

A NOTE ON ESTIMATING  
UNEMPLOYMENT BY EDUCATION

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## A Note on Estimating Unemployment By Education

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### Abstract

In this paper we describe a range of methods for preparing forecasts of the educational profile of employment in the Irish economy. We use these forecasts to derive a profile of the possible evolution of education-specific unemployment rates in the next decade.

Our results indicate the following:

- Changes in the educational composition of the labour force alone imply, *ceteris paribus*, a fall in the overall unemployment rate of 4.5 percentage points by 2010 compared to 1996.
- Underlying structural change in the economy, towards more skill-intensive sectors, is by itself driving an increase in the demand for skilled workers at the expense of unskilled workers.
- Education-specific unemployment rates, for a given overall unemployment rate, are higher for unskilled workers than for skilled workers.
- The most likely outcome for the next decade is an emerging shortage of skilled labour and surplus of unskilled labour. The demand for semi-skilled labour should remain strong.

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The introduction of “free” second level education in 1967 was the single most important change in educational policy over the past 30 years. It led to a steady extension of participation in education, initially concentrated at second level, and more recently reflected in a major expansion in third level education. The impact of this investment has been to reduce the supply of unskilled labour and increase the supply of skilled labour<sup>1</sup>.

At the same time structural shifts in the goods market over time, from agriculture to services, have led to an increase in the relative demand for skilled labour. In addition to these structural shifts the skill-intensity of employment has been rising in all sectors further increasing the relative demand for skilled labour.

In recent years there has been a strong pick-up in the demand for labour, particularly skilled labour. This has led to a fall in unemployment rates, especially among skilled workers, despite strong growth in labour supply. More recently there has also been an increase in the demand for “semi-skilled labour”, especially in the market services sector. This demand is concentrated in jobs requiring some educational qualifications (Junior Certificate) so that the unemployment rate among those with Primary education only is still persistently high.

In this paper we look at how these education-specific unemployment rates are likely to evolve in the next decade, as the relative supply of unskilled labour is projected to continue to decline. We describe a range of methods used to project forward the educational profile of a typical worker in the 11 sectors of the Irish economy identified in the ESRI macroeconomic model<sup>2</sup>. We then match forecasts of labour supply by education level from the ESRI demographic model with forecasts of employment for 11 different sectors from the macroeconomic model to arrive at a broad profile of the evolution of labour demand and unemployment by level of education<sup>3</sup>.

### **Labour Supply By Education: Input from The Demographic Model**

The ESRI model of demographic change produces forecasts of labour supply by sex and education for each year to 2011. In the demographic model these labour supply projections are derived as follows:

1. Population projections by sex and age are derived from a detailed set of life tables.
2. Net migration flows by sex are exogenous to the demographic model, being derived from the macroeconomic model – where net migration depends on employment prospects in Ireland relative to the UK. Gross migration flows are then derived assuming a constant rate of out-migration of 30,000 per year, similar to the rate of out-migration in the 1990s. This outflow is concentrated in the 15-24 age group.
3. Migration flows by age and education level are projected forward using the average of the 1992-1997 shares.
4. Education participation rates by age are projected forward based on a profile for the cohort aged 20 in any given year. The profile for both males and females imposes a

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<sup>1</sup> We use the terms “skilled” relative to “unskilled” labour as stylised proxies to refer to workers with higher levels of education relative to workers with lower levels of education. Clearly this crude binary definition embraces a continuum; a worker with no educational qualifications has fewer skills than a worker with a Junior Certificate level of education.

<sup>2</sup> The ESRI HERMES-Ireland macroeconomic model is described in Bradley and Fitz Gerald (1991).

<sup>3</sup> These forecasts were prepared in May 1998.

steady increase in the proportion with third level education and a corresponding, more gradual decrease in the proportions with Junior Certificate and Leaving Certificate qualifications. The very low proportions with Primary education in 1996 (4.1% for males and 2.4% for females) are projected forward unchanged.

5. Labour force participation rates are then derived as a function of education, age and marital status<sup>4</sup> (the latter for females only).
6. The resultant labour supply numbers will change the net migration forecast in the macroeconomic model (via a change in the Irish unemployment rate). This process is iterated using a rule-of-thumb that a unit increase in net migration will reduce the labour force by 0.6.

The labour supply projections are shown in Figure 1. The projected rise in the education participation rates among new labour force entrants is combined with an outflow of older retirement-aged workers with a much lower average educational attainment. This leads to a steady rise in the educational attainment of the labour force. By 2011 less than 10% of the labour force is forecast to have only Primary qualifications while more than one-third should have third level qualifications.

These compositional changes in labour supply have profound implications for the future structure of the labour market. If we hold education-specific unemployment rates constant at their 1996 level, these changes in the educational composition of the labour force alone imply a fall in the overall unemployment rate of 4.5 percentage points by 2010 compared to 1996.

