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Wage Determination in Economies in Transition: Ireland Spain and Portugal

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1. Introduction

The process of transition from being a poor and relatively underdeveloped economy to becoming a modern economy with a standard of living close to the EU average is complex. Already many countries in Central Europe have embarked on this path and, with EU membership, over the rest of this decade this process of transition and convergence can be expected to accelerate. However, this path of transition is not a new one. A number of existing EU members have already followed it over the last thirty years and the lessons from their experience could be useful in understanding the process of convergence in living standards facing the new EU members.

This paper considers the experience of three existing member states and how the process of convergence has affected, and in turn been affected by, the performance of their labour markets. It concentrates on the process of wage determination in three countries – Ireland, Spain and Portugal. In the case of Ireland, while EU membership occurred in 1973, the process of transition began around 1960 and has continued over a protracted period of forty years. For Portugal and Spain the process has been more concentrated. Liberalisation and democratisation of their economies took place in the 1970s and EU membership occurred in 1986. The changes that took place in these societies affected the labour market both directly and indirectly.[1]

In this paper we consider how the process of transition, including freeing of trade and EU membership, has affected both the demand for labour and the supply of labour. In the case of labour supply the role of trade unions has changed, with direct implications for the wage bargaining process itself. EU membership has also opened up the possibility of migration affecting labour supply. On the demand side, membership of the EU and the completion of the Single Market have changed the focus for many of the firms operating in these previously rather closed economies. Today firms producing tradable goods and services are competing in a global market and this has important implications for the factors driving their demand for labour.

In Section 2 of this paper we examine the movement of wage rates over the period of convergence. In Section 3 we set out models of wage determination that allow for new effects on wage determination arising from the EU integration process. Section 4 describes the results obtained from estimating these models using data for Ireland, Spain and Portugal. Conclusions are discussed in Section 5.

2. Wage Rates and Labour's Share of Value Added

In looking at Ireland, Spain and Portugal we are considering three very different economies that have shown significant convergence towards the EU average standard of living over the last thirty years. All three have undergone radical transformation in that period and all three have become members of the EU since 1970. This process of convergence has affected the process of wage determination.

In a standard neo-classical model, if wage rates converge too rapidly towards the EU standard of living, then the incentive for firms to increase production in the converging economy will be reduced. This could slow, or even halt the process of convergence. On the other hand, if wage rates were to lag behind the convergence in living standards (measured in terms of output), then the enhanced profitability of firms could accelerate the convergence process.

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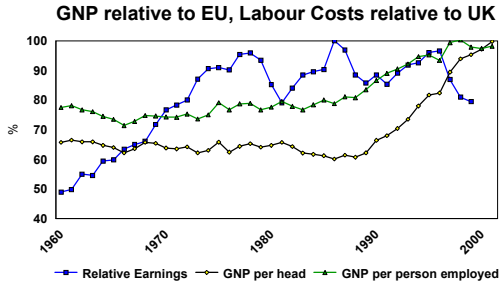
[1] For example, trade unions only became legal in Spain in 1977.

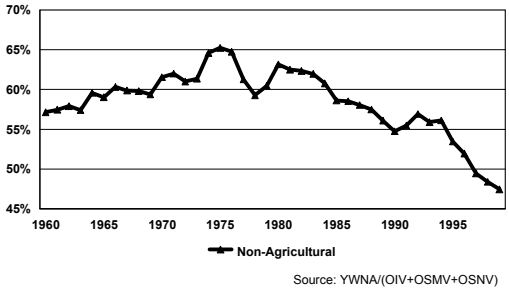
The rise in output and the rise in productivity will themselves affect the labour market through their effects on the demand for labour. EU membership and the broader process of EU integration could also be expected to affect the supply of labour through enhancing the opportunity for migration, and indirectly through changing expectations and the regulation of the labour market. Thus the behaviour of the labour market can play a potentially important role in determining the speed and nature of the convergence process.

Figure 1: Ireland - Wage and Output Convergence



In Figure 1 we show Irish labour costs relative to the UK over the 40 years from 1960 to 2000.[2] Between 1960 and the mid-1970s Irish labour costs rose rapidly relative to the UK. However, from the late 1970s to today Irish labour costs have plateaued out, fluctuating around a level of 90 per cent of UK labour costs.[3] Since 1980 such changes as have occurred have arisen from changes in the exchange rate, with no obvious long-term trend in relative wage rates. This convergence in labour costs predates the convergence in living standards to the EU average, as shown in Figure 1. Whether the convergence in wage rates hindered subsequent convergence in output is discussed elsewhere (Duffy, Fitz Gerald, Kearney and Smyth, 1999). In this paper we are concerned with how the convergence process itself impacted on wage formation behaviour.

Figure 2: Ireland - Labour Share of Value Added, Excluding Agriculture.



In Figure 2 we examine how labour's share of value added (excluding agriculture) has moved over the forty years 1960 to 2000. As shown in Figure 1, the convergence in Irish labour costs to close to UK levels over the twenty years 1960-1980 preceded a convergence in productivity levels. As a result, labour's share of value added rose over that period. However, in the period 1980 to 2000, with the stabilisation of Irish labour costs slightly below UK

[2] The UK is used for comparison purposes due to the difficulty in obtaining a satisfactory series for EU wage rates covering the appropriate period. In the case of Ireland the openness of the capital and labour markets to movements to and from the UK make it the obvious country to use. For Spain and Portugal the choice is less obvious. In both cases we tested both France and Germany and found that France appeared to provide a more relevant basis for comparison.

[3] The EU labour costs survey data for 1996 are used to benchmark Irish labour costs (wage rates and employers social insurance contributions) relative to UK levels.

levels and a gradual rise in productivity, labour's share of value added has fallen continuously. In turn, the rise in profitability has enhanced Ireland's attraction as a location for supplying the broader EU market (Bradley, Fitz Gerald and Kearney, 1993), adding to the process of convergence.

