

Aspects of the Labour Market for New Graduates in Ireland: 1982-1997

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Abstract: Using a survey on the first destinations of award recipients in higher education from 1982 to 1997, the trend in first destinations and starting salaries for primary level graduates in Ireland is studied. The data show that despite large increases in supply throughout the 1980s, the average real wage received by recent graduates increased by 25 per cent over the decade. This phenomenon is explained by a combination of rising emigration and increasing demand during the period. With the onset of economic recession in 1990 and lower levels of emigration and demand, the real wage fell between 1990 and 1995. The paper finds that the increase in supply during this period was the main reason for the fall in real wages.

I INTRODUCTION

Since the early 1980s, there has been a significant rise in the level of education of people leaving the Irish education system. Between 1982 and 1997 the annual total of people graduating with a university degree almost trebled from 5,443 to 16,243 graduates. The scale of this increase is more extraordinary when one considers that a similar increase in the number of graduates from UK third level institutions occurred over a considerably longer period of twenty-five years between 1962 and 1987.¹ Comparative data collected by the OECD (1996a) shows

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1. Bee and Dolton (1990b).

that since the mid-1980s participation in third level education in Ireland has risen more rapidly than most European countries. The increase has resulted in a situation where almost half the cohort leaving the education system in recent years has some third-level education.

In the absence of a corresponding increase in demand, an increase in the labour supply of any group will depress the wages of that group. Increases in supply of various demographic groups are widely seen to have played an important part in the changes in wage structure in the USA over the past thirty years. Welch (1979), for example, looks at the changes in the returns to education arising from an increase in cohort size of young men in the US between 1967 and 1975 (a result of the post World War II baby boom). The results show that relative wages between schooling groups for prime-aged workers remained fairly steady whereas those for well-educated new job-market entrants had fallen relative to their less educated counterparts. More recently, Katz and Murphy (1992) in looking at the US wage structure between 1963 and 1987 found that the college wage premium declined during the periods of the largest increases in supply, and expanded sharply during the periods of smallest growth in supply.

The wages received by graduates are a factor in the demand for education. How graduates fare in the labour market influences the present generation of fifth and sixth year students. The salary associated with any occupation signals the relative attractiveness of such an occupation. This signal will affect the decision that second level students must make with regard to going into higher education and what subjects to study. Fredriksson (1997) argues that the large decline in the university wage premium in Sweden between 1967 and 1991 had a detrimental effect on the demand for education during the period. The proportion of school-leavers going on to third level fluctuated with the rises and falls in the university wage premium. This argument has also formed part of the debate on teacher supply in the UK, where problems with both quantity and quality have led to researchers analysing the factors that determine a graduate's labour supply decision. Controlling for the subjective valuation of the non-pecuniary rewards, Dolton (1990) finds that the lower are relative wages or wage growth in a particular occupation, the less likely a graduate is to choose that career.

The period of the 1980s and 1990s saw a significant rise in the returns to education and skill in Ireland. In particular, Barrett *et al.* (1999a) find that a significant portion of the increase in earnings inequality that occurred between 1987 and 1994 is explained by increases in the returns to education. This increased return to university education has been attributed primarily to the shift in demand towards skilled labour internationally and the extremely open nature of the Irish economy; Barrett *et al.* (1999b). The age-specific nature of this increase in returns is also highlighted in Barrett *et al.* (1999a). They find

that the increase in the premium commanded by workers with a university education varies for younger and older groups, with the latter experiencing the majority of the increase in the premium. The evidence on the age-specific nature of the increase in returns to education is supported by the findings in this paper. Looking at the salaries received by university graduates during their first year of employment after graduating, we find that salaries fell in real terms after 1990, taking until 1996 to recover.

The paper is structured as follows. Section II briefly describes the economic background in Ireland during the 1980s and 1990s. Section III describes the data used in the analysis. Section IV looks at the change in the composition of new graduates during the 1980s and 1990s, as well as first destinations and earnings of graduates in the year following their graduation. This section also considers possible supply and demand explanations for the trend in the starting salaries of new graduates. Section V summarises and concludes.

II BACKGROUND

Over the period 1982 to 1997 the performance of the Irish economy has been varied. The experience of graduates in the labour market during this period largely reflects changes in the economy as a whole. With the outbreak of world recession in 1980 the number of people at work in Ireland fell rapidly by 7 per cent from 1,156,000 to 1,078,500 in 1985. Only by 1993, with 1,146,200 people at work, did the economy reach an employment level close to that of 1980. Following exceptional economic growth since the early 1990s the level of employment in the economy reached 1,346,400 in 1997, an increase of 16 per cent on 1980. The increase in the labour force in the 1990s coincided with a significant change in the labour force participation of women. Between 1982 and 1990 women accounted for between 27 and 29 per cent of the total labour force, by 1997 this had risen to 40 per cent. The significant rise in the participation of women in the labour force is largely confined to the 30-54 years of age group, whose participation increased from 11.5 per cent in 1990 to 21 per cent by 1997.

Emigration also re-emerged during the 1980s. By 1989 the numbers emigrating represented almost 3.5 per cent of the total labour force. The proportion of degree recipients emigrating also fluctuated noticeably between 1982 and 1997. O'Connell and Sexton (1994) argue that the expansion of higher education in Ireland between 1981 and 1991 took place in the context of insufficient domestic demand, resulting in graduate unemployment, graduate emigration and credentials inflation. In 1982 only 5 per cent of male and female graduates emigrated in their first year after leaving university. By 1987 this figure stood at 25 per cent for men and 20 per cent for women. New graduate

emigration remained at these levels until 1989, after which point the numbers emigrating fell rapidly in response to the worldwide recession. After 1993 the proportion of new male and female graduates emigrating fluctuated between 10 and 15 per cent. The increase during the 1980s in the proportion of highly educated workers emigrating is further documented in Barrett and Trace (1998) and Fitz Gerald and Kearney (1998).