## **Labour Demand By Education: Different Projection Methods**

In this section we aggregate data on the educational profile of employment from the Labour Force Survey (LFS) to the 11-sector classification used in the macroeconomic model.<sup>56</sup> Figure 2, Figure 3 and Figure 4 show the educational profile of a typical worker in the agricultural, industrial and services sectors over the period 1990-1997. The agricultural sector has the lowest proportion of workers with third level education while the services sector has the highest. The educational qualifications of a worker in the industrial sector and the services sector rose steadily in the 1990s. Between 1991 and 1997 the proportion of workers with Primary education in Industry fell from 23.3% to 14.8% an absolute fall of 18,272, while the proportion of workers in Services with Third Level qualifications rose from 28.7% to 36.9%, equivalent to an absolute increase of 113,089.

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<sup>4</sup> Marriage rates for females are projected forward using the forecasts of educational attainment. The marriage pattern in recent years indicates that higher levels of educational attainment postpone the age of marriage and also slightly reduce the average marriage rate (Fahey and First Gerald (1997)).

<sup>5</sup> The eleven sectors are: Agriculture, High Technology Manufacturing, Traditional Manufacturing, Food Industries, Building & Construction, Utilities, Distribution, Transport & Communication, Personal & Professional Services, Health & Education, Public Administration.

<sup>6</sup> There were some adjustments necessary to map the 29 sector breakdown from the Labour Force Survey (LFS) into the eleven sectors used in the HERMES-Ireland model (see Corcoran, Hughes and Sexton (1993) for details). The data we use are based on the LFS Principal Economic Status (PES) definitions of employment. However the data we have for 1988-1994 are based on ILO definitions of employment. We use an education-specific scaling factor to approximate the PES equivalent of these ILO data.

There are marked differences in the education-specific unemployment rates<sup>7</sup>. In 1997, when the average unemployment rate was 11% the unemployment rate for Primary was 23.9%, for Junior Certificate was 15.2%, for Leaving Certificate 7.2% and for Third Level 3.1%. Nickell and Bell (1995) find that unskilled unemployment rates in the OECD are higher than skilled, especially in eras of low aggregate unemployment. They point to several possible reasons for this, including: a) during periods of low labour demand firms are more likely to 'hoard' skilled workers who can also do many unskilled jobs, and b) lower unskilled wages means that the unemployment benefit replacement rate is higher than for skilled labour thus reducing the incentives for employment.

Projections of education-specific unemployment rates are highly sensitive to the method used to forecast the education shares of employment in each of the 11 sectors. For this reason we use a range of extrapolation methods to develop a profile of the possible evolution of the labour market within which range the actual outcome is likely to fall.

The education shares of employment in each sector are projected forward for the period 1998-2010 using the following alternative extrapolation methods (see Corcoran, Hughes and Sexton (1993) for a full discussion of projection models):

Method 1: Unchanged educational profile within each sector

The education shares of employment for each sector are set equal to their value in 1997. Under this variant any change in the educational profile of employment is attributable to shifts in employment between sectors. This is a very conservative assumption since the educational profile of the average worker in all 11 sectors has been rising throughout the 1990s. It forms the limiting lower bound on the overall change in educational shares.

Method 2: Rate of Change in Shares Declining Over Time (Double Log Trend)

This method of extrapolation uses a constant elasticity of each share with respect to time (estimated 1990-1997) to project forward the shares. The rate of change in the shares will decline over time.

Method 3: Educational Profile Within Sectors Changes in Proportion to Labour Supply

This uses the ratio (averaged 1990-1997) of the education shares of employment in each sector to the education shares in the labour force as a whole to project forward the sectoral education shares. The exogenous forecast for labour supply by education from the demographic model, for the period 1998-2010, is then used to estimate education shares in each sector. This means that individual sectors' education shares of employment change in direct proportion to the change in the educational profile of the labour force.

Method 4: Constant Percentage Change in Shares (Logarithmic Extrapolation)

This method of extrapolation projects forward the log shares using their average annual growth rate from the period 1990-1997.

Method 5: Constant Arithmetic Change in Shares (Linear Trend)

This assumes that the shares will change in each year by the same amount as the average change in shares over the period 1990-1997. This method has often been found to provide a good approximation in projecting in the short to medium term. However because of the aggregation restriction (the shares must sum to one) this method of extrapolation is unsuitable over long time horizons (it will eventually lead to negative shares or shares greater than one). In the sub-model it forms the limiting upper bound on the change in shares.

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<sup>7</sup> These numbers are estimates only. Because of the mapping from ILO to PES definitions in the model the estimated unemployment rates do not correspond exactly with ILO or PES consistent LFS data. However the differences between the education-specific unemployment rates are comparable.

