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Investment in Education and Economic Growth on the Island of Ireland

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John FitzGerald¹, April 2019

Abstract

Looking at the post-war years, this paper considers how investment in education developed using different models and following different trajectories in Ireland and Northern Ireland. The result has been a very different impact on economic growth: increasing human capital made a major contribution to growth in Ireland since 1960, while in Northern Ireland the failure to make adequate investment in education is reflected in a continuing poor economic performance.

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Introduction

Since independence in 1922 the two economies on this island have pursued rather different paths. Both economies had a difficult experience during the 1920s and 1930s, but the Northern Ireland economy fared reasonably well during the war years and the 1950s, showing significantly faster growth than Ireland. From 1969 onwards the “Troubles” had a major impact on the Northern Ireland economy, while in Ireland the self-inflicted financial crisis of the 1980s had a very serious impact. However, since 1990 the paths of the two economies have shown major divergence, with exceptional growth in Ireland and a rather poor performance in Northern Ireland, in spite of the Belfast Agreement in 1998 bringing peace to the island.

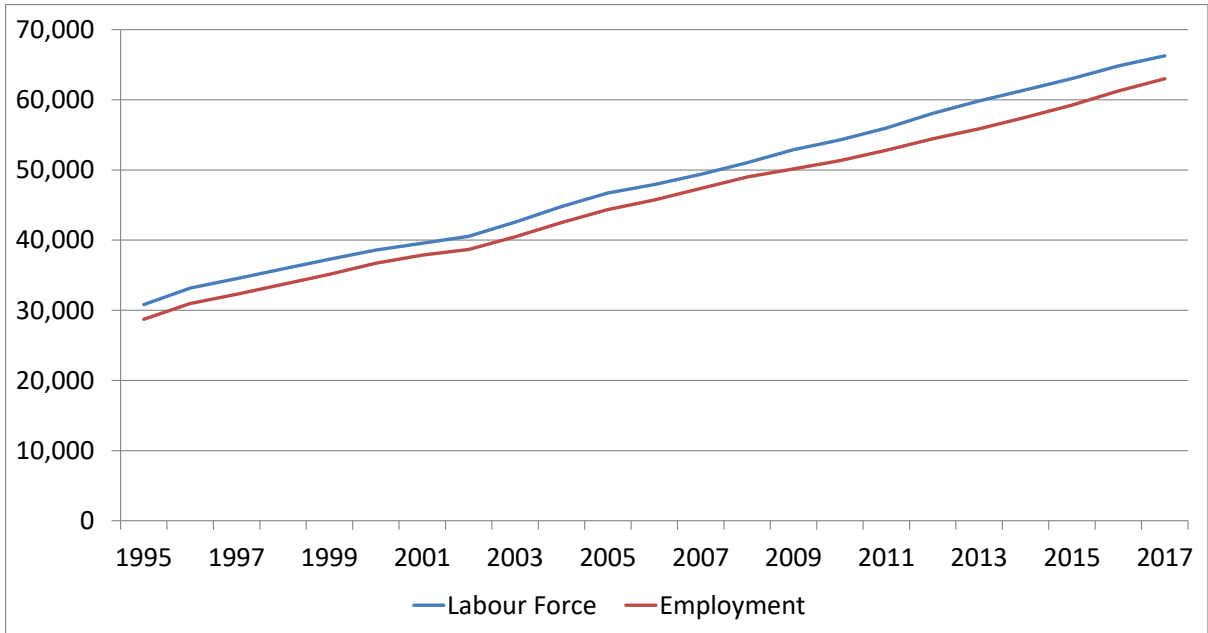
A crucial factor in Ireland’s economic failure in the immediate post-war years was the neglect of investment in education. In Northern Ireland, the UK Education Act of 1944, initiated an upgrade of its education system along similar lines to what was happening in England. The resulting two tiered system separated children at age 11, with those with superior achievement at that age going on to grammar schools, while the rest of children went on to secondary school. In both cases education was free.

By contrast, in Ireland there was little progress until the publication of the OECD report *Investment in Education* in 1965. This report highlighted the economic and social costs arising from the very inadequate education system in Ireland. This report initiated a major reform, beginning with the introduction of free secondary education in 1967.

The 1967 reform was only the beginning of a long process of upgrading the Irish education system. By contrast, the Northern Ireland system has remained largely unchanged since the 1960s. As a result, of the reforms in Ireland there has been a dramatic increase in the proportion of the population Ireland with a good education while Northern Ireland, where the education system has not undergone major change, stands out in these islands as having the population with the lowest level of educational attainment. This contrasting experience has played a vital role in determining the different performance of the two economies over the last 30 years.