In addition to the increase in the number of graduates with a degree, there was also an increase in the *share* of the total labour force accounted for by this group. In 1982 males graduating with a degree represented 3 per cent of the active male population aged between 20 and 24 years; for females the figure stood at 3 per cent also.² By 1997, the male graduating cohort represented 7 per cent of the same group, whereas female graduates' share had jumped up to 9 per cent.

The increase in the Irish rate of human capital accumulation during the 1980s and 1990s resulted in a rise in the quality adjusted labour force. The quality-adjusted measure uses the differences in earnings attributable to age and education as a proxy for productivity differences between groups. The raw labour force numbers are then adjusted in accordance with these productivity differences. Durkan *et al.* (1999) find that while total employment only increased by 13 per cent between 1981 and 1996, the quality adjusted measure increased by 34 per cent.

An important question for this paper is whether the supply of and demand for graduates can be disentangled. The demand view holds that inflows of foreign investment, dependent to a certain extent at least on factors other than the educational level of the population, raised the demand for skilled workers who would otherwise have emigrated (Barry, 1999). This position is supported by the fact that despite large increases in supply throughout the 1980s, the demand for skilled labour did not increase sufficiently, leading to increased graduate emigration over the period. The importance of supply factors operates through the impact of foreign labour market (UK) conditions on Irish wages (Fitz Gerald, 1999). This paper asks whether the fall in emigration during the worldwide recession of the early 1990s, and the resulting increase in domestic supply, affected the wages received by an ever-expanding cohort of new graduates. Section IV will show that this glut of supply at the beginning of the decade did indeed play a significant role in the downtrend in salaries received by new graduates at the time.

2. This is the ILO measure of the active population, that is, those people making themselves available for work.

III THE DATA

The data used comes from an annual survey on the first destinations of award recipients in higher education, carried out by the Higher Education Authority in Ireland since 1982. The survey is a report on the initial employment, further study and training patterns of recipients of degrees, diplomas and certificates. The First Destinations Survey refers to the situation of graduates as at 30th April following receipt of the award. In the following sections we will be looking at the recipients of primary degrees only. The survey has information on the following degree awards: Arts, Social Science and Humanities; Science; Commerce and Business Studies; Medicine, Dentistry and Paramedical Studies; Engineering; Law; Agriculture; Veterinary Medicine; Architecture; Food Science and Technology. Given that we will be looking at how graduates fare in the labour market immediately after graduating, not all graduates will be suitable for the purposes of our analysis. In particular, four faculties are excluded from the analysis; these are Medicine and Dentistry, Veterinary, Law, and Architecture. The survey considers medical interns and trainee solicitors to be employed, in the same way that the graduates of, say, Arts or Commerce are. However, for various reasons these graduates show very low initial remuneration relative to future earnings as well as relative to the majority of other new graduates, and we therefore exclude them.

The First Destinations Survey is an amalgamation of the information from postal surveys carried out by the careers advisory services in various educational institutions around the country. In the April after they leave university graduates receive a detailed questionnaire covering personal information, degree studied for, grade achieved in the degree, present employment status by industry and occupation, location of present employment, and salary in present job. If no response is received to the first postal questionnaire a second one is then sent. The response rate has consistently been very high, at around 85 per cent. Response rates vary somewhat between faculties, being relatively higher for those faculties with fewer numbers, such as Food Science and Technology, and Engineering. Despite this slight variation in response rates between faculties the survey provides wage data on groups that maintain a constant composition throughout the entire 1982 to 1997 period, thus reflecting changes in prices for workers with a given set of skills. This makes it possible to compare wages over time for various graduate groups.

In the questionnaire graduates are asked to place their present annual salary within any one of nine salary bands. In 1997 the lower band was IR£0-IR£4,999 and the top group was unbounded above £19,000. Shizmizu and Crow (1988) show that if the number of people in each income band is known, and if we impose a log normal distribution on income, then it is possible to calculate both

the mean and median income of a sample by simple regressions. However, when such methods were applied to the first destinations data it was found that the weighted averages were practically the same as the means obtained under the assumption of log normality. Hence, in the following calculations, rather than imposing log normality on the wage distribution, we use the weighted mean where the unbounded upper group is constrained to the minimum for that group in any particular year, i.e. £19,000 in 1997.

In looking at the performance of graduates in the year after receiving their degree we focus on ten different graduate groupings, categorised on the basis of graduating faculty and sex. As the size of each sex-education group decreases it becomes more and more likely that a small number of extreme values in the income distribution could contaminate the weighted means, resulting in an unrepresentative sample. Consequently, only four of the faculties listed above are separated into male and female components. Neither Agriculture nor Food Science and Technology graduates are split up into male and female components, as these faculties are relatively small and tend to be male dominated.

Two things must be emphasised at this point. First, this paper is concerned with graduates' starting salaries. It cannot, therefore, be assumed that the graduate labour market has reached an equilibrium at this point. Many of the respondents will still be seeking permanent employment — a factor that will be apparent amongst graduates of less applied faculties such as Arts and Social Science. Second, in looking at graduates' salaries in their first year of employment after graduating, we do not wish to draw any conclusions about salary prospects over the rest of their working life. There are some studies, however, that have emphasised the importance of a graduate's starting salary in their earnings later on in life, e.g. Dolton *et al.* (1990) and Bee and Dolton (1991).