Figure 3: Spain - Wage and Output Convergence

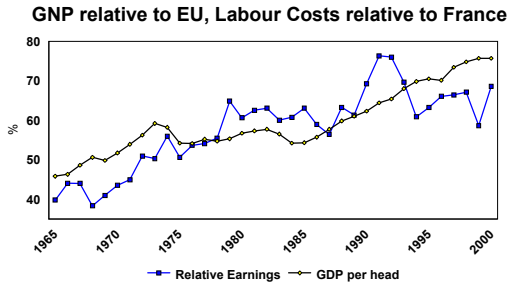


Figure 3 shows the path of wage and price convergence in Spain since the mid-1960s. While less dramatic than in the case of Ireland, relatively steady progress is seen in the process of convergence over the full period. In the case of labour costs, they rose much more rapidly in Spain in the early 1990s than in other partner EU countries.[4] However, within a few years there was a major downward adjustment, such that labour costs in Spain fell back below 70 per cent of the French level, while convergence in living standards continued.

Figure 4: Spain and Portugal - Labour Share of Value Added

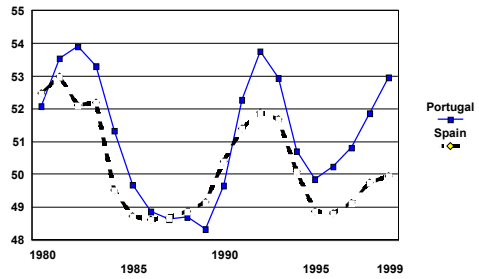
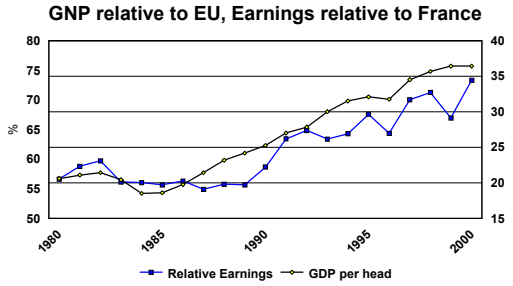


Figure 5: Portugal - Wage and Output Convergence

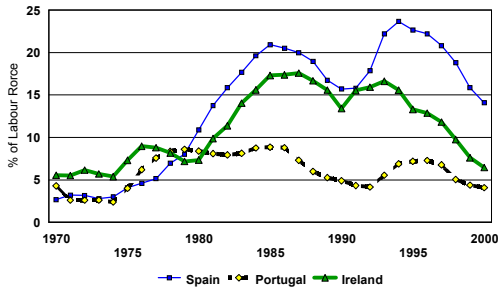


Labour's share of value added in both Spain and Portugal appears to show significant cyclicality since 1980 (Figure 4), but no obvious trend. This reflects the fact that wage rate convergence has followed a similar path to the convergence in output per head. In the case of Spain, the temporary rise in labour costs relative to France (and the rest of the EU) in the late 1980s and the early 1990s certainly accentuated the fall in profitability in the late 1980s.

[4] A similar pattern is shown if Spanish labour costs are compared to those in Germany.

As shown in Figure 5, since joining the EU in the mid-1980s Portugal has made fairly steady progress in terms of convergence in living standards towards the EU average. While still experiencing a significantly lower standard of living than the average, the gap has narrowed dramatically over the last fifteen years. Labour costs began the 1980s very much below labour costs elsewhere in the EU. They began to rise more rapidly than in France in the late 1980s, after the process of convergence in living standards had begun. Since then progress has continued over the 1990s. However, unlike the case of Spain and Ireland, they still remain very far below EU average levels. To some extent this reflects lower price levels in Portugal, so that the purchasing power of a given level of wages (in euros) is higher than in neighbouring countries. However, even allowing for this difference in prices, the figures still reflect the fact that the purchasing power of wages in Portugal remains well below that in the rest of the EU.

Figure 6: Unemployment Rates



If the labour market cleared instantly then the explanation for the path of wage rates would be found through modelling labour demand and labour supply; the wage determination equation would just be a reduced form of the simple underlying structural model. However, as shown in Figure 6, the path of unemployment in Spain and Ireland indicates that the labour market has been very slow to clear. In Portugal, by contrast, unemployment never rose above 9 per cent of the labour force and the labour market has shown more rapid adjustment to the state of the economic cycle. In the case of Ireland, unemployment rose rapidly in the early 1980s. While there was some evidence that it was affected by the state of the economic cycle, there was also extensive evidence of hysteresis. However, over the last four years it has returned again to the lower levels last experienced in the 1970s.

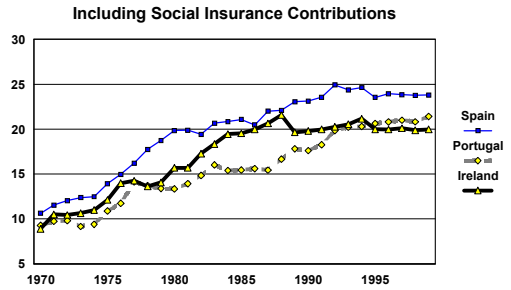
For Spain, the pattern of the unemployment rate mirrored that in Ireland, with little evidence that the labour market cleared in the short term. However, even with more rapid growth in the late 1990s it still remains high. These data suggest that the Portuguese labour market has been more flexible than that of Spain and Ireland, with wage rates adjusting to clear the labour market over a relatively short space of time (see Bover, Garcia-Perea and Portugal, 1998).

