, Hurley, O'Sullivan and Storey, 1993 and Bradley, Whelan and Williams, 1993, a more traditional closed economy model was adopted. More recently, Curtis and Fitz Gerald, 1996, adopted a model which explicitly acknowledged the openness of the labour market. Both models assumed that wage rates were determined in the tradable sector (industry) with the rate of wage inflation being passed on to the rest of the economy (Lindbeck, 1979).[7] In this Section we re-examine these models in the light of the latest data.

The models can be nested within a single encompassing model for the purpose of testing. The

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[6] The figures for men are rather similar.

[7] An alternative specification was examined here using non-agricultural wage rates (average earnings) rather than average earnings in the industrial sector but the results were very similar.

closed economy model adopted the following specification for the demand and supply of labour (see Curtis and Fitz Gerald, 1996 for a formal derivation of the two models):

$L^d = f(Q, w\text{-}p)$ (1)
$L^s = g(w, z, t, Q/L, U, N)$ (2)

Where

L	=	employment	Q	=	output in Ireland
w	=	wage rates	p	=	the output price
z	=	consumer prices	t	=	the tax wedge
Q/L	=	productivity	U	=	the unemployment rate
N	=	unionisation			

The demand for labour is a function of output and the real wage, where the price is the price of industrial output (1). Wage rates and consumer prices, the tax wedge, productivity, the unemployment rate and unionisation, determine the supply of labour (2). Lower case variables represent the natural log of upper case variables. The wage rate and output data are for the industrial sector and the data are described in more detail in Curtis and Fitz Gerald, 1996.

The open economy model took account of the fact that the tradable sector was operating in a wider EU market and the representative firm had a choice between producing in Ireland or elsewhere. Labour supply is also assumed to be affected by conditions in the UK labour market, both directly through migration, and indirectly through changes in expectations. The resulting open economy model is:

$L^d = f(Q_w, w, w_u)$ (3)
$L^s = g(w, z, t, w_u, z_u, t_u, U, U_u, N)$ (4)

The subscript u indicates the appropriate variable for the UK and Q_w is a measure of world output.

In the open economy model the demand for labour in Ireland is a function of world output, with the process of competition determining what share of that output is produced in Ireland (3). In this model competitiveness is measured in terms of relative labour costs between Ireland and the UK. In addition to the variables that appeared in the closed economy labour supply equation (2), the open economy equation (4) includes the UK wage rate, tax wedge and unemployment rates, reflecting the integration of the labour markets in the two countries.

Assuming a log linear form for the labour supply and demand equations, representing the objectives of the representative employer and employee, they can be solved for the desired or "equilibrium" wage rate w^*. The resulting specifications for wage rates from the two models, closed and open economy, can be nested within a single equation:

$$W^* = a_0 + a_1 q_w + a_2 (z\text{-}t) + a_3 p + a_4 w_u + a_5 (z_u - t_u) + a_6 e + a_7 (q - l) + a_8 U +$$

$$a_9 U_u + a_{10} N \quad (5)$$

For the closed economy model the following restrictions apply:

$a_1 = 0$; $a_3 = 1 - a_2$; $a_4 = a_5 = a_6 = 0$

When these restrictions are implemented the equation to be estimated takes the form (6):

$$W^* - p = a_0 + a_2 (z-t) - p + a_7 (q - l) + a_8 U + a_9 U_u + a_{10} N \quad (6)$$

For the open economy model the following restrictions apply:

$a_3 = 0$; $a_5 = 1 - a_2 - a_4$; $a_6 = 1 - a_2$; $a_7 = 0$

$$\Delta \log(w_i) = b_1 \Delta \log(w^*) + b_2 (\log(w^*_{-1}) - \log(w_{-1})) \quad (7)$$

In implementing this specification it is assumed that actual wage rates adjust to their optimal or "equilibrium" level over time. In testing between the different specifications the adjustment process is specified as an error correction mechanism (7). The closed and open economy models are applied to data for Ireland covering the period 1962 to 1994. This sample spans a period of major change in the Irish economy as the process of integration into the EU proceeded and as the supply and demand curves for labour suffered the shocks discussed in the previous section. The dependent variable in the models estimated in this Section is average annual earnings in the industrial (tradable) sector. This variable reflects the full costs to the employer of employing a unit of labour.