IV CHANGES IN COMPOSITION OF NEW GRADUATES

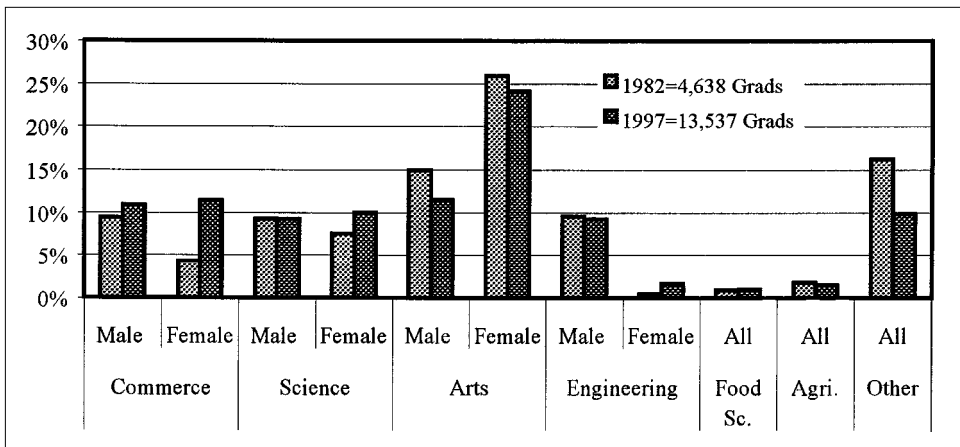
4.1 ~~Salaries~~ *Salaries and First Destination of Recent Graduates*

Apart from the large increase in the number of third level graduates each year, there has also been a change in the composition of this group. Figure 1 shows the proportion of new primary degree recipients accounted for by the various groups in 1982 and in 1997. The *other* category consists of Medicine and Dentistry graduates; Veterinary graduates; Law graduates; and Architecture graduates.

There is a significant rise in the participation of women in third level education, particularly in subject areas where they were under-represented in 1982, such as Commerce and Business Studies and Engineering. In 1982 the ratio of male to female graduates was 1.25:1; by 1997 this had almost been reversed, with a ratio of 1.17:1 in favour of female graduates. This large increase in the number of women in third level education coincides with an increase in

the participation of women in the labour force as a whole. However, whereas the increase in the participation of women in higher education was a fairly smooth trend over the sixteen-year period, the major increases in the labour force participation of women came in the 1990s. Overall, Commerce and Business Studies degrees and Science degrees have gained a share of the graduate total at the expense of Arts and Social Science and the Other category. Apart from a fall and then a rise in the early 1990s, the labour force participation of all graduates, calculated as the sum of graduates seeking employment and graduates in employment has remained between 5 and 6 per cent for male and female graduates over the sixteen years. As expected the graduates of the more applied faculties, such as Engineering, exhibit a higher participation rate than their fellow graduates.

The trend in the real starting salaries for new graduates is graphed in Figure 1 below. The wage measure used is a weighted average of the annual salary of recent graduates in full-time employment. The weights are given by a group's employment share in each year. Note that Medicine and Dentistry, Veterinary Science, Law and Architecture are not included in the average for the graduates listed below.³ The lines in the figure represent accumulated growth in salaries since 1982. Average compensation per employee in the economy is also plotted

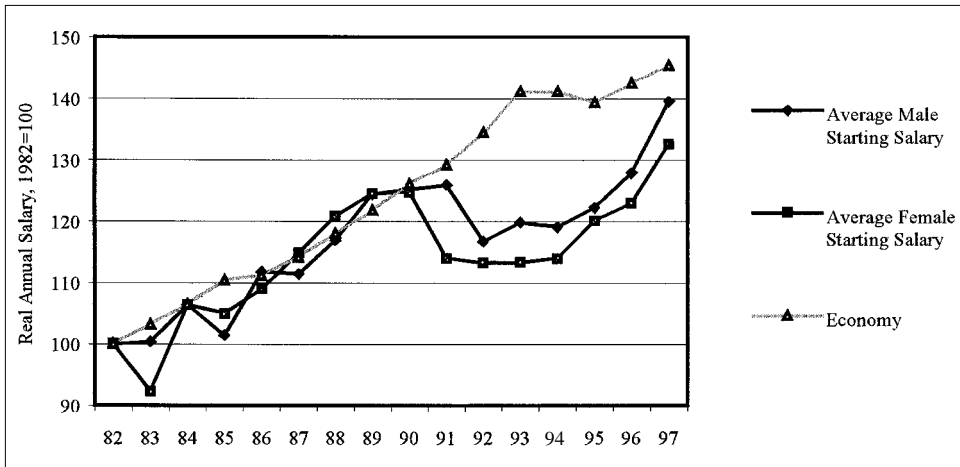


Source: *First Destination of Award Recipients in Higher Education, 1982-1997*.

Figure 1: *New Graduate Totals 1982 and 1997*

3. Between 1982 and 1997 the changes in the real starting salaries for these graduates differ greatly from the changes in the salaries of graduates from the other faculties. Following a declining real wage throughout the 1980s their starting salaries rose dramatically in the early 1990s. The data is available from the author.

4. European Economy, 1997: *Broad Economic Policy Guidelines*. No. 64 Statistical Index.



Source: *First Destination of Award Recipients in Higher Education, 1982-1997*.

a. Annual Salaries are deflated by the Consumer Price Index for each year. All salaries are calculated in 1982 prices.

Figure 2: *Graduate Starting Salaries by Sex*

alongside the trend for graduates.⁴ New graduates kept pace with the average increases in the economy up to 1990 with male and female graduates experiencing similar growth in their starting salaries. As a consequence of this, the male-female wage ratio was unchanged at 1.13 between 1990 and 1982. The gains made by male and female graduates were quickly eroded after 1990 following the significant downturn in all graduates' salaries.

As a result of this slump, the real starting salaries for male graduates remained unchanged between 1990 and 1996, and the starting salary for female graduates in 1996 was actually lower than it was in 1990. The relatively larger fall in the starting salary for female graduates had a significant effect on the male-female wage ratio, which had risen to 1.19 by 1997. The different paths taken by new graduates and the average worker in the rest of the economy is quite stark. This phenomenon will be discussed in the Conclusions, having looked at the various supply and demand explanations behind the shifts in graduates' wages.