These five methods were used to generate projections for the educational shares of employment in each of the 11 sectors out to 2010. Forecasts of labour demand by sector from the macroeconomic HERMES model are applied to these projected shares to generate projections of employment by sector by education. The sectoral data are then aggregated to generate a profile of the structure of employment and unemployment by education level.

## Projections

Table 1 shows the projected structure of labour demand (employment) under each of these five extrapolation methods. Even with unchanged educational shares within sectors (*Method 1: Unchanged Within Sector Profile*) the growth in the importance of services employment and the decline in agriculture leads to a marked shift in employment towards third level qualifications. Underlying structural change in the economy is by itself driving the increase in the demand for skilled labour at the expense of unskilled labour.

The lower half of the table shows the implied education-specific unemployment rates. The overall unemployment rate is forecast to decline to 7.7%<sup>8</sup> in the latter half of the next decade. With unchanged educational shares (*Method 1*) the relatively slow decline in Primary education jobs leads to a very large shortage of unskilled labour and a surplus of skilled labour. We consider this an unrealistic scenario:

1. It imposes an unnatural immediate halt on the persistent trends within all 11 sectors towards jobs with higher educational qualifications as seen in Figure 2, Figure 3 and Figure 4.
2. It does not allow for the general rise in educational levels of the workforce, as seen in Figure 1, which would, *ceteris paribus*, lead to so-called "qualifications' inflation" in jobs. In other words even if the skill requirement embodied in a job does not alter, a higher average level of skills in the economy will mean that the qualifications of workers in all jobs will rise. The corollary of this is that in periods of low labour demand skilled labour will take unskilled jobs, again raising the qualifications of workers in all jobs.
3. The education-specific unemployment rates are unsustainable (unskilled unemployment rates are higher than skilled unemployment rates in equilibrium). Migration flows in Ireland have always guaranteed a high elasticity of labour supply, and in more recent years these migration flows have been disproportionately among young skilled workers<sup>9</sup>. Skilled workers will migrate to find work rather than stay unemployed.

Similarly we find the education-specific unemployment rates under *Method 4* and *Method 5* to be unsustainable. In these scenarios the estimated unemployment rate for those with Leaving Certificate qualifications is higher than for Junior Certificate. We would expect these unemployment rates to readjust through the qualifications' inflation and migration mechanisms described above, so that education-specific unemployment rates, for a given overall unemployment rate, will remain higher for unskilled workers than for skilled workers.

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<sup>8</sup> On a PES basis.

<sup>9</sup> See Fitz Gerald and Kearney (1998).

We consider that the most likely *ex post* scenario is *Method 3*<sup>10</sup>. Given a forecast unemployment rate of 8.5% in the five-year period 2001-2005, this projects a large excess of those with Primary education (25.3%), a much lower unemployment rate for Junior Certificate (13.2%), and a below average unemployment rate for Leaving Certificate and Third Level combined of 3.8% (4.2% for Leaving Certificate and 3.4% for Third Level).

The projected unemployment rate for Junior Certificate is interesting. These workers account for almost one-quarter of all employment in 1997 (approximately 323,500). Even under *Method 4*, which projects a very rapid decline in the relative demand for Junior Certificate, total employment is forecast at 326,000 in 2005 and 296,000 in 2010. This suggests a continuation of strong demand for these so-called "semi-skilled" workers. Under each scenario the projected unemployment rate for this category of worker declines from the average in 1991-1995 of 18.3%.

This accords with recent evidence suggestive of emerging shortages in the unskilled labour market. The increase in the returns to Junior Certificate education between 1987 and 1994, reported in Barrett, Callan and Nolan (1999), indicates a growth in demand for such workers. In addition, preliminary data from the Living in Ireland Surveys for 1994-1996 suggest that the average growth in hourly earnings for workers with Junior Certificate qualifications was substantially higher than for any other education category.

In sum, these projections suggest that the most likely outcome for the next decade is an emerging shortage of skilled labour and surplus of unskilled labour. The demand for semi-skilled labour should remain strong.

## Summary

The projections derived in this note are a first attempt to forecast the education profile of labour demand by industrial sector. These are matched to labour supply projections from the ESRI demographic model and labour demand projections from the ESRI macroeconomic model. These are then combined to estimate education-specific unemployment rates into the next decade.

The projection methods used are purely based on an extrapolation of past trends. It is a matter of judgement as to which method produces the most behaviourally plausible forecast scenario. To make this judgement, we assume that both qualifications' inflation and migration mechanisms will operate to ensure that unemployment rates will always be lower for those with higher levels of education.