In estimating the model the unionisation variable is dropped because it did not prove possible to obtain a consistent series spanning the whole period. The variable used by Curtis and Fitz Gerald, 1996, in estimating their model for the period to 1990, is not available for the later period. In spite of this omission, the tax wedge variable ensures that the parameters of the supply and demand curves are separately identified (with the exception of the intercepts).

The model also differs from the specification shown above in that the difference between the unemployment rates in Ireland and the UK is used to measure the extent of labour market pressure. This involves restricting $a_8 = -a_9$ in equation 5. In experimentation this proved the most satisfactory unemployment variable. As explained earlier, this is consistent with the models of migration where the difference in the unemployment rates was found to be an important driving force in the past.

Finally, we tested alternative definitions of productivity. The standard definition of productivity, used in earlier work, is output in industry divided by employment in that sector. We tried two alternative definitions which adjust for the distortionary effects of transfer

pricing on the volume of industrial output. In the first we subtracted the volume of profit repatriations, deflated by the national accounts deflator for factor flows, from the volume of industrial output. In the second we deflated the value of profit repatriations by the deflator for GDP arising in the industrial sector. The traditional definition, unadjusted for profit repatriations, performed better in the general equation (5). While in the restricted closed economy equation (6) the adjusted productivity variables performed slightly better, since the results for the other tests were unaffected by the choice of productivity variable, for consistency with previous studies, we have continued to use the traditional definition throughout the results presented below.

In testing between the different the restrictions on the general specification (5) the ECM adjustment scheme was maintained. However, to maintain comparability with earlier work, the results shown below for the closed economy model use the partial adjustment scheme employed in the studies cited above.

Table 1

Model:	*General*	*Closed Economy*			*Open Economy*		
Coefficient	1962-94	1962-94	1962-79	1980-94	1962-94	1962-79	1980-94
a_0	-4.1018				-3.0746	-2.0343	1.1273
	(2.6)				(1.9)	(1.5)	(0.1)
a_1	0.0711				0.2021	0.2644	0.3735
	(0.7)				(1.5)	(2.1)	(0.5)
a_2	0.5155	0.1836	0.5444	0.2331	0.8865	0.7226	0.5878
	(2.2)	(2.1)	(4.4)	(1.4)	(4.5)	(2.8)	(0.9)
a_3	0.1768						
	(2.0)						
a_4	0.5769				0.6098	0.4866	0.1549
	(2.6)				(3.7)	(3.1)	(0.2)
a_5	-0.3736						
	(1.7)						
a_6	-0.1164						
	(0.7)						
a_7	0.2957	0.2464	0.6046	0.2673			
	(3.0)	(2.3)	(6.4)	(1.5)			
a_8	-0.0042	-0.0051	-0.0332	0.0062	-0.0034	-0.0173	-0.0110
	(1.4)	(1.1)	(2.2)	(1.5)	(0.7)	(2.1)	(0.9)
b_1	1.2764	0.6600	0.3527	0.4593	1.0132	1.1381	0.5206
	(3.8)	(6.8)	(4.2)	(2.4)	(12.6)	(6.7)	(1.6)
b_2	0.0550				0.0636	-0.0250	0.4181
	(0.5)				(1.2)	(0.4)	(1.3)
St. Error	0.0154	0.0318	0.0201	0.0222	0.0208	0.0144	0.0206
Sum Sq. Errors	0.00522	0.0284	0.0052	0.0049	0.0113	0.00227	0.00341
Elasticities:							
own - demand					-0.6	-1.0	-1.1
own - supply					4.4	2.7	1.6
UK wage - supply					-2.5	-0.8	0.7

The results of estimating the 3 models: the unrestricted model, the closed economy model and the open economy model are all shown in Table 1. The results indicate that both sets of

restrictions, the closed economy and the open economy models, are rejected by the data. While the open economy model performs better than the closed economy model, it does not dominate it.