In general there are three phases in the growth of graduates' starting salaries between 1982 and 1997. Phase one, from 1982 to 1990 is a time of strong growth and rising real wages for male and female graduates; phase two, from 1991 to 1994, sees a downtrend in salaries; and phase three, from 1995 to 1997, is a time of strong recovery for both male and female graduates. There are some differences in the evolution of wages between faculties and sexes, but the general

pattern of these three phases is consistent across most groups. This implies that the driving force behind these changes in graduate remuneration was economy-wide, rather than specific to graduates with certain types of skills.

Table 1 describes the changes in the real annual wages of ten graduate groups between 1982 and 1997, and for three sub-periods corresponding to the three phases of salary growth described in Figure 1.

Table 1: *Real Annual Wage Changes for Graduates in the First Year of Employment, 1982-1997*

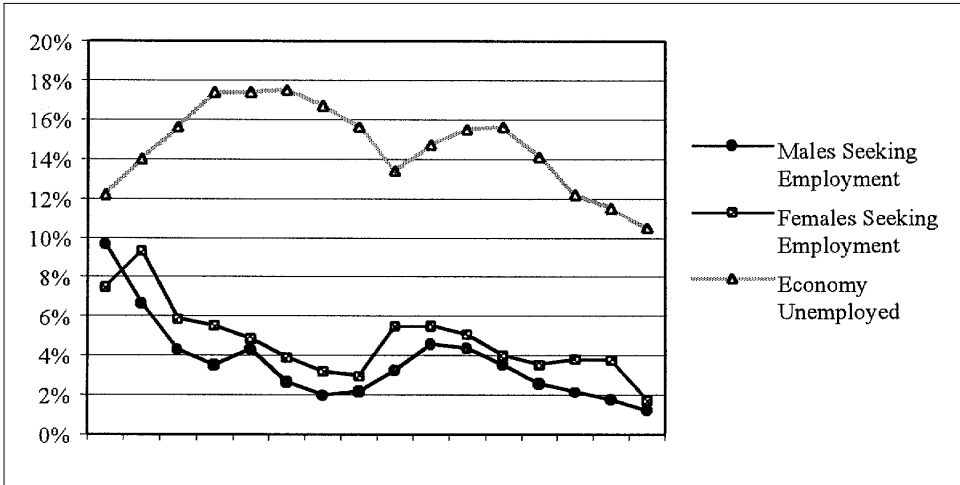
<i>Faculty</i>	<i>Sex</i>	<i>Percentage Change in Mean Annual Starting Salary</i>			
		<i>1982-1990</i>	<i>1990-1995</i>	<i>1995-1997</i>	<i>1982-1997</i>
Arts and Social Science	Male	8.8	-0.8	12.1	21.0
Arts and Social Science	Female	17.6	-12.4	13.8	17.2
Commerce and Business	Male	33.4	-1.3	15.3	51.8
Commerce and Business	Female	25.3	7.9	9.4	47.9
Engineering	Male	16.6	-5.8	13.3	24.4
Engineering	Female	23.3	-10.7	16.1	27.9
Agriculture	All Grads	14.0	27.6	0.8	46.7
Food Science	All Grads	26.0	-13.5	6.6	16.1
Science	Male	42.1	0.0	13.3	61.0
Science	Female	33.7	-0.1	6.0	41.5

Source: First Destinations Survey.

The downtrend in wages in the first half of the 1990s is evident for the most of the groups, with many of the graduates experiencing negative or zero growth in their wages. Female Commerce and Business Studies graduates, despite increasing their share in the graduate total, saw the growth in their salaries fall by less than their fellow graduates. The trend in the growth of Agriculture graduates' salaries is slightly different to their fellow graduates. This group's average starting salary continues to grow strongly throughout the early 1990s, only slowing down after 1995, when most other graduates begin to see a recovery in their starting salaries.

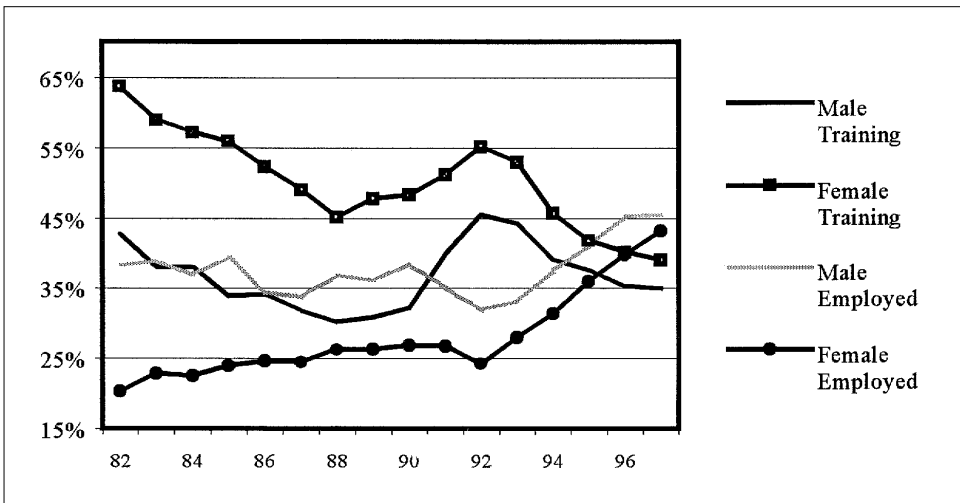
Further evidence of the adverse labour market conditions faced by new graduates in the first half of the 1990s is shown in Figures 3 and 4.

Figure 3 shows the proportion of graduates remaining in Ireland in their first year after leaving university and seeking employment. The economy unemployment rate, taken from the annual labour force survey, is also shown. All unemployment figures are for April of each year. Up to 1989 the trend in the unemployment rate of new graduates is different to that for the rest of the



Source: *First Destinations Survey*.

Figure 3: *New Graduate Unemployment, 1982-1997*



Source: *First Destinations Survey*.