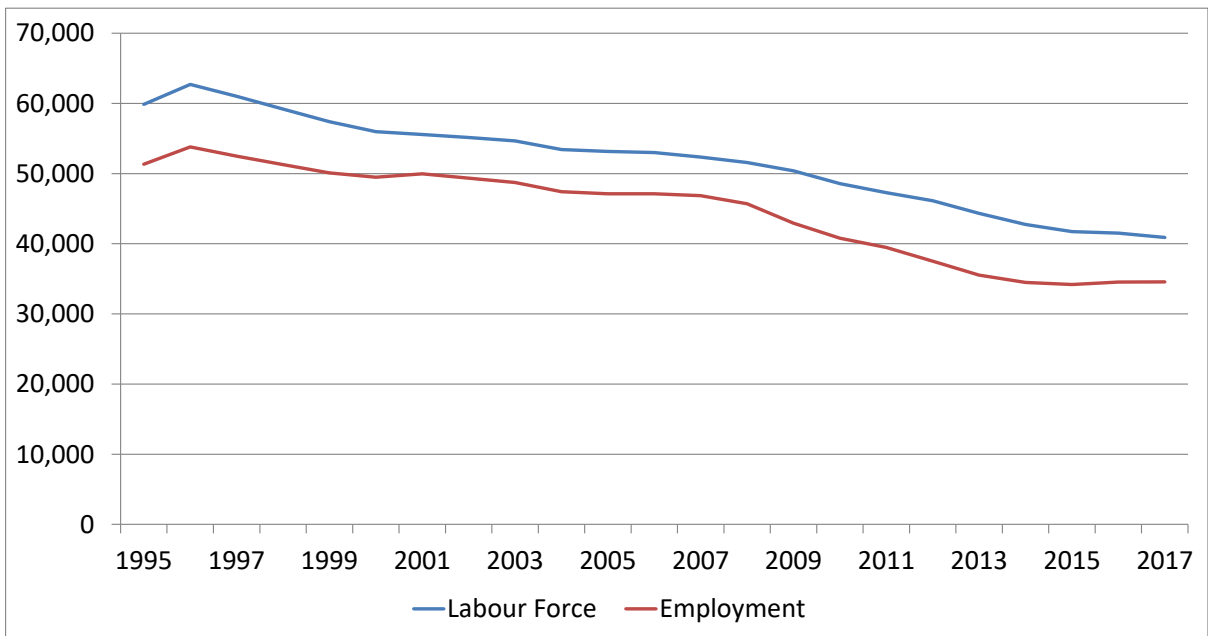
The developments in the economies on the island of Ireland must be seen against the backdrop of the major changes that have taken place in the wider EU labour market. Figure 1 shows the steady increase in both employment and the labour force with third level qualifications across the EU15. This growth in employment continued through the years of the financial crisis. By contrast, Figure 2 shows the trend in employment and the labour force for those that had not completed high school. The gap between the two – unemployment of those who had not completed high school – rose substantially in the period 2008-2013.

Figure 1: Labour Market for those with Third Level Education, EU15, thousands.



Source: Eurostat Labour Force Survey.

Figure 2: Labour Market for those who had not completed High School, EU15, thousands.



Source: Eurostat Labour Force Survey.

With increased globalisation the EU economy has specialised into producing goods and services requiring skilled labour. Because of technical change in modern economies, which has been amplified by these effects of globalisation, there has been a continuing rise in the demand for labour with third level education across the EU. By contrast, many of the goods produced using unskilled labour are now manufactured elsewhere, especially in Asia. The EU economies that have upgraded the skills of their work force in line with the changing demand for labour have kept unemployment low and raised productivity. By contrast, where the upgrading of the skills of the workforce has

lagged behind the changes in demand, the result has been low growth in productivity, and hence earnings, often combined with high unemployment.

With a low own elasticity of demand for unskilled labour (and a low elasticity of substitution for skilled labour) the increasing mismatch between the supply and demand for unskilled labour has put downward pressure on unskilled wage rates, or else resulted in rising unemployment where the welfare system provides an effective floor (Bergin and Kearney, 2009).

Section 2 of this paper provides more detail on the educational systems in Northern Ireland and in Ireland. The resulting educational attainment of the population is discussed in Section 3 in the wider EU context. The effects of the investment in human capital on growth are analysed in Section 4. Finally, the policy implications of these results are discussed in Section 5.

2. Two Education Systems

Two centuries ago the need to develop primary education in Ireland attracted significant government attention. The result was the establishment of a primary education system for the whole of Ireland in the early 1830s (O'Brien, 2013). Initially, the government set up a board in 1831 to provide multid denominational education across the island. The Catholic Church and the Church of Ireland Archbishops of Dublin sat on the Board of Education and tried to make it work.² However, in the later 1830s the Presbyterian Church opted out as they wanted separate denominational education. This ended the efforts to develop an integrated primary education system.

This set the pattern for the subsequent two centuries as education in both parts of the island has been managed on denominational lines. In Ireland the system has evolved in recent years, with most schools accepting children of different backgrounds, whatever the nature of the management. However, in Northern Ireland children generally attend schools where the management is of the same faith background as the parents.

In 1920 the new Northern Ireland government inherited a denominational system of education. The first Minister for Education, Lord Londonderry, wanted to move to a multi-denominational system but this was rejected, especially by the Catholic Church (Borooah, 2015). Since then the system has been largely denominational in nature, though there has been some increase numbers of children attending integrated schools over the last 20 years.

Across the island, in 1922 second level education was fee paying, which limited attendance to those whose parents could afford it. The result was that very few children completed a high school education. This situation persisted up to the end of Second World War in Northern Ireland and until 1967 in Ireland.