The ESRI macroeconomic model forecasts a sharp decline in aggregate unemployment over the next ten years (see Duffy et al., 1997). Based on this forecast, the projections indicate a significant tightening in the market for skilled labour (Leaving Certificate and third level qualifications), with a forecast shortage of workers with third level education by the end of the next decade.

Education-specific unemployment rates vary according to the level of education. Unemployment rates are highest for workers with Primary education only, second highest for

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<sup>10</sup> This variant assumes that the education shares of employment in a given sector are fixed in relation to the education shares in the labour force. For example the share of Primary workers employed in the agricultural sector, averaged over the period 1991-1997, was 47.5%, while the share in total labour supply was 20.5%. This gives a fixed ratio of 2.3 which is used to project forward the share of Primary workers in Agriculture out to 2010 given the exogenous forecast (from the demographic model) of the Primary share in the labour force.

those with Junior Certificate, then Leaving Certificate and lowest for those with third level education. In our preferred specification the gap between education-specific unemployment rates is forecast to remain as the average unemployment rate declines.

Although we forecast that the relative decline in the demand for unskilled labour observed in recent years will continue, strong growth in total employment will also increase the demand for labour with low educational qualifications<sup>11</sup>. The trends in sectoral labour demand suggest that there will be growth in the demand for workers with Junior Certificate qualifications, particularly in the services sector<sup>12</sup>. Within the preferred specification these jobs are filled first by skilled labour (workers with Leaving Certificate qualifications) so that the gaps between education-specific unemployment rates remain broadly unchanged. Finally there is a surplus of workers with Primary education levels, given the forecast decline in employment in agriculture.

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<sup>11</sup> The negative substitution effect due to unskilled labour being replaced by technical progress, capital or skilled labour will be offset by the positive scale effects due to strong growth in output.

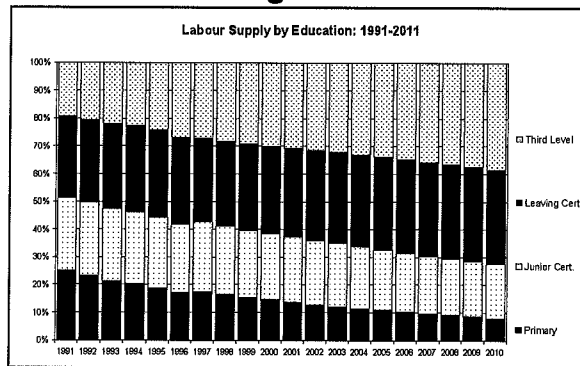
<sup>12</sup> Occupational forecasts to 2003 in Duggan, Hughes and Sexton (1997) project strong demand for certain low-skilled services occupations (e.g. domestic servants/cleaners, drivers, other security workers) with a decline in unskilled work in the agricultural and clothing and textiles sectors.



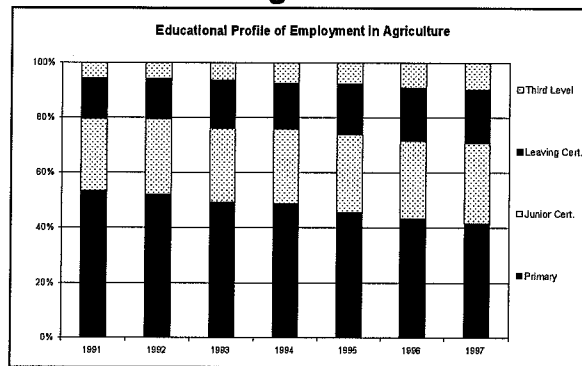
**Table 1: Profile of Labour Market By Education, 1991-2010**