In the case of the open economy model, estimated for the full period, the coefficient on the UK wage rate is significant. The results imply a very high elasticity of labour supply with respect to wage rates of 4.4. The effect of a rise in UK wage rates of 1 per cent is to reduce domestic labour supply by around 2.5 per cent as enhanced conditions in the UK attract emigrants. The implied own elasticity of demand for labour is around –0.6. This is within the range suggested by Bradley, Fitz Gerald and Kearney, 1993. The tax wedge is also significant, implying that a major part of the burden of taxation is passed on to employers. The coefficients determining the speed of adjustment indicate very rapid adjustment of wage rates to changes in the "optimal" wage rate. The ECM term is small and insignificant.

In the closed economy model, estimated over the whole sample period, the coefficient on productivity comes out at just under 0.2, significantly different from unity (as imposed in Bradley, Whelan and Wright, 1993).[8] The coefficient on the tax wedge is also quite low, though still significant. The coefficient on the unemployment rate differential is not significant, though correctly signed. Finally, the coefficient on the lagged dependent variable is significant, implying a relatively slow speed of adjustment.

Table 2: Chow Test for Break in Sample

Break	Closed Economy	Open Economy
1975-76	4.25	2.31
1976-77	4.11	2.31
1977-78	8.70	2.26
1978-79	8.48	2.18
1979-80	8.26	2.67
1980-81	9.20	2.50
1981-82	6.10	2.95
1982-83	3.42	2.92
1983-84	2.62	2.66
1984-85	1.92	3.01
1985-86	1.78	2.33

Further tests were carried out to check for a break in the sample. These tests proved significant at the 5% level suggesting a break in sample in both equations. The results of tests for the timing of the break between 1975 and 1986 are shown in Table 2. The statistic for the

[8] If the productivity variable is adjusted for profit repatriations (deflated by the national accounts deflator for factor income) the coefficient is 0.45.

Chow test suggests that the break took place around 1980 in the closed economy equation rather than later in the 1980s. In the open economy equation it seems to occur later, though still probably before the "partnership" approach to wage bargaining was adopted. It will need data for a number of additional years before any firm conclusions can be drawn on when a change in behaviour occurred. While the limited data post 1986 still leave room for uncertainty in the case of the open economy equation, this suggests that the impact of the "partnership" approach to wage formation has been less significant than many have assumed.

Table 1 also shows the results for the two specifications assuming a break in sample at 1980. In the case of both the closed and the open economy models a Chow test proved significant, indicating a break in sample at that point. In the open economy equation the coefficient on the domestic tax wedge was also fairly consistent, in terms of magnitude, across the regressions, though for the latter sub-period it not significant. The major change when the equation was estimated over separate sub-periods occurred in the speed of adjustment. It was significantly slower for the latter sub-period than for the earlier sub-period or for the regression over the whole sample.

In the case of the closed economy model the equation performed well when estimated over the sub-period to 1979. However, when estimated for the full period the tax wedge and productivity variables were barely significant and for the latest sub-period the equation proved totally unsatisfactory. A key factor in the difference between the two sub-periods is the coefficient on productivity, which has a value of 0.6 for the period to 1979 but is not significantly different from zero for the post 1979 period.[9]

These results suggest that the open economy model is better than the closed economy model but that it does not adequately handle the changing circumstances of the Irish labour market over the full period. The specification does not allow for the likely outward shift in the supply curve, discussed in Section 3. It also assumes that the elasticity of labour supply is constant over time whereas changes in migration and in female labour force behaviour may have affected it making it more elastic. The results suggest a very high elasticity of labour supply, which may well be due to the effects of ignoring the changes in the nature of the supply curve, giving rise to specification error.