The 1944 Butler Act introduced free second level education in England and Wales. This reform was introduced in Northern Ireland as the Northern Ireland Education Act, 1947. This replicated the English system of free grammar schools, based on selection, and free secondary schools open to all. While the selective nature of the system has been modified in much of England, initially with the introduction of comprehensive schools, the system of selection on ability into grammar schools has

² In 1831 the Chief Secretary said of the Board, which included among the seven Commissioners the Catholic and Church of Ireland Archbishops of Dublin (Murray and Whately): the commissioners got on "admirably well together – especially the two in black petticoats" (O'Brien, 2013).

remained unchanged in Northern Ireland since its introduction. Though the 11 plus exam, which was used to select children for grammar schools, was abolished from 2009, it has been replaced by a similar but ad hoc system of selection on ability into the second level system at the age of 11.

In 1965 a report on education in Ireland entitled *Investment in Education*, was published. It was produced under the auspices of the OECD and authored by Martin O'Donoghue, Paddy Lynch, Bill Hyland and Pádraig O'Nualáin. It strongly recommended that Ireland greatly increase investment in education. It drew on economic research for other countries which highlighted the economic benefits of investment in human capital. This report had an important influence on subsequent policy: free second level education was introduced in 1967. This saw the beginning of a major increase in participation at second level over subsequent decades.

The system was rolled out by expanding existing schools that had been fee-paying and gradually building new schools.³ Unlike the system in England and Northern Ireland, the decision was made to provide free second level education in each school for children of all abilities. This has been the system ever since. Other than in south Dublin, fee paying schools, which often select on ability, account for a small share of total pupils.

At third level Trinity College Dublin was established in 1592, and it remained the sole university till 1795, when Maynooth College was established as a Catholic Seminary. Three Queens Colleges were established in Belfast, Cork and Galway in 1849. The Royal University was established in Dublin in 1880; it was the first university that could award degrees to women. In 1909 it became University College Dublin. These were the third level institutions at the time of independence in 1922.

Since 1922, the University of Ulster was established in 1967 as part of a UK wide expansion of third level institutions, and in Ireland the 1970s also saw a major expansion of new institutions – the Regional Technical Colleges (Institutes of Technology) and two new universities.

At third level there was expansion in the post-war years in both jurisdictions but the capacity (in terms of numbers of students) of the third level institutions in Ireland is much greater per head of population than in Northern Ireland.

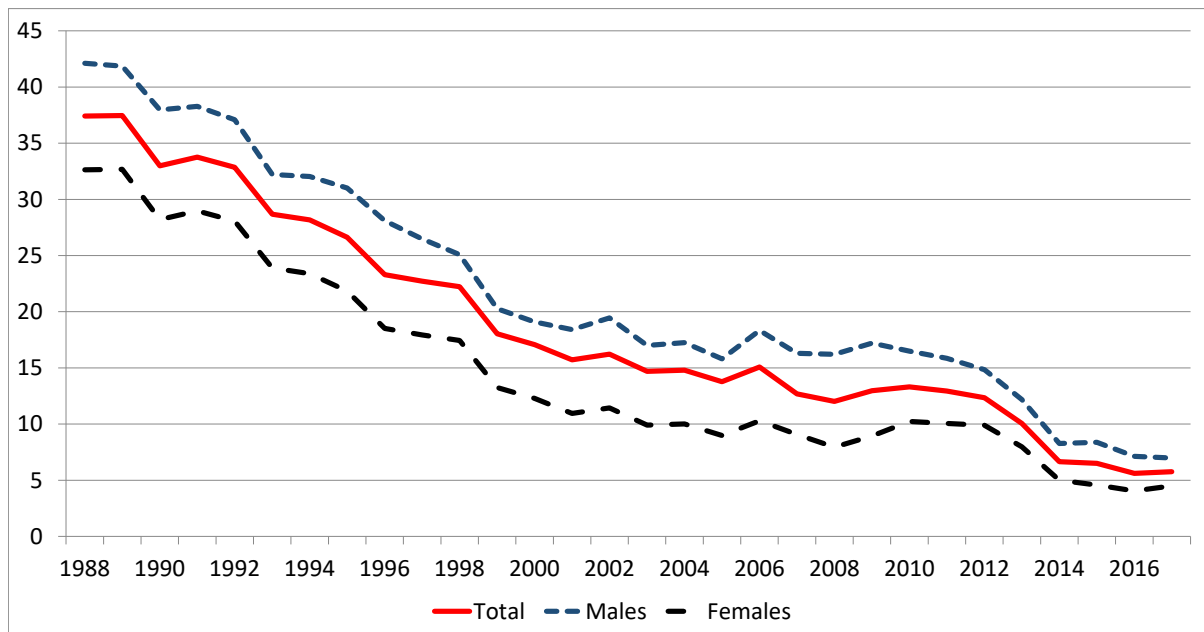
At second level, the educational systems on this island, while having a similar denominational basis, have evolved very differently. While in Ireland the system of second level education largely involves schools with children of mixed ability, there has been significant streaming of pupils by ability within schools. In 1980 60% of second level schools adopted this approach of streaming by ability (Smith, 2016). However, a 1987 study by Hannan and Boyle found that streaming did not significantly improve outcomes for good students, but that it could have serious negative effects on students of lower ability.

In the light of this research, policy developed to encourage more integrated schooling. By the early 2000s the proportion of schools implementing streaming had halved. Smith found that the situation had evolved so that:

³ While there had previously been a limited set of free Vocational schools, over the subsequent 30 years these were either amalgamated with other schools, or took on the character of an integrated secondary school.

“streaming does not appear to be driven by the heterogeneity of student ability but rather by the presence of a sizeable group of students who are seen to have difficulties in core skills such as literacy. In addition, the use of streaming has become concentrated over time in schools serving working-class populations.”