<i>Period Averages:</i>	<i>1991- 1995</i>	<i>1996- 2000</i>	<i>2001- 2005</i>	<i>2006- 2010</i>
<b>Structure of Labour Force (Labour Supply)</b>				
Primary	21.8%	16.2%	12.2%	9.1%
Junior Cert.	26.1%	24.6%	22.7%	20.5%
Leaving Cert.	30.5%	30.8%	32.8%	33.8%
Third Level	21.7%	28.4%	32.3%	36.7%
<b>Structure of Employment (Labour Demand)</b>				
<i>Method 1. Unchanged Within Sector Profile</i>				
Primary	19.0%	14.7%	14.1%	13.6%
Junior Cert.	25.0%	24.0%	24.0%	23.7%
Leaving Cert.	32.2%	31.6%	31.5%	31.7%
Third Level	23.9%	29.8%	30.4%	31.1%
<i>Method 2. Rate of Change Declining Over Time</i>				
Primary	19.0%	14.2%	12.0%	10.4%
Junior Cert.	25.0%	23.5%	22.4%	21.4%
Leaving Cert.	32.2%	32.3%	32.4%	32.1%
Third Level	23.9%	30.1%	33.2%	36.1%
<i>Method 3. Change Proportional To Change in Labour Supply Shares</i>				
Primary	19.0%	13.7%	10.0%	7.2%
Junior Cert.	25.0%	23.5%	21.6%	19.2%
Leaving Cert.	32.2%	32.3%	34.3%	35.2%
Third Level	23.9%	30.5%	34.1%	38.3%
<i>Method 4. Constant Percentage Change in Shares</i>				
Primary	19.0%	13.8%	10.0%	7.0%
Junior Cert.	25.0%	23.5%	21.3%	18.4%
Leaving Cert.	32.2%	31.4%	29.9%	27.8%
Third Level	23.9%	31.4%	38.9%	46.9%
<i>Method 5. Constant Arithmetic Change in Shares</i>				
Primary	19.0%	13.3%	8.4%	3.8%
Junior Cert.	25.0%	23.3%	21.7%	19.9%
Leaving Cert.	32.2%	32.3%	32.5%	32.1%
Third Level	23.9%	31.1%	37.5%	44.2%
<b>Excess Supply % (Unemployment Rates on PES Basis)</b>				
Unemployment Rate:	14.9%	9.7%	8.5%	7.7%
<i>Method 1. Unchanged Within Sector Profile</i>				
Primary	25.8%	17.6%	-6.3%	-38.3%
Junior Cert.	18.3%	12.0%	3.5%	-6.9%
LC & 3rd Level	8.5%	6.4%	12.9%	17.8%
<i>Method 2. Rate of Change Declining Over Time</i>				
Primary	25.8%	20.7%	9.9%	-5.9%
Junior Cert.	18.3%	13.9%	9.8%	3.5%
LC & 3rd Level	8.5%	4.9%	7.8%	10.6%
<i>Method 3. Change Proportional To Change in Labour Supply Shares</i>				
Primary	25.8%	23.7%	25.3%	26.9%
Junior Cert.	18.3%	13.9%	13.2%	13.2%
LC & 3rd Level	8.5%	4.2%	3.8%	3.7%
<i>Method 4. Constant Percentage Change in Shares</i>				
Primary	25.8%	23.2%	25.3%	29.6%
Junior Cert.	18.3%	13.8%	14.3%	17.2%
LC & 3rd Level	8.5%	4.3%	3.4%	2.2%
<i>Method 5. Constant Arithmetic Change in Shares</i>				
Primary	25.8%	26.1%	37.8%	62.3%
Junior Cert.	18.3%	14.5%	12.7%	10.4%
LC & 3rd Level	8.5%	3.3%	1.7%	0.0%