The data shown above for relative labour costs include both wage costs and social insurance contributions paid by employers. The after tax wages received by individual workers are significantly different from the cost to employers, due to the operation of the tax (including social insurance) system. For employees what concerns them in the long run is the development of real after tax wage rates. For employers it is the cost of employing a unit of labour relative to the price they get for their output. The “wedge” between these two prices is accounted for by changes in tax rates and changes in output prices relative to consumer prices.[5]

[5] The difference between output prices and consumer prices is due both to the impact of indirect taxes and changes in the terms of trade (domestic prices relative to import prices).

In Figure 7 we show the ratio of personal taxation to personal income for Ireland, Spain and Portugal. It rose fairly steadily in all three countries up to the 1980s. In the case of Ireland it peaked in 1987 and fell back by 1990, remaining relatively unchanged thereafter. In the case of Spain it continued to increase until the early 1990s, showing some small reduction in 1995. In Portugal, while showing a fairly continuous increase over the thirty years, it grew particularly rapidly in the second half of the 1980s.

Figure 7: Ratio of Personal Taxation to Personal Income



The rise in tax rates, especially when the rise was quite rapid, may have had an impact on wage determination. The evidence in Drèze and Bean, 1990, using data for an earlier period, found that the tax wedge did not have a significant effect on wage determination in many of the countries they considered. However, they did find a significant effect on Spanish wage rates. (They did not consider Ireland.) In this paper we re-examine this issue, including a tax wedge variable in the models estimated.

In addition to the factors considered above, a range of institutional factors may have affected wage determination in the three countries examined. In Ireland, the advent of what is referred to as the "partnership process", beginning in 1987, introduced institutionalised wage bargaining between the government, employers and trade unions. The process involves an explicit trade off of tax-cuts for wage moderation. This arrangement has persisted up to and including the present. In the case of Spain, very rigid labour laws made the Spanish labour market quite inflexible. However, over the 1990s more flexibility has been introduced by the introduction of more flexible work contracts for new labour market entrants.

Unionisation may also have played a significant role in affecting the wage bargaining process, changing the shape of the supply curve of labour. The evidence suggests that for Ireland, union density did play a significant role (Curtis and Fitz Gerald, 1994). However, unionisation was itself endogenous, and it may have picked up other aspects of structural change occurring in the economy. In the case of Spain unions only became legal in 1977, which means that any effect that unionisation could have is limited to the post-1980 period. In any event, data problems prevented the inclusion of unionisation in the empirical work carried out here.

The final factor that potentially affects labour supply in a global economy is migration and its related effect on employees' expectations. While in a closed economy, labour is assumed to choose between employment in the domestic economy and leisure (unemployment), in an open economy migration presents a third possibility. In a fully integrated market, labour in one country or region can choose between the after tax wage rate available in the home country or region and the after tax wage rate in other countries or regions. Obviously there are costs to migration so that the rate of return in the foreign country must significantly exceed that in the home country to adequately reward migration. The broad process of European integration improves information on living standards in neighbouring countries (or regions), and this may give rise to pressures for similar conditions domestically, even if the costs of migration prevent the bulk of the labour force from moving.

While in the case of Ireland, migration to the UK has been unrestricted for the last two hundred years, the same was not true for Spain and Portugal. In the latter two countries full free movement of labour only became possible with EU entry. However, even with the possibility of free movement of labour after EU entry, this has not played a major role in balancing the labour markets in Spain and Portugal (Blanchard and Jimeno, 1995).

A succession of papers highlights the importance for Ireland of substantial migration flows relative to the size of the labour force. These flows are driven by changes in both unemployment and wages relative to the UK (see Barrett (1998), Kearney, 1998, and O'Grada and Walsh (1994)). The Harris-Todarro specification used in these studies of migration implies an infinite elasticity of labour supply in Ireland in the long run. That is, labour will continue to migrate to or from Ireland to ensure an equilibrium wage or unemployment differential between the Ireland and the foreign labour market. The size of this differential is determined by the costs of migration.

When the supply of labour in one country (Ireland) is infinitely elastic in the long run through migration, there will be no long-run Phillips curve effect. While changes in unemployment may exert a negative effect on wage rates in the short run, emigration will reduce unemployment in the long run, eliminating any downward pressure on wage rates.[6] The converse will be true for falls in unemployment that will attract immigration.

As discussed below, while migration has had a significant effect on wage determination in Ireland, this was not the case for Spain and Portugal. However, it played a significant role in the post-unification German labour market and, with EU enlargement, there remains the possibility that it could play an important role in the convergence process for the new EU member states.

3. Modelling Labour Supply and Labour Demand

Wages are assumed to be determined as part of a bargaining process between employers and trade unions. The bargain determines the wage rate and employers then choose their level of employment conditional on the agreed wage rate and the other variables that determine their profitability.[7] In this paper we try two different variants of such a bargaining model.

In the first "closed economy" model we assume that firms are operating in a national economy and are unaffected by the external environment. They are assumed to be supplying a domestic market and they are not directly affected by competitiveness relative to the outside world. In this closed economy model labour is also assumed to be immobile. As a result it is domestic prices and tax rates that affects bargaining behaviour.

We also consider an "open economy" model. In this model firms are assumed to be supplying a global market. It is the demand for their output on the world market that drives production and they are assumed to be competing against firms in the rest of the world. Hence their competitiveness relative to foreign firms affects their bargaining behaviour. Even if firms are not in the tradable sector, the discipline of the global market is assumed to have an indirect effect on their behaviour. Labour is also assumed to be mobile through migration. The after

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[6] As discussed in Fahey, Fitz Gerald and Mâitre, 1997, since the early 1980s migration into and out of Ireland was predominantly skilled. The high-level of unemployment reflected a high replacement rate that discouraged migration. For a detailed discussion of how this affected the labour market see Fitz Gerald and Kearney, 2000.