Figure 3: Proportion of children with lower secondary education, Ireland, %



Source: CSO Labour Force Survey and Eurostat

However, because a high proportion of the pupils in the lower streams were dropping out before the end of high school she found that “ability grouping can be seen as playing a key role in the reproduction of socio-economic inequality within Irish schools.”

As shown in Figure 3, the proportion of children dropping out before doing their leaving cert. has fallen dramatically since the late 1980s. While the improvement had appeared to slow in the 2000s, the effect of the financial crisis appears to have persuaded children to remain in school, resulting in a further decline in early school leaving (Bercholz and FitzGerald, 2016).

Borooah, 2015, has carried out a detailed analysis of the educational system in Northern Ireland. Since the introduction of free second level education after the war the system has selected children into grammar schools on the basis of ability. Approximately 30% of each cohort progress to grammar schools, while the majority of pupils go on to secondary schools. This is a much more extreme form of selection than the streaming occurring within schools in Ireland. Also, while in Ireland there has been a reduction in streaming within schools, the Northern Ireland system has remained largely unchanged since its inception 70 years ago.

In Northern Ireland, as well as the split of second level schools into Secondary and Grammar, they are also divided into Catholic and Protestant schools with, more recently, some schools that are non-denominational. Borooah also discusses the effects of the split along religious lines on the wider society and suggests the development of a “shared education” model to overcome some of the problems with the current system.

A critical assessment of the performance of secondary schools today in Northern Ireland today is provided by Borooah:

“Taken collectively, Northern Ireland’s post-primary secondary schools fail to meet the minimum acceptable standard for post-primary schools in England of 40% of Year 12 pupils.⁴ However, this collective failure masks an even deeper failure at the level of individual schools. Of Northern Ireland’s 142 secondary schools, 82 (or 58%) performed below the ‘40% standard’ and, in these underperforming schools, the average proportion of Year 12 pupils obtaining the requisite GCSE passes was just 28% while, in the secondary schools that were not underperforming, it was 51%. So, there are two aspects to performance inequalities within Northern Ireland’s schooling system: (1) inequality between grammar and secondary schools; and (2) inequality between secondary schools.”

The performance also differs between Catholic and Protestant schools. In Protestant secondary schools only 33% of children reached the requisite standard whereas the figure in Catholic schools was 41%. By contrast the figure for grammar schools of both denominations was around 95%.

Table 1: Participation rates in education at age 17 in UK regions, 2016, %

Ireland	100
United Kingdom	94
North East	98
North West	96
Yorkshire & Humber	93
East Midlands	91
West Midlands	93
East Midlands	94
London	93
South East	93
South West	94
Wales	75
Scotland	100
Northern Ireland	89

Source: Eurostat

A commonly used indicator of deprivation in Northern Ireland is eligibility for school meals. On this measure only 20% of protestant boys from a deprived background reached the requisite standard whereas 33% of Catholic boys from the same background did so. The comparable figure for Protestant girls was 33% and for Catholic girls 44%. Thus the present system most severely disadvantages boys from a Protestant background.

The drop-out rate from education for children aged 17 is higher in Northern Ireland than in the other UK regions, as shown in Table 1. This reflects the problems in the underlying educational system and also in the importance that parents, and hence children, attach to education.

⁴ This standard is defined as obtaining 5 or more A* – C (E&M) GCSE passes, which is treated as being the standard for successfully completing high school.

Because education plays such an important role in determining the future life chances of children, the failure of the education system to address their needs will have long-lasting consequences for the Northern Ireland economy and society.

3. Educational Attainment

The impact of investment in human capital takes many years to pay off for the economy and also for the wider society. For example, while free secondary education was introduced in Ireland in 1967, the resulting increase in numbers completing high school did not rise appreciably until at least 5 years later. Then it took a further 20 years before it affected the productivity and behaviour of 40 year olds and another 20 years before the effects fed through to the older generation of workers. Thus the success or failure of an educational system in upgrading the qualifications of the population must, as a result, be assessed in quite a long time scale.

This Section looks at the outcomes of the operation of the different educational systems on this island in terms of the educational attainment of the population of working age. It is also valuable to place developments in Ireland in a wider UK and EU context. Data on the educational attainment of the different cohorts of the population in Ireland, the UK and the rest of the EU in the mid-1990s are used to discover the effectiveness of the educational systems across the EU over time. The results for Ireland and Northern Ireland are highlighted in the Figures 4, 5, and 6. The data are affected by differential survivorship and also by migration. The effects of migration on Northern Ireland and Ireland are discussed later in this Section.