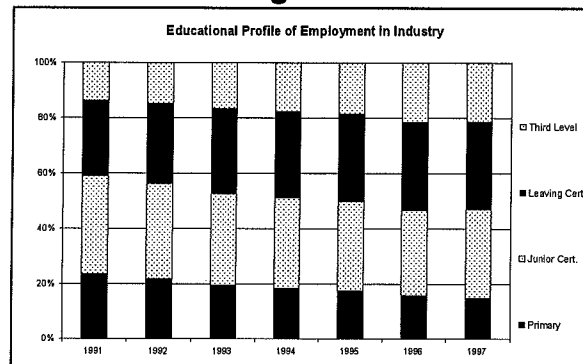
**Figure 1**



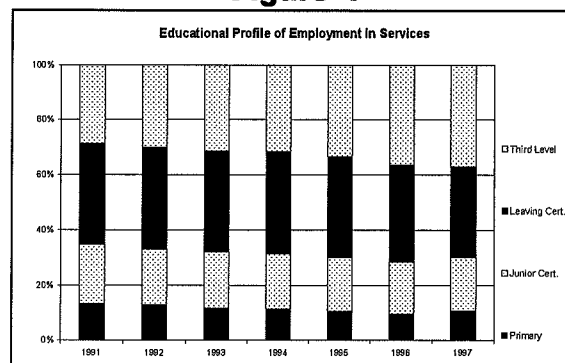
**Figure 2**



**Figure 3**



**Figure 4**



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**Table A.1: Projected Education-Specific Employment Shares Under Each Extrapolation Method**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>Structure of Labour Supply</b>																				
Primary	25.1%	23.3%	21.2%	20.3%	18.9%	17.2%	17.4%	16.4%	15.4%	14.5%	13.7%	12.8%	12.2%	11.5%	10.9%	10.2%	9.6%	9.1%	8.6%	8.1%
Junior Cert.	26.2%	26.3%	26.2%	26.0%	25.6%	24.6%	25.4%	24.8%	24.3%	23.9%	23.6%	23.2%	22.8%	22.3%	21.8%	21.4%	21.0%	20.5%	20.0%	19.5%
Leaving Cert.	29.2%	29.8%	30.7%	31.1%	31.4%	31.2%	30.0%	30.5%	31.0%	31.5%	32.0%	32.5%	32.8%	33.1%	33.4%	33.6%	33.7%	33.8%	33.9%	33.9%
Third Level	19.4%	20.5%	21.9%	22.6%	24.1%	27.0%	27.2%	28.3%	29.3%	30.1%	30.8%	31.5%	32.2%	33.1%	33.9%	34.8%	35.8%	36.6%	37.6%	38.5%
<b>Structure of Labour Demand</b>																				
Method 1: Unchanged Within Sector Profile																				
Primary	21.6%	20.5%	18.5%	17.8%	16.4%	14.8%	14.9%	14.7%	14.6%	14.4%	14.3%	14.2%	14.1%	14.0%	13.9%	13.8%	13.6%	13.5%	13.5%	13.4%
Junior Cert.	26.2%	25.3%	24.7%	24.6%	24.2%	23.2%	24.2%	24.1%	24.2%	24.1%	24.0%	24.0%	23.9%	23.9%	23.9%	23.8%	23.7%	23.7%	23.6%	23.5%
Leaving Cert.	30.9%	31.6%	32.5%	32.7%	33.0%	32.5%	31.3%	31.3%	31.4%	31.5%	31.5%	31.5%	31.5%	31.6%	31.6%	31.7%	31.7%	31.7%	31.7%	31.7%
Third Level	21.3%	22.6%	24.3%	24.9%	26.4%	29.5%	29.6%	29.9%	29.8%	30.0%	30.2%	30.3%	30.4%	30.5%	30.6%	30.7%	30.9%	31.1%	31.2%	31.4%
Method 2: Rate of Change Declining Over Time																				
Primary	21.6%	20.5%	18.5%	17.8%	16.4%	14.8%	14.9%	14.2%	13.7%	13.2%	12.7%	12.3%	12.0%	11.6%	11.3%	11.0%	10.7%	10.4%	10.1%	9.9%
Junior Cert.	26.2%	25.3%	24.7%	24.6%	24.2%	23.2%	24.2%	23.5%	23.4%	23.1%	22.8%	22.6%	22.4%	22.2%	22.1%	21.8%	21.6%	21.4%	21.2%	21.0%
Leaving Cert.	30.9%	31.6%	32.5%	32.7%	33.0%	32.5%	31.3%	32.5%	32.5%	32.5%	32.5%	32.4%	32.4%	32.4%	32.3%	32.3%	32.2%	32.1%	32.0%	32.0%