[7] Output prices, world demand and input prices.

tax rate of return from employment in the home country is compared to the rate of return from employment elsewhere. The relative rate of return drives migration through a Harris-Todaro type model. Even if the proportion of the labour force that actually moves is small, there may still be a significant effect on expectations.

The closed economy model adopts the following specification for the demand and supply of labour (see Curtis and Fitz Gerald, 1994 for a formal derivation of the two models):

$$l^d = f(q, w-p) \quad (1)$$
$$l^s = g(w, z, t, q/l, U, n) \quad (2)$$

Where

l	=	employment	q	=	output in the home country
w	=	wage rates	p	=	the output price
z	=	consumer prices	t	=	the tax wedge
q/l	=	productivity	U	=	the unemployment rate
n	=	unionisation			

In each case the lower case letters represent the logs of the relevant variables. 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). The wage rate is for the non-agricultural sector. The data are described in more detail in Appendix 1.

The open economy model takes account of the fact that in a modern EU economy firms are producing for a wider EU market and the representative firm in the tradable sector has a choice between producing in the home country or elsewhere in the EU. Labour supply is also assumed to be affected by conditions in the external EU labour market, both directly through migration, and indirectly through changes in expectations. The resulting open economy model is:

$$l^d = f(q_w, w, w_w) \quad (3)$$
$$l^s = g(w, z, t, w_w, z_w, t_w, U, U_w, n) \quad (4)$$

The subscript w indicates the appropriate variable for the outside world and q_w is an appropriate measure of world output.

In the open economy model, the demand for labour in the home country is a function of world output, with the process of competition determining what share of that output is produced in the home country (3). In this model competitiveness is measured in terms of relative labour costs between the home country and the rest of the EU. In addition to the variables that appeared in the closed economy labour supply equation (2), the open economy equation (4) includes a representative EU 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:

$$w^* = a_0 + a_1 q_w + a_2 (z-t) + a_3 p + a_4 w_w + a_5 (z_w - t_w) + a_6 e + a_7 (q - l) + a_8 U + a_9 U_w + a_{10} n \quad (5)$$

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):

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

For the open economy model the following restrictions apply:

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

When these restrictions are implemented the equation to be estimated takes the form (7):

$$w^* = a_0 + a_1 q_w + a_2 (z-t) + a_4 w_w + (1-a_2-a_4)(z_w - t_w) + (1-a_2) e + a_8 U + a_9 U_w + a_{10} n \quad (7)$$

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 (8).

$$\Delta \log(w_i) = b_1 \Delta \log(w^*) + b_2 (\log(w^*_{-1}) - \log(w_{-1})) \quad (8)$$

The process of moving from a closed economy to a fully integrated economy within the EU may involve major shifts in both the supply and demand curves for labour. With integration firms will find that their potential markets increase but they may also face greatly enhanced competitive forces. Similarly labour may face important new opportunities as a result of the introduction of free movement of labour. If the process of integration happens very rapidly, as in the case of the former East Germany, the long run equilibrium wage rate may change dramatically in a very short space of time. However, both firms and labour may be much slower to change because of the high costs of adjustment.

In particular for firms, adjustment to take advantage of the new opportunities can only come about through investment. As a result, while economies are undergoing the process of transformation, the speed with which the gap between actual and long-run optimal wage rates is closed may be slow, depending on a build up of investment to shift the economy to its new production frontier.

Equation (8) implies a constant proportional closure of the remaining gap each year between the optimal and actual level of wage rates (and output). Where there is a sudden opening up of the economy, this involves the biggest step in the adjustment process in the first year with the adjustment steps steadily falling in size thereafter, as the change each year remains proportional to the remaining gap to be bridged. However, it may be more realistic to assume a constant absolute step in the adjustment process each year. Such a process would be consistent with a situation where the costs of adjustment through investment rise non-linearly with the absolute size of the investment undertaken.

If this is the case for countries undertaking a major transformation, the ECM in (8) may be rejected by the data. Instead, over the period of the transition, wage inflation may exceed that in the EU by a constant absolute amount until the new equilibrium is reached.

In the case of Spain and Portugal the process of opening up their economies to free trade was relatively rapid, beginning in the mid-1970s and culminating with EU entry in the mid-1980s. In the case of Ireland the process took place over a period of fifteen to twenty years. For firms in Ireland 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 short-run demand curve for labour as firms gradually implemented their decisions to expand production for a global market. If the only factor were a shift in expectations shifting the supply curve, then the adjustment process should have been much more rapid.

Finally, in practice, it proved impossible to test down from the most general specification (5) and the two models were tested separately. However, when each of the two models was

applied to data from Ireland, Spain and Portugal the results indicated that only one of the two models adequately represented the data within the sample period. In the case of Ireland and Spain the models were applied to data from the mid-1960s to the present. For Ireland, this period covers the transition from a very closed economy to full integration into the single EU market. In the case of Portugal the final model was applied to data from around 1980 - covering a similar period of transition to full EU membership. No stable relationship was found spanning the full period from the 1960s to the present.

4. Model Results

The dependent variable in the models estimated in this paper is average annual earnings for the economy or, in the case of Ireland, the non-agricultural sector. This variable reflects the full costs to the employer of employing a unit of labour (including employers' social insurance contributions). In the case of Ireland firms were assumed to be competing against firms in the UK, and Irish labour was assumed to face a choice between employment in Ireland and employment in the UK. For Spain and Portugal, France was chosen as the country towards which their economies were converging.[8]

The results of our estimation are given below. Section 4.1 presents our results for the closed economy model for Ireland, while the open economy model is considered in section 4.2. The open economy model does not work for either Spain or Portugal, and the closed economy models for these countries are presented in sections 4.3 and 4.4 respectively.