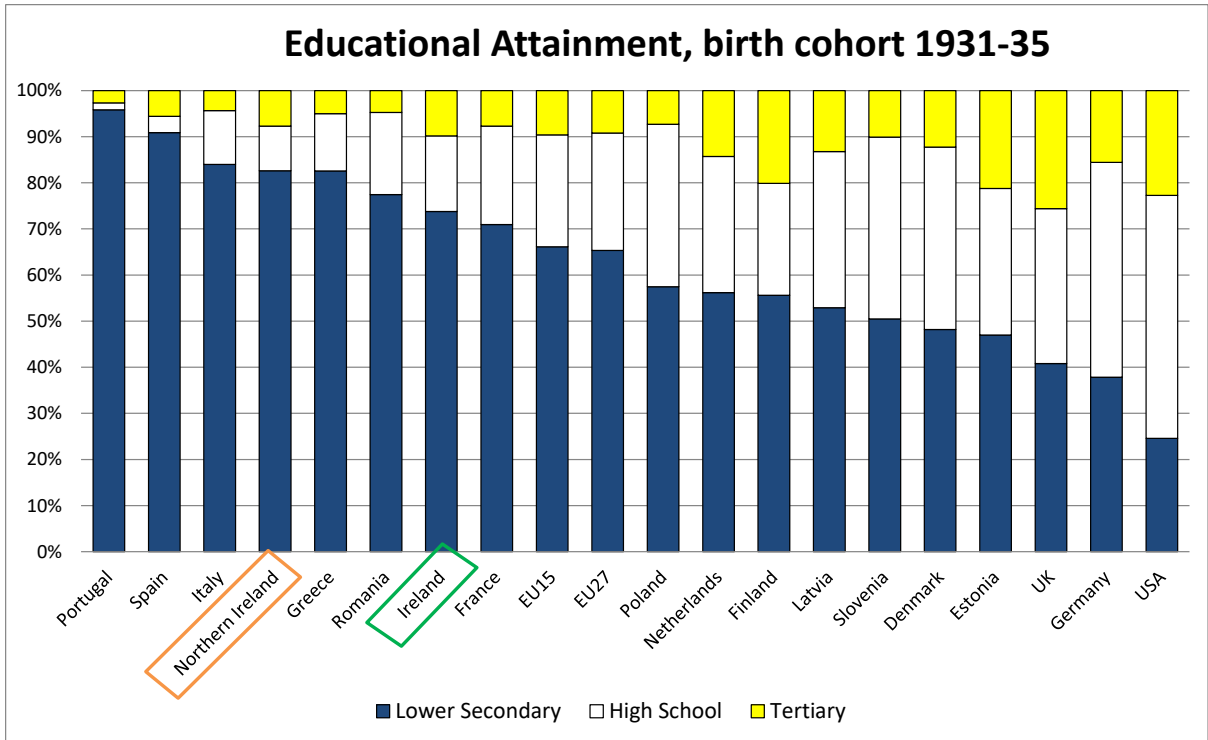
For the cohort born between 1931 and 1935 the effects of differential mortality and migration arising from the Second World War were particularly important.⁵ Subject to this important caveat, Figure 4 provides a summary picture of the educational attainment of that cohort of the European population. It is clear from Figure 4 that across Northern Europe, from Estonia to the UK, 40% of the cohort completed second level education and over 10% went on to complete third level.

However, across southern Europe, Ireland and Northern Ireland, the educational outcomes were much inferior, with under a quarter completing high school. The fact that the UK as a whole was one of the top-performing countries highlights the poor outcomes for those born in Northern Ireland in the early 1930s.

Figure 5 shows the outcomes across Europe for those born between 1951 and 1955. Once again Ireland and Northern Ireland appear with the group of southern European countries as having poor educational systems.

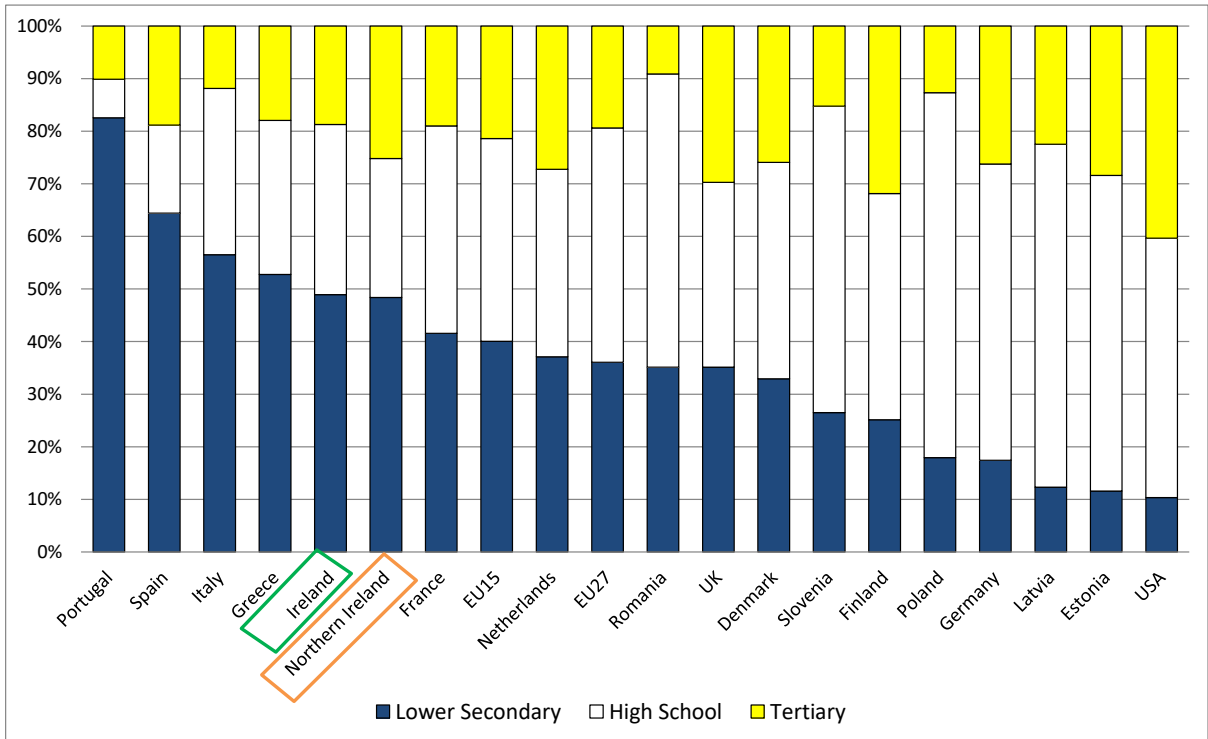
Figure 4: Educational Attainment, Birth Cohort 1931-35, %