Figure 4: *Comparing Graduate Destinations, 1982-1997*

labour force. While total unemployment increased throughout the 1980s, new graduate unemployment continued to decline. The option to emigrate was clearly crucial for new graduates. The decreasing number of graduates remaining in Ireland to look for work eased the pressure on wages allowing them to grow at the rates seen in Figure 2 and Table 1. From 1989/1990 onwards, when the option to emigrate was not as straightforward as it was in the 1980s, the new graduate unemployment rate increased in line with the increase in unemployment for the rest of the labour force. The proportion of new unemployed graduates more than doubled within the space of two years for both men and women.

A number of studies have recognised the fact that the proportion of graduates going into research or training at any one time is affected by the state of the graduate labour market at that time (Hughes and O'Connell, 1995; Bee and Dolton, 1990a). There are many reasons as to why graduates may choose to do further research or training rather than actively seek employment. Not least among these is the wish to avoid being tagged as an unemployed university graduate. Figure 4 graphs the proportion of graduates in employment alongside the proportion of graduates choosing to do further research or training. Those graduates doing teacher-training courses dominate the large proportion of female graduates choosing to continue their studies, particularly in the 1980s. The adverse labour market faced by graduates in the first half of the 1990s is again evident in Figure 4, with a decrease in employment and an increase in number of graduates doing further research or training during this period.

4.2 *The Demand for Graduate Labour*

So far we have seen that there was a large increase in the number of graduates in the 1980s and 1990s. We have also seen that there was a fall in the starting salaries received by these graduates in the first half of the 1990s. It seems reasonable to suggest that one event is caused by the other. Clearly, however, demand had a significant role to play, because supply increased over the entire period, whereas the downturn in starting salaries was isolated to a four or five year period.

Changes in the demand for new graduate labour can be decomposed into those that occur *between industries* and those that occur *within industries* (Freeman, 1986; Katz and Murphy, 1992). Between-industry demand shifts are driven by changes in product demand across industries or by sectoral shifts in the growth of productivity. *Within-Industry* demand shifts occur when the occupational distribution within industries changes so that certain demographic groups are favoured above others. Such demand shifts come about as result of the outsourcing of the production process or changes in the price of other inputs.

The effects on the demand for graduate labour arising from between-industry demand shifts will depend on the industrial employment distribution of each of

the groups. Table 2 shows the average employment and occupation distributions for ten graduate labour groups between 1982 and 1997. The vast majority of new graduates can be found in a handful of industries, such as Professional Services; Engineering and Metals; Food Processing and Production; Production of Chemicals and Glass; and, to a lesser extent, the Retail and Personal Services industry.

The concentration of graduates within a few industries leaves them susceptible to shifts in demand in these industries. Table 3 shows that over the entire 1982 to 1997 period industrial distribution changed to the benefit of the majority of most graduates, with both the manufacturing and service industries gaining a labour market share at the expense of agriculture, forestry and fisheries. Looking at the sub-groups of manufacturing and services industries we can surmise that there were between-industry demand shifts that benefited some graduate labour groups in particular. Taking, for example, the professional services category (including insurance and business services) we can see that there was a trend increase in demand for labour in this sector over the entire period. Workers in the professional services sector increased their share of the total labour input from 15 per cent in 1983 to 23.5 per cent in 1997. This would undoubtedly have been favourable to the labour demand of all of the graduate groups listed in our sample.

If within-industry demand shifts were important for new graduates, then one would expect to see a shift towards the technical, professional and managerial occupations within the industries where we find concentrations of new graduates. Without specific information on the distribution of occupations within industries for every year of the survey, it is difficult to get an accurate picture of these shifts. We can say, however, that the large increase in the proportion of workers in professional, managerial and technical occupations between 1993 and 1997 marked a rise in the demand for highly skilled labour. The fact that graduates, both new and old, make up a large proportion of this group gives support to the theory that a significant positive shift in the demand for new graduate labour was behind the recovery in salaries shown in Figure 2 and Table 1. The data that is available on the occupational distributions within industries shows that between 1993 and 1997 the majority of new workers classified as professionals, technicians or managers were indeed working in Professional Services, Insurance, and Commerce Sector.⁵ A large proportion of all new graduates are found in this occupation and industrial sector. This lends support to the theory of a within-industry demand shift favouring new graduates during the period.

5. *Labour Force Survey, 1993, 1996 and 1997*. Central Statistics Office.

4.3 \square Supply

From the point of view of the effect of cohort size on the wage structure, the different phases of growth in the starting salaries for primary level graduates and the relatively rapid increase in the supply of graduates makes the Irish graduate labour market an interesting case to study. This section focuses on the supply explanations behind these trends. One theory that has attracted attention in previous work is that shifts in supply are the driving force behind observed shifts in wages (Katz and Murphy, 1992 and Welch, 1979). Looking at the raw data on new graduates, this seems to provide a good explanation as to the source of the changes in annual salaries. To test the theory that an over-supply of graduates in the first half of the 1990s was behind the down turn in graduates' salaries the theory of Katz and Murphy (1992) is drawn upon. We test an extreme version of the above hypothesis and see whether the data is consistent with stable factor demand. In this scenario, we would be assuming that supply changes arising from increases in the number of university graduates and decreases in emigration were behind the fall in graduates' real wages after 1990.