For this paper we use data from 1960 to 1998 for Ireland, Spain, Portugal, France and Germany. For Spain and Portugal we use compensation of employees taken from the OECD Economic Outlook database. The majority of the Irish data comes from the ESRI databank, which is based on the Irish National Accounts. Other data sources used include Eurostat and the OECD Main Economic Indicators database and full details are given in Appendix 1.

4.1 Ireland – the Closed Economy Model

Our estimation period runs from 1964 to 1998. The basic closed economy wage equation is of the form,

$$w - p = a_0 + a_1 (z-t)-p + a_2 (q - l) + a_3 (U + U_{-1})/2 + a_4 \ (w_{-1} - p_{-1}) \qquad (9)$$

In the equation, w represents the log of average non-agricultural wage[9], p represents the log of the price deflator for output in the manufacturing sector, z is a measure of the tax wedge, U represents the unemployment rate, and (q-l) is a proxy for productivity. We ran a series of chow tests in order to identify possible structural breaks. These tests indicated that there was a break in the early 1980's – around the time that Irish labour costs completed their process of convergence to UK levels (see Figure 1). Allowing for this structural break, we estimated the above equation from 1964 to 1981 and then from 1982 until 1998. The results are given below.

[8] Experimentation with also made with data for Germany instead of data for France, yielding similar results.

[9] We repeated the analysis using the average industrial wage instead of the non-agricultural wage, and the results were broadly similar.

The structural break in the early 1980's antedates the social partnership process, which only began in 1987. This suggests that the partnership process reflected changes in the underlying labour market as much as causing them.

Table 1: *Results for Closed Economy Model for Ireland*

	1964 – 1981			1982 - 1998		
Coefficient	Short Run Value	t-statistic	Long Run Value	Short Run Value	t-statistic	Long Run Value
a_0	-0.3137	-1.22	-0.5753	1.6492	5.11	2.1087
a_1	0.4615	3.43	0.8465	1.1634	5.66	1.4875
a_2	0.6196	3.53	1.1364	0.0852	1.24	0.1089
a_3	-0.0156	-1.35	-0.0285	-0.0020	-1.09	-0.0025
a_4	0.4548	4.23		0.2179	2.03	
R^2bar	0.9833			0.9977		
St. Error	0.0264			0.0125		
DW	2.5404			1.9996		
DFFITS	-1.9882			1.2186		

In the period to 1981, the long-run coefficient on the tax wedge was also not significantly different from one (0.85). With a very elastic supply of labour, the burden of any increase in taxation was borne by the employer. Given that workers bargain in terms of their after-tax wage, any increase in the tax wedge resulted in higher after-tax wages for employers. The coefficient on unemployment is insignificant, which also reflects the long run very high elasticity of labour supply through migration. This means that domestic unemployment conditions did not influence wage rates. If the domestic labour market was showing excess supply, it was reflected eventually in emigration.

In the earlier period the long-run coefficient on productivity was not significantly different from one (1.14). However, in the later period the long-run coefficient on productivity goes to zero (0.11). This coincides with a period when there was a significant fall in labour's share of value added (Figure 2). The very elastic supply of skilled labour and the demographic changes that greatly enhanced the supply of skilled labour over the period since 1980 have all maintained downward pressure on real wage rates. The bargaining power of labour was, as a result, weak.

The long-run coefficient on the tax wedge increases in the later period. It implies that the rapid increase in tax rates in the 1980s increased labour costs for employers, adversely affecting their competitiveness. Conversely, the fall in tax rates after 1987 reduced labour costs for employers.

The coefficient on unemployment remains negative but insignificant in the later sample period.[10]

[10] We attempted to test for breaks in each of the individual variables separately, but the data did not permit this. The regime change involves structural breaks in all the variables around the same time, and it is not possible to isolate variable-specific effects.

4.1 Ireland – the Open Economy Model

The closed economy model, discussed above, displayed instability over the sample period. In addition, it does not take account of the direct effects on the wage bargaining process of the external environment facing the Irish economy. While the open economy model of wage bargaining in the Irish economy fits the data much better than the closed economy model, it also has problems in modelling consistently wage formation over the full period since 1960. In particular, it does not fit properly through the convergence period 1960-75. This is reflected in the fact that the data are not cointegrated over that period.

The model as fitted includes an error correction mechanism (ECM) term covering the period from the mid-1970s to 1998. However, for the earlier period a dummy is included such that the ECM effectively takes on a zero value. As discussed above, this result is consistent with a model where the movement between the 1950s equilibrium and the post-EU membership equilibrium took place at a fairly constant rate, determined by the cost of adjusting the capital stock.

As seen in Figure 1, Irish wage rates converged from below 60 per cent of UK levels in 1960 to about 90 per cent of UK levels in the mid 1970s. Since then they have fluctuated around that level. Once wage rates had completed their convergence to broadly the UK level in the mid-1970s the open economy model satisfactorily explains the adjustment process. This period covers the years when major progress in the convergence in living standards took place.

In modelling this process we assume an ECM of the form

$$\Delta w = b_1 \Delta w^* + [b_2 + (b_3 \times D_{74})](w^*_{-1} - w_{-1}) \qquad (10)$$

Here, D_{74} represents a dummy variable equal to one up to 1974 and zero thereafter. From Figure 1 we know that wage rates stabilised at about 90 per cent of UK levels from the mid-1970's, and so we expect a change in behaviour after this. The choice of 1974 for the break yields the lowest standard error, and is consistent with results from Duffy, Fitz Gerald, Kearney and Smyth, 1999. As can be seen from the results below, when D_{74} equals one b_2 and b_3 cancel each other out, so that the second term of the equation goes to zero. However, from 1975 onwards the dummy equals zero and the ECM reduces to a standard form

$$\Delta w = b_1 \Delta w^* + b_2 (w^*_{-1} - w_{-1}) \qquad (11)$$

With b_2 estimated at 0.44, this implies that there is only a moderate speed of adjustment to any undershoot or overshoot in wage rates.