⁵ This Figure is based on those who survived to age 65. For much of Europe the devastation caused by the Second World War have affected those who survived and also the educational opportunities available to this cohort in the 1940s. In particular, the Holocaust saw a huge segment of the population wiped out in many EU countries. Soviet deportation of the middle class citizens of the Baltic Republics had a big effect on those populations. These considerations do not affect the data for later cohorts, born after the War.



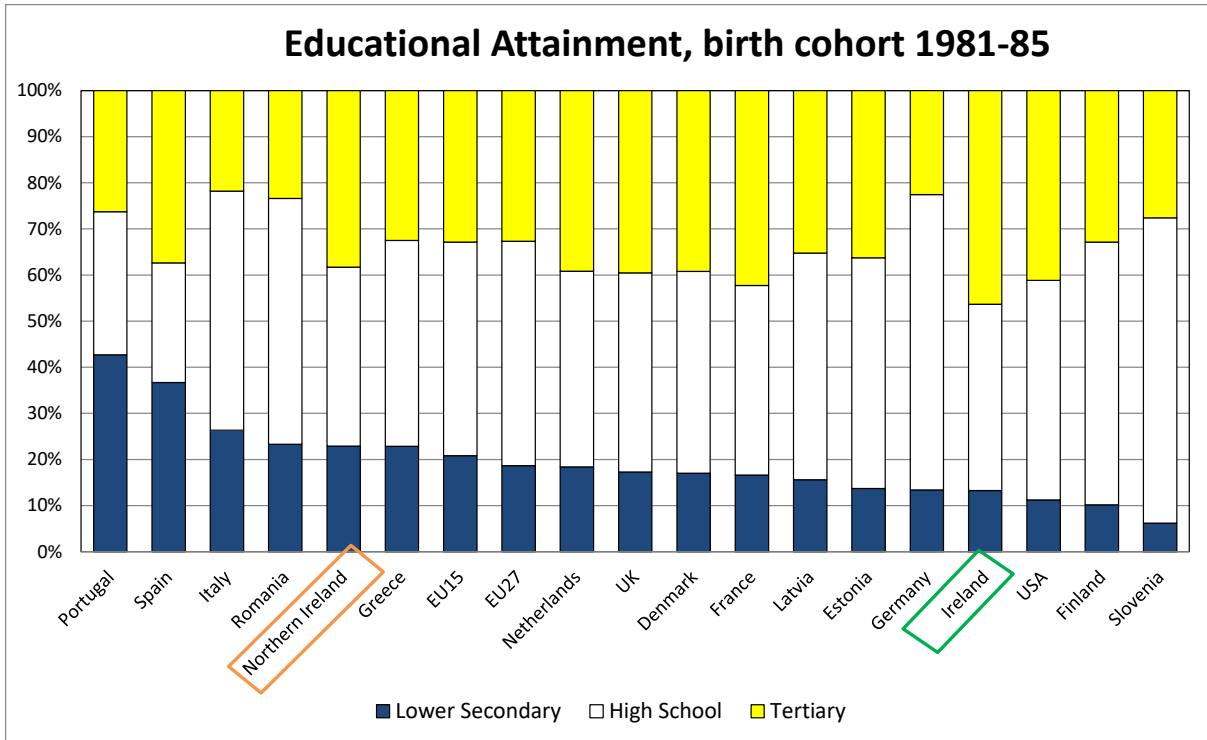
Source: Eurostat Labour Force Survey and NISRA Census