Table 4 shows the percentage changes in the shares of aggregate labour input accounted for by various demographic groups. The last two rows of Table 4 show the change in the proportion of the aggregate labour input accounted for by new graduates each year. The rise in the supply of new graduate labour relative to the rest of the economy has been substantial. The rise in the number of women at third level has also resulted in an increase in their labour force participation. For example, between 1982 and 1990, female graduates working one year after leaving university increased their share of the working population by a staggering 84 per cent. This increase in the number of working female graduates was almost

Table 4: *Percentage Change in Share of Aggregate Labour Input*^a

	<i>Age Group and Sex</i>	<i>1982- 1990</i>	<i>1990- 1995</i>	<i>1995- 1997</i>	<i>1982- 1997</i>
MEN	16-29	-10.9	-17.1	-1.9	-27.6
WOMEN	16-29	4.6	-6.7	0.1	-2.4
MEN	30-54	8.3	-4.6	-1.4	1.8
WOMEN	30-54	46.7	69.8	6.0	164.2
MEN	55-75	-26.7	-17.3	-5.8	-42.9
WOMEN	55-75	-28.0	6.6	4.4	-19.8
MEN	New Graduates	44.7	19.7	-0.1	73.0
WOMEN	New Graduates	84.8	77.6	11.6	266.4

a. We are assuming most graduates are less than 29 years of age. Therefore, the number of graduates in each year are subtracted from the total number of workers in the 16-29 years age group.

double that of the next closest group, women in the 30 to 54 years of age group. The number of new working graduates relative to other labour groups continued to rise in the 1990s, though it levelled off somewhat towards the end of the period.

Table 5 gives a breakdown of changes in the total labour input of new graduates by graduating faculty. Again, the pattern here is of a female dominated increase in labour supply across faculties. The patterns of change in labour supply mirrors the changes in the composition of the graduate total that we saw in Figure 1, that is, a move away from the less applied subject areas such as Arts and Social Science, into more technical subjects such as Science and Engineering.

Table 5: *Supply Changes within Faculties*

<i>Percentage Change in Share of New Graduate Labour Input</i>					
<i>Faculty</i>	<i>Sex</i>	<i>1982-1990</i>	<i>1990-1995</i>	<i>1995-1997</i>	<i>1982-1997</i>
Arts and Social Science	Male	-33.7	-0.3	-7.2	-38.6
Arts and Social Science	Female	-27.8	31.6	9.3	3.8
Commerce and Business	Male	-0.3	-31.2	1.5	-30.4
Commerce and Business	Female	120.5	17.9	6.2	176.2
Engineering	Male	-13.7	-5.9	-11.3	-28.0
Engineering	Female	193.6	24.5	13.9	316.1
Agriculture	All Grads	-30.8	44.5	-31.5	-31.5
Food Science	All Grads	-45.1	23.1	-19.0	-45.2
Science	Male	41.0	-14.9	-3.4	15.9
Science	Female	51.1	10.0	18.3	96.6

Source: *First Destinations Survey*.

In order to check the hypothesis of stable factor demand for new graduate labour, we compute the inner products of changes in wages with the changes in supplies between any two periods. That is,

$$(W_t - W_\tau)' (X_t - X_\tau) \leq 0 \quad (1)$$

Where W_t is a (10×1) vector of wages for each group of graduates at time t , and X_t is a (10×1) vector of the labour supplies of each group at time t .⁶ Periods during which changes in supplies and changes in wages negatively co-vary (i.e., when Equation (1) is satisfied) have the potential to be explained solely by supply shifts. The top half of Table 4 shows the results of implementing Equation (1)

6. See Katz and Murphy (1992) for the derivation of Equation (1).

for the three phases of growth in graduates' starting salaries.⁷ Looking at the diagonal element for the 1990 to 1995 period, -0.0117 , we can conclude that supply increases were damaging to graduates' starting salaries during this period. The majority of the off-diagonal elements are positive, implying that over longer periods of the sample the supply changes did not affect graduates' starting salaries.

All comparisons between 1982 and each of the other years are positive and large, implying that over longer periods of the sample demand changes were important. Despite the large increases in the supply of graduates to the labour market over the entire period, the rising level of demand in the economy was sufficient to cause a smooth increase in the real wage over the period. It must be pointed out here that the supply measures used in Table 6 measure the number of graduates working in Ireland; the supply affect is eased somewhat by the proportion of graduates emigrating, particularly in the 1980s. The inner product for the period 1995 to 1997 (-0.0004), though negative is somewhat smaller than the other negative inner products, making it difficult to distinguish it from sampling error.

Table 6: *Inner Products of Changes in Wages with Changes in Supplies*

<i>Year</i>	<i>1982</i>	<i>1990</i>	<i>1995</i>
<i>Inner products of actual changes</i>			
1990	0.0120		
1995	0.0175	-0.0117	
1997	0.0166	-0.0149	-0.0004
<i>Inner products of changes in detrended series</i>			
1990	-0.0082		
1995	-0.0009	-0.0062	
1997	-0.0043	-0.0069	-0.0004

If we remove the parts of the changes in supply and changes in wages that are due to smooth increases in demand, it might be possible to make the observed wage changes consistent with the observed pattern of change in supplies. For example, given the extraordinary increase in the supply of all new graduates during the 1980s we would expect to see a relatively steady fall in the returns to education received by these graduates. The fact that the exact opposite trend

7. This is a compacted version of the full table that shows the results of implementing Equation (1) for each pair of years of the survey. In the larger version most of the off diagonal elements are positive, indicating that the supply effect was confined to a few short periods. The full set of results is available from the author.