Given an ECM of the above form, the open economy equation is then given by

$$w = a_0 + a_1 q_w + a_2 (z\text{-}t) + a_3 w_w + (1\text{-}a_2\text{-}a_3)(z_w - t_w) + (1\text{-}a_2) e + a_4 (U_{-1} - U_{w\text{-}1}) \qquad (12)$$

Here we use the volume of industrial output of OECD manufacturing industries as a proxy for world output, and the other world variables relate to the United Kingdom. Instead of having separate variables for Irish and UK unemployment rates, we use the difference between the two. Finally, e represents the Irish pound-sterling exchange rate.

The estimation period runs from 1964 to 1998, and the results are given below.

Table 2: *Results for Open Economy Model for Ireland*

	1964 - 1998	
Coefficient	Value	t-statistic
b_2	0.4438	2.16
b_3	-0.4143	-1.85
b_1	1.1479	21.15
a_1	0.1560	2.06
a_2	0.7988	8.49
a_3	0.7177	8.28
a_4	-0.0034	-1.02
a_0	-4.0668	-5.01
R^2bar	0.9999	
St. Error	0.0148	
DW	1.6417	
DFFITS	1.5164	

Up to 1960 the exceptionally closed nature of the goods market prevented Ireland from benefiting from the post-war economic growth in the rest of Europe. The economy and the capital stock were operating at a level well below that which would have been optimal in an open economy environment. The opening up of the economy made Ireland a much more attractive place to invest. In effect, Ireland became an export base for many large multinational companies. However, this change did not occur overnight, and firms were slow to adapt to the changed circumstances. The demand for labour, as a result, took many years to adjust upwards.

However, from the mid-1970's onwards the model fits well. Unemployment relative to the UK is insignificant. This is unsurprising given the opportunity of migration and the implied long-run very high elasticity of labour supply. Under these circumstances unemployment has little impact on wages, as those without a job will simply emigrate rather than remaining in the domestic labour market. This means that adverse developments in the labour market do not put downward pressure on wages. The volume of industrial output of OECD manufacturing industries, has a significant positive effect, as we expected[11].

The domestic tax wedge has a significant positive effect on wages, and the coefficient is not significantly different from one. That is similar to the estimated coefficient in the closed economy model. This reflects the elasticity of labour supply. The partnership process that began in the late 1980's recognised the importance of this factor, but the trade-off between taxes and wage rates had existed since the 1970's. The fact that the incidence of taxes on labour fell largely on employers partly explains the problems Ireland faced in the early 1980's – the substantial increases in tax rates raised labour costs making the economy uncompetitive. A similar story can be told for Spain (see below).

Wage rates in the UK are a very significant determinant of Irish wage rates. This is partly a result of migration, but also reflects the fact that UK wage rates affect the demand for labour by firms in Ireland competing against firms in the UK. Firms producing in Ireland are price-takers competing in a world market. In order to maintain output in Ireland they need to remain competitive. Labour costs in competing countries (the UK) affect their decisions on output location and, therefore, on what they are prepared to pay for labour in Ireland.

11 We considered many alternatives to the volume of industrial output of OECD manufacturing industries, including the level of GDP in the EU, the OECD, the G7 countries, Irish GDP and value added in Irish industry, but none resulted in a better fitting equation or significantly different coefficients.

The reduced form (equation 12) can be solved for the elasticity of labour demand and labour supply. This equation yields an own elasticity of demand for labour of –1.29. This is very elastic and reflects the openness of the Irish economy. The own elasticity of supply for labour is 5.12, which is extremely high. This is plausible though, and is consistent with very elastic supply through migration. The elasticity of the supply of labour with respect to the UK wage rate is -3.31, implying that a rise in UK wage rates significantly reduces labour supply in Ireland. Finally, the effect of a rise in the domestic unemployment rate on labour supply is -0.02, and insignificant. We expect a negative impact, and such a small number is unsurprising given the possibility of migration.

4.3 Spain – the Closed Economy Model

The open economy model does not work for Spain. It comes as no surprise that external factors do not affect labour supply, because migration is not an important factor in driving the Spanish labour market. However, it is a little more surprising that the external competitive environment does not appear to directly affect Spanish firms' demand for labour.

The equation to be estimated is as follows:

$$w - p = a_0 + a_1 (z-t)-p + a_2 (U + U_{-1})/2 + a_3 (q - l) \quad (13)$$

Here, the wedge term is formed by multiplying the ratio of the private consumption deflator to the producer price index for manufacturing by one minus the average rate of tax (including social insurance contributions) on personal incomes. Productivity is measured as GDP divided by total employment, and an average of the current and previous year's unemployment rates is used. The equation was initially estimated from 1965 to 1998. There is no lagged dependent variable term as this proved to be insignificant in the estimation. The dynamics of the equation require further examination.

As might be anticipated, repeated chow tests indicate that there is a change in wage formation behaviour during the early 1980's. The fact that trade unions were legalised in 1977 coupled with the fact that Spain joining the EU in 1986 means that this break reflects significant structural changes in the economy. The results of the estimation for both periods are given below.

Table 3: *Results for Closed Economy Model for Spain*

	1965 - 1983		1984 - 1998	
Coefficient	Value	t-statistic	Value	t-statistic
a_0	8.9888	18.35	9.6226	49.66
a_1	1.3655	10.12	1.2823	12.29
a_2	-0.0271	-22.33	-0.0194	-9.17
a_3	1.4295	19.97	1.1368	5.74
R^2bar	0.9986		0.9988	
St. Error	0.0152		0.0095	
DW	2.2170		2.2391	
DFFITS	-1.1204		-1.2795	

The first point to note is that unemployment exerts a strong negative effect on the level of wage rates. This reflects the fact that migration is not an important determinant of labour supply. Secondly, this specification implies hysteresis – a rise in unemployment affects the level of wage rates, not their rate of change. Hence, a one-off shock to unemployment has a permanent impact on the level of wage rates, but wage rates do not continue to adjust in order to clear the labour market. This is consistent with the experience of the Spanish economy since the mid-1980s, where unemployment has remained high over much of the last twenty years.