Third Level	21.3%	22.6%	24.3%	24.9%	26.4%	29.5%	29.6%	29.8%	30.4%	31.2%	32.0%	32.6%	33.3%	33.8%	34.3%	34.9%	35.5%	36.1%	36.7%	37.2%
Method 3: change Proportional to Change in Labour Supply Shares																				
Primary	21.6%	20.5%	18.5%	17.8%	16.4%	14.8%	14.9%	13.7%	12.9%	12.1%	11.3%	10.5%	9.9%	9.3%	8.8%	8.2%	7.6%	7.2%	6.8%	6.3%
Junior Cert.	26.2%	25.3%	24.7%	24.6%	24.2%	23.2%	24.2%	23.7%	23.4%	22.9%	22.4%	22.0%	21.6%	21.2%	20.7%	20.2%	19.7%	19.3%	18.7%	18.3%
Leaving Cert.	30.9%	31.6%	32.5%	32.7%	33.0%	32.5%	31.3%	32.1%	32.6%	33.1%	33.5%	34.1%	34.4%	34.7%	34.9%	35.1%	35.2%	35.3%	35.3%	35.3%
Third Level	21.3%	22.6%	24.3%	24.9%	26.4%	29.5%	29.6%	30.4%	31.2%	32.0%	32.7%	33.4%	34.1%	34.8%	35.6%	36.4%	37.4%	38.3%	39.2%	40.1%
Method 4: Constant Percentage Change in Shares																				
Primary	21.6%	20.5%	18.5%	17.8%	16.4%	14.8%	14.9%	13.9%	13.0%	12.2%	11.4%	10.6%	9.9%	9.3%	8.6%	8.0%	7.5%	6.9%	6.4%	6.0%
Junior Cert.	26.2%	25.3%	24.7%	24.6%	24.2%	23.2%	24.2%	23.8%	23.4%	22.9%	22.3%	21.8%	21.3%	20.8%	20.3%	19.6%	19.0%	18.4%	17.7%	17.1%
Leaving Cert.	30.9%	31.6%	32.5%	32.7%	33.0%	32.5%	31.3%	31.1%	31.1%	30.9%	30.5%	30.2%	29.9%	29.5%	29.2%	28.7%	28.3%	27.8%	27.3%	26.8%
Third Level	21.3%	22.6%	24.3%	24.9%	26.4%	29.5%	29.6%	31.2%	32.5%	34.1%	35.7%	37.3%	38.9%	40.4%	41.9%	43.6%	45.3%	46.9%	48.6%	50.2%
Method 5: Constant Arithmetic Change in Shares																				
Primary	21.6%	20.5%	18.5%	17.8%	16.4%	14.8%	14.9%	13.2%	12.2%	11.2%	10.2%	9.3%	8.3%	7.4%	6.5%	5.6%	4.7%	3.8%	2.9%	2.0%
Junior Cert.	26.2%	25.3%	24.7%	24.6%	24.2%	23.2%	24.2%	23.3%	23.1%	22.7%	22.3%	22.0%	21.7%	21.4%	21.1%	20.7%	20.3%	19.9%	19.5%	19.1%
Leaving Cert.	30.9%	31.6%	32.5%	32.7%	33.0%	32.5%	31.3%	32.5%	32.6%	32.6%	32.6%	32.5%	32.4%	32.4%	32.4%	32.3%	32.2%	32.1%	32.0%	31.8%
Third Level	21.3%	22.6%	24.3%	24.9%	26.4%	29.5%	29.6%	30.9%	32.1%	33.4%	34.8%	36.2%	37.5%	38.8%	40.0%	41.4%	42.8%	44.3%	45.7%	47.0%