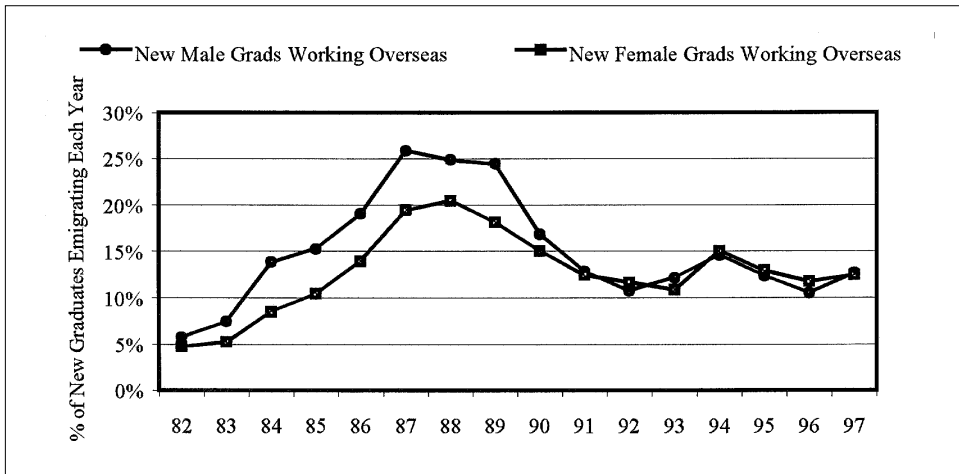
was observed, as shown in Figure 2, implies that the demand in the economy more than matched the increase in graduates entering the labour force at the time. The question is if this steady increase in demand did not occur, would the increases in supply have resulted in a fall in wages? To answer this question we implement Equation (1) for a series of *detrended* data. The results are shown in the bottom half of Table 4. The detrended series are the residuals from a regression of wages and of supplies on a constant and a time trend for each of the ten graduate groups. All of the inner products now show negative values, implying that accounting for *trend* demand growth alone can make the data consistent with the stable demand hypothesis. We can therefore say, that if there was no increase in the demand for new graduates, the supply increases would have resulted in a fall in wages.

V CONCLUSIONS

The rapid increase in the supply of third level graduates that occurred in Ireland between 1982 and 1997 led to a radical change in the educational make-up of the labour force during this period. The pressure on the salaries for new graduates resulting from this rapid increase in supply was eased by two major factors. First, there was a trend increase in the demand for labour inputs across certain industries and occupations. Based on the concentration of many new graduates within these industries and occupations, we infer that there was an increase in the demand for graduate labour over the period. This supports the results in other work by Barrett *et al.* (1999a, 1999b) and Hughes and O'Connell (1995).

The second factor that eased the pressure on the wages of new graduates was the increase in the level of graduate emigration. This was particularly apparent in the 1980s, as shown in Figure 5 below. As the level of emigration dropped in the early 1990s the pressure on wages became too great, and the real wages received by new male and female graduates dropped by 7 per cent and 9 per cent respectively within two years.

We also found quite a difference in the behaviour of male and female graduates' salaries after 1990 (Figure 2). This disparity is largely as a result of the concentration of female graduates in Arts and Social Science. As shown in Table 1, this group saw their real wage decline by over 12 per cent between 1990 and 1995. Looking at Tables 2 and 3, however, we would expect to see female graduates faring better than their male counterparts. This is because we find female graduates concentrated in industries and occupations the demand for which increased during this period. For example, from the average occupational distributions of the graduate groups in Table 2, we can see that Female Arts and Social Scientists differ from their fellow graduates in the relatively higher



Source: *First Destinations Survey*.

Figure 5: *New Graduates Working Overseas*

proportion of new graduates working in clerical or service occupations (on average 18 per cent of female Arts and Social Science graduates are classified in this category). However, as Table 3 shows, the proportion of the total working population in clerical and service occupations *increased* by approximately 25 per cent between 1990 and 1993 (from 40 per cent to 50 per cent). To explain this disparity in wages we must therefore look for supply explanations. And, as shown in Table 4, whereas the increase in the change in the share of the total working population accounted for by male graduates between 1990 and 1995 was 20 per cent; the same figure for female graduates was 78 per cent.

The theory of a severe supply effect is further supported by the results from the inner products calculations. These showed that the increases in supply during the early 1990s had a negative effect on the starting salaries of third level graduates. The relatively lower returns to education received by new graduates between 1990 and 1995 is also further evidence of the age-specific nature of the changes in the returns to higher education (Barrett *et al.* 1999a).

Section III noted that during the early 1990s, there was a significant difference between the growth in wages received by entry-level graduates and the growth in the level of average compensation for other workers in the economy (Figure 2). Barry (1999) discusses this very question, suggesting that "... [it] could reflect ... increased competition in the labour-market, [or it could be] evidence only of the weak UK labour-market conditions of the time".⁸ Our simple supply and

8. Note that the diagram on page 8 of Barry (1999) depicts *nominal* values of graduate pay and average compensation whereas the equivalent Figure 2 in the present paper is drawn in terms of real values.

demand analysis would seem to suggest that it is a combination of both. The increased competition amongst graduates for jobs, in the face of waning domestic demand, is a direct result of the weaknesses in the UK labour market. We would argue that in the face of these shifts in demand and supply, that it is plausible to suggest that the graduate labour market adjusted more flexibly than the rest of the labour market, therefore lowering the equilibrium wage for new graduates. These are, after all, workers with no previous labour market attachments, hence no union status or experience. If graduates are not willing to accept work at a lower wage, then the only option is unemployment, further training, or emigration. We have already seen that emigration was not an option in the early 1990s. Both unemployment and the number of graduates in training increased, although not to such an extent so as to compensate for a drop in graduate emigration from a quarter of all new graduates to a tenth of all new graduates, as was the case between 1989 and 1992. The relative inflexibility of the rest of the labour market in the early 1990s is illustrated by the rising unemployment during the period coupled with falling or stagnant supply (Table 4 and Figure 3).

In conclusion we can say that the future looks good for young graduates of universities in Ireland. The present rising demand for their skills, much of which seems to be concentrated within-industries, and the levelling off of the growth in supply, has put their salaries on a higher growth path than the one they were on throughout the 1980s. An avenue for further research would be to examine whether the slowdown in the supply of new graduates to the labour market, shown in Table 4, will affect the wages received by graduates one year after leaving college. Based on the preceding evidence one would expect to see rising returns to education amongst young graduates throughout the latter years of the 1990s and into the next century.