The tax wedge is also significant in both periods. The fact that it is significantly greater than one seems implausible. However, its importance was signalled by earlier work on European labour markets indicating that tax wedge effects were significant only in Ireland and Spain (Dreze and Bean, 1990, for Spain, Bradley *et al.*, 1993, for Ireland). The implication is that the very rapid rise in tax rates at the end of the 1980's had a considerable impact on Spanish labour cost competitiveness. This is reflected in the rise in Spanish labour costs relative to France (see Figure 3), and this contributed to the rise in unemployment at that time.

As expected, productivity has a significant positive effect throughout. The coefficient on productivity is not significantly different from one in the later period. This means that Spanish profitability has not changed greatly since the early 1980's.

Unlike the case of Ireland, the pattern of adjustment of the Spanish economy to EU membership and convergence in living standards is fairly even over time. As reflected in the unitary coefficient on productivity, labour's share of value added did not show any long-term trend and wage rates converged at roughly the same rate as output per head.

4.4 Portugal – the Closed Economy Model

The open economy model does not work for Portugal either. Again, it comes as no surprise that external factors do not affect labour supply, because migration is not an important factor in Portuguese labour supply. The fact that the competitive environment in the rest of the EU does not directly affect Portuguese firms' demand for labour might be considered surprising. However, in the case of Portugal, competition for investment may not come from its EU partners. Rather, in the clothing industry in particular, Portuguese firms face competition from countries outside the EU. It is possible that the inclusion of wage costs from those countries that were competitive with the Portuguese tradable sector could still prove significant.

While we have data from 1965 to 1998, the pre-1980 data may be unreliable due to the revolution that took place in 1974 and the subsequent adjustment to democratic institutions. Estimation over the entire period certainly indicated a break in the late 1970's, which is what we expected to find, *a priori*. Due to the validity issues concerning the earlier data, we only present estimates for the closed economy equation from 1980 onwards. The equation to be estimated is of the form:

$$w - p = a_0 + a_1 (z-t)-p + a_2 (U + U_{-1})/2 + a_3 (q - l) + a_4 * (w_{-1} - p_{-1}) \qquad (14)$$

Table 4: *Results for Closed Economy Model for Portugal*

	1980 - 1998		
	Short Run		Long Run
Coefficient	Value	t-statistic	Value
a_0	3.8734	3.01	9.9200
a_1	-0.0526	-0.14	-0.1347
a_2	-0.0139	-2.53	-0.0356
a_3	0.4766	2.87	1.2207
a_4	0.6095	4.56	
R^2bar	0.9675		
St. Error	0.0259		
DW	0.8014		
DFFITS	0.8915		

In the case of Ireland and Spain the producer price variable, p, is the output price for the manufacturing sector. However, data limitations mean that in the Portuguese case p represents the GDP deflator. The tax wedge term is formed in the same way as that for Spain. As in the Spanish model, the unemployment rate is the average of the current and the previous year's

values. Productivity is calculated by dividing GDP by total employment. Unlike the Spanish case, the lagged dependent variable is significant. Estimation from 1980 to 1998 yields the results given in Table 4.

The tax wedge variable is not significantly different from zero, in contrast to results for Ireland and Spain. This is consistent with results obtained by Drèze and Bean, 1990. In Spain any increase in the tax wedge reduced the supply of labour and increased producer wages. However, in Portugal, labour supply is relatively inelastic, so that most of the incidence of changes in the tax rate falls on labour.

Unemployment exerts a negative effect on the level of wage rates. The long-run coefficient is about –0.035. This reflects the fact that migration is not an important factor in the determination of labour supply in Portugal. This compares to a long-run coefficient of –0.019 for Spain for the later period. The greater sensitivity to unemployment rates in Portugal helps explain Figure 6. Throughout the entire period unemployment in Portugal has never surpassed 9 per cent, whereas in Ireland and Portugal it was in double figures for most of the past two decades. The level of unemployment benefit is quite low relative to the wage rate in Portugal, and this contributes to the speedier clearing of the labour market. Hence, the Portuguese labour market is more flexible than that of Ireland or Spain, and unemployment has a much greater long-run impact on wage rates.

Labour's share of value added in Portugal follows a path similar to that in Spain (Figure 4), demonstrating cyclicality, but no obvious trend. As in the case of Spain, the long-run coefficient on productivity is not significantly different from one, so that profitability in Portugal has not changed greatly since the early 1980's. Again, there has been no major change in the incentives to increase output (and employment) in Portugal relative to the rest of the EU.

As with Spain, the path of convergence in wage rates to the EU average has been rather similar to that for relative output levels. However, a significant gap still exists in absolute terms between rates in Portugal and in other EU countries.

5. Conclusions and Implications

Stability

The model of wage determination estimated in this paper is a reduced form of an underlying structural model of supply and demand. When faced with factors that cause significant shifts in the supply or demand curves for labour – such as Spain and Portugal underwent in the 1970s – this is manifested as a structural break in the reduced form model. This makes the use of such models to understand future behaviour conditional on a continuation of the underlying labour market conditions that prevailed in the estimation period. Where major changes in the labour market occur, shifting the supply or the demand curve for labour, it will be necessary to re-estimate the model. To understand where such changes are likely to occur it is necessary to focus on the underlying model of the supply and demand for labour.