**Table A.2: Projected Education-Specific Unemployment Rates Under Each Extrapolation Method**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
<b>Aggregate</b>																					
Unemployment Rate:	15.0%	15.8%	16.3%	15.1%	12.3%	12.1%	11.0%	9.0%	8.0%	8.4%	8.8%	9.0%	8.7%	8.4%	7.8%	7.7%	7.7%	7.7%	7.8%	7.8%	7.8%
<b>Primary</b>	26.7%	25.9%	27.0%	25.5%	23.7%	24.3%	23.9%	18.4%	12.8%	8.9%	4.4%	-0.7%	-5.6%	-11.6%	-18.0%	-24.6%	-31.8%	-37.9%	-44.4%	-52.9%	-52.9%
Junior Cert.	15.0%	18.9%	20.9%	19.7%	17.1%	17.2%	15.2%	11.6%	8.5%	7.5%	7.0%	5.8%	4.0%	1.8%	-1.1%	-2.8%	-4.7%	-6.7%	-8.9%	-11.3%	-11.3%
Leaving Cert.	10.0%	10.9%	11.0%	10.7%	7.9%	8.4%	7.2%	6.6%	6.7%	8.4%	10.2%	11.9%	12.3%	12.7%	12.6%	13.1%	13.2%	13.4%	13.6%	13.7%	13.7%
Third Level	6.9%	7.2%	7.1%	6.6%	3.9%	4.1%	3.1%	4.0%	6.4%	8.8%	10.6%	12.3%	13.9%	15.4%	16.9%	18.5%	20.2%	21.7%	23.4%	24.9%	24.9%
LC & 3rd Level	8.7%	9.4%	9.4%	9.0%	6.2%	6.4%	5.3%	5.4%	6.5%	8.6%	10.4%	12.1%	13.1%	14.1%	14.8%	15.8%	16.8%	17.7%	18.8%	19.6%	19.6%
<b>Junior Cert.</b>	26.7%	25.9%	27.0%	25.5%	23.7%	24.3%	23.9%	20.9%	18.0%	16.6%	14.9%	12.5%	10.4%	7.4%	4.1%	0.8%	-2.8%	-5.6%	-8.7%	-13.0%	-13.0%
Leaving Cert.	15.0%	18.9%	20.9%	19.7%	17.1%	17.2%	15.2%	13.9%	11.6%	11.4%	11.7%	11.3%	10.2%	8.8%	6.8%	5.9%	4.8%	3.6%	2.3%	0.7%	0.7%
Third Level	10.0%	10.9%	11.0%	10.7%	7.9%	8.4%	7.2%	3.1%	3.4%	5.3%	7.3%	9.3%	9.9%	10.5%	10.7%	11.4%	11.8%	12.3%	12.7%	13.1%	13.1%
LC & 3rd Level	6.9%	7.2%	7.1%	6.6%	3.9%	4.1%	3.1%	4.3%	4.5%	5.2%	5.4%	5.6%	5.9%	6.3%	6.7%	7.3%	8.3%	9.0%	10.1%	11.0%	11.0%
LC & 3rd Level	8.7%	9.4%	9.4%	9.0%	6.2%	6.4%	5.3%	3.7%	3.9%	5.2%	6.4%	7.5%	7.9%	8.4%	8.7%	9.3%	10.0%	10.6%	11.3%	12.0%	12.0%
<b>Primary</b>	26.7%	25.9%	27.0%	25.5%	23.7%	24.3%	23.9%	23.6%	22.9%	23.8%	24.6%	25.3%	25.5%	25.5%	25.4%	26.0%	26.5%	27.0%	27.5%	27.7%	27.7%
Junior Cert.	15.0%	18.9%	20.9%	19.7%	17.1%	17.2%	15.2%	13.0%	11.7%	12.3%	13.1%	13.6%	13.4%	13.1%	12.5%	12.8%	13.0%	13.2%	13.5%	13.6%	13.6%
Leaving Cert.	10.0%	10.9%	11.0%	10.7%	7.9%	8.4%	7.2%	4.3%	3.2%	3.7%	4.3%	4.6%	4.4%	4.1%	3.5%	3.5%	3.6%	3.7%	3.9%	4.0%	4.0%
Third Level	6.9%	7.2%	7.1%	6.6%	3.9%	4.1%	3.1%	2.2%	2.1%	2.7%	3.1%	3.5%	3.5%	3.5%	3.3%	3.3%	3.4%	3.5%	3.8%	3.9%	3.9%
LC & 3rd Level	8.7%	9.4%	9.4%	9.0%	6.2%	6.4%	5.3%	3.3%	2.6%	3.2%	3.7%	4.1%	4.0%	3.8%	3.4%	3.4%	3.5%	3.6%	3.9%	4.0%	4.0%
<b>Primary</b>	26.7%	25.9%	27.0%	25.5%	23.7%	24.3%	23.9%	22.8%	22.1%	23.1%	23.9%	24.5%	25.5%	26.1%	26.7%	27.4%	28.1%	29.5%	31.0%	31.8%	31.8%
Junior Cert.	15.0%	18.9%	20.9%	19.7%	17.1%	17.2%	15.2%	13.0%	11.5%	12.3%	13.5%	14.3%	14.6%	14.7%	14.4%	15.4%	16.3%	17.2%	18.1%	19.0%	19.0%
Leaving Cert.	10.0%	10.9%	11.0%	10.7%	7.9%	8.4%	7.2%	7.1%	7.7%	10.1%	12.8%	15.5%	16.9%	18.3%	19.4%	21.1%	22.6%	24.1%	25.7%	27.3%	27.3%
Third Level	6.9%	7.2%	7.1%	6.6%	3.9%	4.1%	3.1%	-0.3%	-2.2%	-3.7%	-5.8%	-7.9%	-10.1%	-12.0%	-14.0%	-15.7%	-16.9%	-18.2%	-19.1%	-20.1%	-20.1%
LC & 3rd Level	8.7%	9.4%	9.4%	9.0%	6.2%	6.4%	5.3%	3.5%	2.9%	3.4%	3.7%	4.0%	3.5%	3.2%	2.6%	2.4%	2.3%	2.1%	2.1%	2.1%	2.1%
<b>Primary</b>	26.7%	25.9%	27.0%	25.5%	23.7%	24.3%	23.9%	26.4%	26.8%	29.1%	31.5%	34.1%	37.5%	40.9%	44.9%	49.6%	54.9%	61.5%	68.8%	76.6%	76.6%
Junior Cert.	15.0%	18.9%	20.9%	19.7%	17.1%	17.2%	15.2%	14.5%	12.7%	12.9%	13.5%	13.6%	13.1%	12.3%	11.0%	10.9%	10.7%	10.5%	10.1%	9.7%	9.7%
Leaving Cert.	10.0%	10.9%	11.0%	10.7%	7.9%	8.4%	7.2%	3.1%	3.2%	5.0%	7.0%	9.0%	9.7%	10.2%	10.4%	11.2%	11.8%	12.4%	13.0%	13.5%	13.5%
Third Level	6.9%	7.2%	7.1%	6.6%	3.9%	4.1%	3.1%	0.6%	-0.8%	-1.7%	-3.1%	-4.6%	-6.1%	-7.5%	-8.8%	-9.9%	-10.6%	-11.5%	-12.0%	-12.6%	-12.6%
LC & 3rd Level	8.7%	9.4%	9.4%	9.0%	6.2%	6.4%	5.3%	1.9%	1.2%	1.7%	2.0%	2.3%	1.8%	1.4%	0.7%	0.5%	0.3%	0.0%	-0.2%	-0.4%	-0.4%

Method 1: Unchanged Within Sector Profile

Method 2: Rate of Change Declining Over Time

Method 3: Change Proportional to Change in Labour Supply Shares

Method 4: Constant Percentage Change in Shares

Method 5: Constant Arithmetic Change in Shares