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[9] Using the alternative measure of productivity (footnote 8) the coefficient on productivity in the period to 1979 is 0.61 while it is 0.38 and insignificant for the period 1980-94.

5. Conclusions

Turning to the questions posed in Section 2 as to why convergence in wage rates between Ireland and the UK occurred when it did, these results do not provide a clear-cut answer. The results from the open economy model strongly suggest that external forces have influenced the domestic labour market – in particular by the standard of living (cost of labour) in the UK.

While the cost of migration may have fallen in the sample period, it seems unlikely that it could have had a major role in explaining the extent and speed of the convergence. To test this hypothesis formally it would be necessary to consider the very limited data available for the earlier period 1930 to 1960. If the explanation were a falling cost of migration then this would have had an impact on the unemployment rate differential between Ireland and the UK. This, in turn, could affect the economy through the Phillips curve. However, the unemployment differential between Ireland and the UK has been greater in the years since 1960 than it was in the 1950s.

The second possibility, that European integration affected expectations causing a rapid rise in wage rates, remains just that, a possibility. If this were the case it would have the effect of shifting inwards the supply curve for labour. However, as already discussed, there were a number of factors that led to a rapid outward shift in the labour supply curve, especially for skilled labour. The high elasticity of supply of labour thrown up by the open economy model would, if anything, tend to contradict this hypothesis, though this result is probably due to a failure to model fully the factors driving labour supply in the sample period.

This leaves the effect of European integration on the demand for labour as probably the most important single factor driving convergence. The timing of the adjustment process is consistent with this hypothesis. The opening up of the economy did not happen instantaneously in 1960 but it involved a series of different measures culminating in EU membership in 1973. For firms facing this changing environment their reaction time was slow. They first of all had to be convinced that the change was irreversible and then the implementation of new investment took many years to achieve. This could explain a slow outward shift in the demand curve for labour as firms gradually implemented their decisions to expand production in Ireland. If the only factor were a shift in expectations shifting the supply curve, then the adjustment process should have been much more rapid. The costs to individuals of raising their labour costs and adjusting their life-style would have been small!

However, if it had purely been a demand shift, then wage rates should not have run ahead of the ability of the economy to absorb the change. The pricing out of existence of many unskilled jobs in the early 1980s as a result of the convergence in labour costs would suggest

that other factors must have played a contributory role (possibly including changes in the social welfare system).

While institutional change – the "partnership approach" – could explain the apparent slow down in real wage growth after 1980, it can not explain the earlier process of convergence. The tests for the timing of the change in behaviour suggest that it may have occurred before the Programme for National Recovery of 1987. Even though the change in behaviour in the 1980s and the 1990s could be consistent with the story of "partnership" being important in moderating wage demands, the nature and the extent of the change in behaviour would suggest that much more is going on in the Irish labour market. While helping to bring about a more orderly labour market, with fewer industrial disputes than in the 1970s, the partnership approach served more to validate the results which market forces had made inevitable. The significant differences in the growth in wage rates in individual industrial sectors in recent years reflect the importance of market forces in determining wage rates.

The convergence in labour costs between Ireland and the UK over the period 1960 to 1980 was almost certainly a manifestation of the wider process of integration. On balance it seems likely that it owes more to a shift in demand for labour, resulting from European integration, than to any of a range of supply side shocks. However, It is also clear that no single factor can account for the observed phenomena and that changes in the supply side have also contributed to the change, especially to the reduction in the rate of increase in real wage rates since 1980. It seems likely that the favourable developments in the field of industrial relations since the mid-1980s have favoured this transformation, even if they were not its root cause.

References

Barrett, A., T. Callan and B. Nolan, 1997, "The Earnings distribution and Returns to Education in Ireland, 1987-1994", The Economic and Social Research Institute, Dublin, Working Paper No. 85.

Barry, F. and A. Hannan, 1996, "On Comparative and Absolute Advantage: FDI and the Sectoral and Spatial Effects of Market Integration", University College Dublin, Working Paper No. 96/19.