REFERENCES

- BARRETT, ALAN AND FERGAL TRACE, 1988. "Who is Coming Back? The Educational Profile of Returning Migrants", Paper presented to the Irish Economics Association at "The Economics of Migration", University College Dublin 23 June.
- BARRETT, A., T. CALLAN, and B. NOLAN, 1999a. "Rising Wage Inequality, Returns to Education and Labour Market Institutions: Evidence from Ireland", *British Journal of Industrial Relations*, Vol. 37, No. 1, March.
- BARRETT, A., T. CALLAN, and B. NOLAN, 1999b. "Returns to Education and the Irish Youth Labour Market", *Journal of Population Economics*, Vol. 12, No. 2, pp. 312-326.
- BARRY, FRANK, 1999. *Introduction to Understanding Ireland's Economic Growth*, Frank Barry (ed.), London: Macmillan Press.
- BEE, M., and PETER DOLTON, 1991, "What do Graduates Earn? The Starting Salaries and Earnings of University Graduates, 1960-1986", *Higher Education Quarterly*, Vol. 45, No. 1, pp. 78-90.
- BEE, M., and PETER DOLTON, 1990a. "Where do Graduates Go? The First Destinations

- of University Graduates, 1961/62 - 1986/87", *Studies in Higher Education*, Vol. 15, No. 3, pp. 313-329.
- BEE, M., and PETER DOLTON, 1990b, "Patterns of Change in Graduate Unemployment, 1962-1987", *Higher Education Quarterly*, Vol. 20, No. 1, pp. 25-45.
- BOUND, JOHN, and GEORGE JOHNSON, 1992. "Changes in the Structure of Wages in the 1980s: An Evaluation of Alternative Explanations", *American Economic Review*, LXXII.
- CANTILLON, SARAH, JOHN CURTIS, and JOHN FITZ GERALD, *Economic Perspectives for the Medium Term*, Dublin: The Economic and Social Research Institute.
- CORCORAN, T., J.J. SEXTON, and D. O'DONAGHUE, 1992. "A Review of Trends in the Occupational Pattern of Employment in Ireland, 1971-1990", *FÁS/ESRI Manpower and Forecasting Studies*, Report No. 2, July.
- COX, RICHARD, and PAMELA MEADOWS, 1997. "Employment of Graduates 1975-1990", *Employment Gazette*, April, UK: Department of Employment.
- DOLTON, P.J., G.H. MAKEPEACE, and G.D. HINCHLEY, 1990. "Early Careers of 1980 Graduates: Earnings, Earnings Differentials and Postgraduate Study", *Employment Department Group*, UK, Research Paper No. 78.
- DOLTON P.J., and G.H. MAKEPEACE, 1986. "Sample Selection and Male-Female Earnings Differentials in the Graduate Labour Market", *Oxford Economic Papers* 38, pp. 317-341.
- DURKAN, JOSEPH, DOIREANN FITZGERALD, and COLM HARMON, 1999. "Education and Growth in the Irish Economy", in Frank Barry (ed.), *Understanding Ireland's Economic Growth*, London: Macmillan Press.
- FITZ GERALD, JOHN, and IDE KEARNEY, 1998 "Migration and the Irish Labour Market". Paper presented to the Irish Economics Association at "The Economics of Migration", University College Dublin, 23 June 1998.
- FITZ GERALD, J., 1999. "Wage Formation and the Labour Market", in Frank Barry (ed.), *Understanding Economic Growth*, London: Macmillan.
- FREDRIKSSON, PETER, 1997. "Economic Incentives and the Demand for Higher Education", *Scandinavian Journal of Economics* Vol. 99, No. 2, pp. 129-142.
- FREEMAN, RICHARD B., 1986. "Demand for Education", in O. Ashenfelter and R. Layard (eds.), *Handbook of Labour Economics* Vol. 1, New York: Elsevier Science.
- HIGHER EDUCATION AUTHORITY (various years). "First Destinations of Awards Recipients in Higher Education", 1982-1996, Dublin: HEA.
- HUGHES, GERARD, and PHILIP O'CONNELL, 1995. "Higher Education and the Labour Market in Ireland, 1981-1991", *European Journal of Education*, Vol. 30, No. 1.
- JOHNES, GERAINT, J. TAYLOR, and GLENYS FERGUSON, 1987. "The Employability of New Graduates: A Study of the Differences Between UK Universities", *Applied Economics*, pp. 695-710.
- KATZ, LAWRENCE F., and KEVIN M. MURPHY, 1992. "Changes in Relative Wages, 1963-1987: Supply and Demand Factors", *Quarterly Journal of Economics*, CVII, pp. 35-78.
- KREUGER, ALAN B., 1993. "How Computers Have Changed the Wage Structure: Evidence From Microdata, 1984-1989", *Quarterly Journal of Economics*, February.
- O'CONNELL, P.J., and J.J. SEXTON, 1994. "Labour Market Developments in Ireland, 1971-1993", in S. Cantillon, J. Curtis and J. Fitz Gerald (eds.), *Economic Perspectives for the Medium Term*, Dublin: The Economic and Social Research Institute.
- OECD, 1996a, *Education at a Glance*, Paris: OECD.

- OECD, 1996b, *Employment Outlook*, Paris: OECD.
- SCOTT, NEIL, 1983. "Graduate Supply and Demand in 1983", *Employment Gazette*, February, Department of Employment.
- SHIMIZU, KUNIO, and EDWIN L. CROW, 1988. *Lognormal Distributions: Theory and Applications*, New York: Marcel Dekker Press.
- STEWART, MARK, 1983. "On Ordinary Least Squares When the Dependent Variable is Grouped", *Review of Economic Studies*, L, pp. 737-753.
- WELCH, FINIS, and KEVIN M. MURPHY, 1992. "The Structure of Wages", *Quarterly Journal of Economics*, pp. 285-326.
- WELCH, FINIS, 1979. "Effect of Cohort Size on Earnings: The Boom Babies' Financial Bust", *Journal of Political Economy*, Vol. 87, No. 5, Part 2.
- WILLIAMSON, PETER, 1981. "Early Careers of 1970 Graduates", *Unit for Manpower Studies*, UK: Department of Employment, No. 26, June.