Figure 5: Educational Attainment, Birth Cohort 1951-55, %



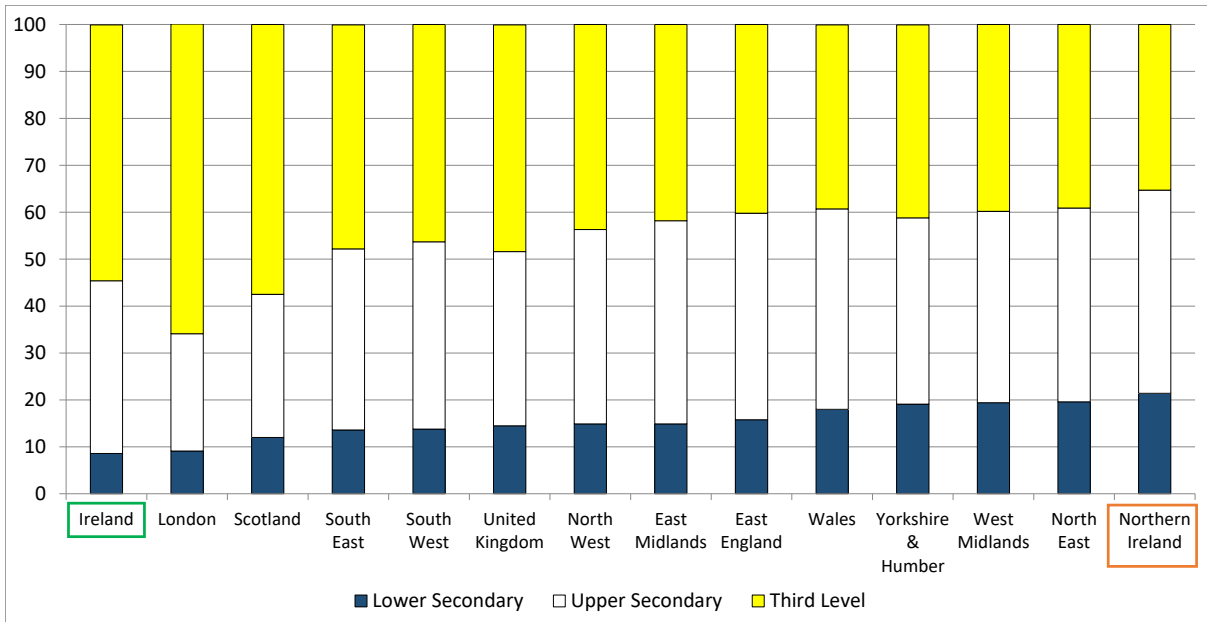
Source: Eurostat Labour Force Survey and NISRA Census

Figure 6: Educational Attainment, Birth Cohort 1981-85, %



Source: Eurostat Labour Force Survey and NISRA Census

Figure 7: Educational Attainment 2017, Population aged 30-34, %



Source: Eurostat Labour Force Survey

The availability of relatively low cost secondary schools in Ireland may explain a slightly higher proportion of children completing high school than in Northern Ireland. However, for both jurisdictions the number failing to complete high school was exceptionally high, similar to the experience in southern Europe.

The effects of the UK 1944 education act are apparent in the UK figures for those born in the early 1950s, especially in the increased progression to third level education. The expansion of the third level sector in England, with the creation of many new institutions in the 1960s, saw many of those born in the early 1950s availing of the opportunity to obtain degrees.

The benefits of the reforms consequent on the UK 1944 Education Act can also be seen in the slightly better performance of Northern Ireland relative to Ireland for this cohort. For Northern Ireland the numbers obtaining a third level qualification more than doubled to around 25% for this cohort. This showed the effects of the investment in grammar schools, which specifically prepared children for third level education. However, the numbers failing to complete high school were still exceptionally high.

Figure 6 shows the outcomes for those born in 1981-85. For this cohort living in Ireland there was a dramatic change, with 45% completing third level education and the proportion failing to complete high school falling to under 15%. This puts the Irish educational experience firmly in line with that of other northern European countries. By contrast, Northern Ireland still had one of the highest proportions of early school leavers in Europe. This reflected the fact that, unlike in England, the system of selection at age 11 has continued unreformed since the 1950s.

The importance of different educational systems is also emphasised in Figure 7, which shows the educational attainment of those aged 30-34 in 2017 across the UK regions. This shows the educational outcomes for the cohort born between 1983 and 1987. The figures for London are heavily distorted by immigration. Northern Ireland has the highest proportion of early school leavers of all UK regions at over 20%. By contrast, Scotland, which has an integrated educational system that does not select children into schools on ability, has the lowest early school leaver rate in the UK (barring London) at around 10%. The Irish rate is slightly lower still.

London has by far the highest share of third level graduates aged 30 to 34 in these islands, much of this resulting from immigration. However, what is particularly striking is that Scotland, in spite of outward migratory flows, had the next highest share of graduates aged 30-34 in the UK outside London, a share that is even higher than that in Ireland. By contrast, in Northern Ireland the share is the lowest in the UK.

Migration

For the last two centuries the island of Ireland has been part of a British Isles labour market. For most of that period there was net emigration from the island. Since the late 1920s the major destination for those leaving the island has been Great Britain (GB). Table 2 shows the share of the current population born in Northern Ireland and Ireland that were living in GB in 2011. The legacy effects of the very large emigration from Ireland from the late 1940s through to the early 1960s is evident from these data. About a third of those born in Ireland between 1926 and 1946 were living in GB in 2011. The outflow from Northern Ireland was somewhat less with between 20% and 25% of that cohort living in GB in 2011.

Table 2: Share of Population living in Great Britain, 2011, %

	Northern Ireland	Ireland
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Total	13.9	9.4
0-15	2.4	1.0
16-24	9.6	2.9
25-34	14.2	6.0
35-44	16.0	6.9
50-64	20.0	14.6
65-74	23.1	31.5
75-84	21.4	37.4
85+	23.8	35.1

Source: ONS Census

However, the growing success of the Irish economy from 1970 can be seen in the reduction in the proportion of the Irish born population living in GB for the younger age groups: under 7% of those born between the late 1960s and early 1980s were living in the UK in 2011. However, for Northern Ireland the pattern is rather different with around 15% of the same cohort living in GB. Emigration has continued to be a significant part of the experience of Northern Ireland in recent years.