In the case of Portugal and Spain this has meant that the reduced form model has been estimated for the period of the 1980s and the 1990s for Portugal, and from the 1960s for Spain. It spans the period of EU membership and a continuing slow process of convergence in living standards to the EU average level.

For Ireland there was a structural break in the model in the mid-1970s when Irish labour costs had converged to roughly 90 per cent of the UK level and stabilised at roughly that level. From the mid-1970s to the late 1990s the open economy model, described in Section 3, provides a good explanation of wage formation behaviour. However, over the last few years

major changes have occurred in the labour market, which may require further modifications to this model (McCoy, Duffy, Hore, and MacCoille, 2000).

Rapidly rising costs of housing and congestion costs due to inadequate infrastructure are constraining inward migration flows in a novel way. While over the past twenty-five years any shortage of skilled labour was met by immigration of skilled workers (and any excess of skilled labour resulted in emigration), the situation is changing rapidly. The cost of immigration for skilled labour is rising due to rising housing costs and congestion, and the result is a change in the shape of the supply curve for labour. In addition, while for a number of decades there was excess supply of unskilled labour (as reflected in the unemployment rate), this is no longer the case with unemployment falling below 4 per cent in 2001.

The result of these labour market changes is that the shape of the supply curve of labour is changing very rapidly. Whereas the estimated model confirms a very elastic supply of labour between in the period to the late 1990s, it is now much less elastic. As a result, while the traditional Phillips curve effect was not detectable using previous Irish data, it may prove relevant in future modelling of the labour market. Fitz Gerald and Kearney, 2000, use a small structural labour market model of the supply and demand for labour to examine how wages are likely to respond to the new environment.

The instability of reduced form wage rate equations in the face of major structural shifts in underlying labour markets is not surprising. However, this instability is likely to be important when modelling the behaviour of wage rates in other economies undergoing a process of transition. As the transitional process for many economies in Central Europe is even more radical than that for the three economies examined here, and as it may be happening over a shorter time scale, it will be very important to consider the forces affecting the underlying structural models of those economies.

Taxation

The analysis of the data for wages for Ireland and Spain indicates that the tax wedge has had an important effect on labour costs in both countries. The very elastic supply curve for labour in Ireland means that in the long run the bulk of the incidence of taxes on labour falls on employers. Thus the rapid rise in tax rates in Ireland in the 1980s had a major negative effect on competitiveness and the stabilisation and even decline in tax rates in the 1990s has contributed to the subsequent improvement in competitiveness. Similarly, in the case of Spain, the rapid rise in tax rates in the late 1980s had a significant negative effect on Spanish competitiveness and this contributed to the rise in unemployment. For Portugal, it would appear that the bulk of the incidence of the taxes falls on labour rather than employers. This may reflect a more elastic demand curve for labour or a more inelastic supply curve.

For the potential new EU entrants, there are important lessons from the Spanish and Irish experience. For previous new EU members, membership appears to have been associated with a major improvement in public services and an increase in the share of government in GDP. Where it happened too rapidly, as in the case of Ireland, it had significant negative effects on competitiveness. For the new entrants it will be important that the rise in tax rates needed to fund any improvement in state services does not run ahead of their economies' ability to absorb them.

Convergence

In the Irish case wage rates converged on EU (UK) rates in the mid-1970s, not long after EU membership. This convergence process was hastened by the openness, not only of the goods market, but also the openness of the labour market. Because convergence in labour costs preceded convergence in productivity it probably slowed the convergence in output and living

standards. It was not until the 1980s, when labour market flexibility (with some help from the "partnership process") saw wages rising more slowly than productivity, that convergence in living standards accelerated. Since the early 1990s the result has been a continuing fall in labour's share of value added, making Ireland an increasingly attractive place to do business.

The need to raise taxes in Ireland to fund the public finance crisis aggravated the situation in the 1980s. If it had proved possible to achieve more of the public finance adjustment in the 1980s through expenditure cuts, the process of convergence might have commenced earlier.

In the case of Spain, labour has generally maintained its share of value added as wage rates have risen in line with productivity. However, when faced by a shock to the labour market resulting in high rates of unemployment in the 1980s, the inflexibility of the labour market has meant that profitability has not increased (real wages fallen) to induce higher output and an outward shift in the demand curve for labour. While unemployment rates have exerted a significant effect on the level of wage rates the labour market displays hysteresis.

The situation in Spain was also aggravated in the late 1980s by the rapid rise in the rate of taxation. However, subsequent adjustment in the early 1990s has returned Spain to the convergence path, with labour still maintaining its share of value added.

For Portugal, like Spain, the convergence process has been fairly consistent over time. Also labour has maintained its share of value added (the coefficient on productivity is close to one). Like the Spanish specification, the wage rate equation implies hysteresis – unemployment affects the level of wage rates, not the rate of wage inflation. However, unemployment in Portugal has remained much lower than in either Spain or Ireland. It is not clear whether this is fortuitous – Portugal did not suffer a shock like Spain or Ireland – or because the labour market is more flexible and clears more rapidly.

What is clear from these three different experiences is that convergence will occur more rapidly and more consistently if labour costs converge at the same rate or more slowly than living standards (or productivity). The more flexible the labour market and the more rapidly wage rates adjust to ensure that labour supply equals labour demand, the steadier the likely progress.

Migration

The Irish labour market experience contrasts with that of Spain and Portugal, in particular because of the important role played by migration. While the extent of migration has changed the shape of the labour supply curve in Ireland, and hence greatly affected wage formation, this has not been true for other EU members. However, the experience of German unification suggests that where big gaps in living standards exist in neighbouring countries (regions) there is the potential for major migration flows. As a result, this possibility needs to be considered by new members of the EU in Central Europe. While the anticipated potential for migration flows may prove to be greatly exaggerated, as was the case with Portuguese membership, it nonetheless could significantly affect wage formation behaviour in the new members.

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