Bradley, J. and J. Fitz Gerald, 1988, "Industrial Output and Factor Input Determination in an Econometric Model of a Small Open Economy", *European Economic Review*, 32, pp. 1227-1241.

Bradley, J., J. Fitz Gerald, P. Honohan and I. Kearney, 1997, "Interpreting the Recent Irish

Growth Experience", in D. Duffy, J. Fitz Gerald, I. Kearney, and F. Shortall Eds. *Medium-Term review: 1997-2003*, The Economic and Social Research Institute, Dublin.

Bradley, J., J. Fitz Gerald, D. Hurley, L. O'Sullivan, and A. Storey, 1993, "HERMES: A Macrosectoral Model for the Irish Economy", in Commission of the European Communities ed., *HERMES: Harmonised Econometric Research for Modelling Systems*, North Holland, Amsterdam.

Bradley, J., J. Fitz Gerald, and I. Kearney, 1993, "Modelling Supply in an Open Economy", *Economic Modelling*, Volume 10, No. 1, January, pp. 11-21.

Bradley, J., K. Whelan and J. Wright, 1993, Stabilization and Growth in the EC Periphery: A Study of the Irish Economy, Aldershot, Avebury.

Callan, T. and H. Sutherland, 1997, *Income Support and Work incentives: Ireland and the UK*, The Economic and Social Research Institute, Dublin, Policy Research Series, No. 30.

Callan T., and A. Wren, 1994, *Male-Female Wage Differentials: Analysis and Policy Issues*, The Economic and Social Research Institute, General research Series, No. 163.

Curtis, J. and J. Fitz Gerald, 1994, "Real Wage Convergence in an Open Labour Market", *The Economic and Social Review*, Vol. 27, No. 4, pp. 321-340.

Drèze, J.H., and C.R. Bean, 1990, *Europe's Unemployment Problem*, MIT Press.

Fahey, T. and J. Fitz Gerald, 1997, *Welfare Implications of Demographic Trends*, Dublin, Combat Poverty Agency, Research Report Series.

Fahey, T. and J. Fitz Gerald, 1998, "The Economic and Social implications of Population Change", *Journal of the Statistical and Social inquiry Society of Ireland*, forthcoming.

Harris, J. and Todaro, M., 1970, "Migration, Unemployment and Development: A two-Sector Analysis", *American Economic Review*, Vol. 84, pp. 259-288.

Honohan, P., 1992, "The Link Between Irish and UK Unemployment", *Quarterly Economic Commentary*, The Economic and Social Research Institute, Spring, pp. 33-44.

Murphy, A., and D.R. Thom, 1987, "Labour Supply and Commodity Demands: An Application to Ireland", *The Economic and Social Review*, Vol.18, No. 3, pp. 149-158.

Lindbeck, A., 1979, "Imported and Structural Inflation and Aggregate demand: The Scandinavian Model Reconstructed", in A. Lindbeck ed., *Inflation and Employment in Open*

Economies, North-Holland, Amsterdam, pp. 13-40.

Nickell, S., and B. Bell, 1995, "The Collapse in Demand for the Unskilled and Unemployment Across the OECD", *Oxford Review of Economic Policy*, Vol. 11, No. 1, pp. 40-62.

O'Rourke, K. and J. G. Williamson, 1995, "Around the European periphery 1870-1913: Globalization, Schooling and Growth", University College Dublin Working Paper WP95/17.

Roche, B. and J. Larragy, 1993, "Data Series on Trade Unions", Department of Industrial Relations, University College Dublin.

Sexton, J.J., and P. O'Connell, *Labour Market Studies: Ireland*, European Commission, Luxembourg.

Walsh, B.M., 1968, *Some Irish population Problems Reconsidered*, The Economic and Social Research Institute, General Research Series Paper No. 42.

Walsh, B. M., 1993, "Labour Force participation and the Growth of Women's Employment in Ireland", *The Economic and Social Review*, Vol. 24, No. 4.