Table 3: Living in England and Wales aged 15-64, % of Population in Ireland, 2011

Ireland	Age	Lower Secondary	Upper Secondary	Third Level
	15-24	6.1	4.7	11.6
	25-49	5.9	4.1	8.7
	50-64	14.6	17.2	6.5
	65+	35.7	19.2	44.0
	15-64	10.0	7.3	8.4
Northern Ireland	15-64	8.7	10.5	23.5

Source: ONS Census, NISRA Census, CSO Census.

Table 3 shows the stock of emigrants from Ireland and Northern Ireland living in England and Wales by level of education.⁶ While two thirds of Irish emigrants aged 65 and over living in the UK had not completed high school and only 13% were graduates, nonetheless those graduates living in Britain constituted 44% of graduates living in Ireland. In other words almost half of Irish graduates in the late 1940s and 1950s emigrated permanently to England and Wales, constituting a major economic and social loss to Ireland. By contrast, for those aged 25-49 the number of graduates in England and Wales was 9% of those living in Ireland. As for many of these graduates their stay in England and Wales is only temporary, the economic and social effects of this outflow are completely different from the experience of the 1945-65 period.

In 2011 almost a quarter of graduates of working age born in Northern Ireland were living in England and Wales. Unfortunately a more detailed age breakdown is not available. However, Table 4 shows where Northern Ireland students are attending third level. It suggests that approximately half of all 18 year olds progress to third level education. While drop outs mean that this is not directly comparable to the figures for educational attainment, these data suggest quite a high level of progression to third level. When the figure for progression to third level in 2008 (50%) is compared to the proportion of 30 to 34 year olds in Northern Ireland with third level qualifications (35%) it is

⁶ Unfortunately, an age breakdown of the data for Northern Ireland is not readily available from the Census.

clear that almost a third of graduates born in Northern Ireland end up living in Great Britain. The fact that a quarter of students attend university in Great Britain as undergraduates increases the probability that they do not return. Thus the problem posed for the Northern Ireland economy by the small share of the Northern Ireland population with third level qualifications is attributable more to emigration than to low levels of progression to third level by children born in Northern Ireland.

Table 4: Northern Ireland domiciled first year students by location of Higher Education Institution attended, % of cohort of 18 year olds

	Northern Ireland	Great Britain	Total
2008	36	15	51
2009	37	15	52
2010	35	16	51
2011	35	19	54
2012	35	15	50
2013	39	16	55
2014	38	17	55
2015	33	19	52
2016	37	19	56
2017	36	19	55

Source: <https://www.economy-ni.gov.uk/publications/enrolments-uk-higher-education-institutions-northern-ireland-analysis-201718>

In spite of the very large outflow of migrants over the last century there has always been a significant number of returning emigrants to Ireland, not just from the UK, but also from the US in earlier decades. Fahey, FitzGerald and Maitre, 1998, show that in 1991 over 30% of male graduates in Ireland with third level qualifications were returned emigrants. From the mid-1990s onwards there was a major return of those who had gone in the 1980s. This pattern of temporary emigration has become part of the Irish experience in recent decades. Even in the boom times of the early 2000s many Irish people left only to return over the subsequent decade. The 2011 and 2016 Censuses show that 28% of Irish graduates living in Ireland in those years were recent returned emigrants.

Unfortunately similar figures are not available for Northern Ireland. However, the larger stock of graduates born in Northern Ireland who are living today in GB suggests a significantly lower rate of return. Anecdotal evidence suggests that this pattern of non-return is much more significant among graduates from a Protestant background.

Research by Barrett and Goggin, 2010, looked at the large number of Irish people who emigrate and subsequently return. This research shows that because of the experience that these temporary emigrants acquire while abroad, their lifetime earnings are enhanced by up to 7%. In turn, this suggests a significant benefit in terms of increased productivity for the wider economy. Because such a return flow of emigrants is not happening on similar scale in Northern Ireland this is a loss to that economy and society. The loss is all the greater because of the high proportion of graduates among the emigrants.

4. Human Capital and Economic Growth

The *Investment in Education* report in 1965 recognised the importance of investment in human capital for economic growth. As discussed earlier, this report had a significant impact on public policy in Ireland. The ramping up of investment in human capital in subsequent years has played an important role in Ireland's economic catch-up on its EU neighbours since 1990. In recent years quite a number of studies have been undertaken that have validated the conclusions of the 1965 report.

Investment in human capital can impact on the wider economy through a number of channels:

1. It will increase the productivity of the individual and hence of the economy ;
2. It will increase labour force participation, especially by women;
3. It will reduce the probability of being unemployed.

A range of studies using different methodologies have quantified the effects of investment in education on growth operating through these three channels.

Breen and Shortall, 1992, using Irish data, examined the long-term effects on the probability of being unemployed of upgrading the educational attainment of school leavers. They quantified the effect on state expenditure on welfare benefits of raising the educational attainment of those leaving school without qualification to the level of minimum qualifications – a junior cert. Because people with at least a junior certificate were much more likely to find employment than those with no qualifications, they found that, by upskilling the early school-leavers, there would be a long-term major saving to the state on unemployment benefits.

Durkan, Fitzgerald and Harmon, 1999, developed an index of human capital using the returns to different levels of education as reported in Callan and Wrenn, 1994. They weight the returns for each level of education by the proportion of the labour force with that level of attainment. Using a Solow growth model decomposition, they estimate that the growing educational attainment of the labour force added around one per cent a year to the effective growth in employment and output. They also suggested that in the period 1996-2006 the growth in educational attainment would add a further 0.8 per cent a year to the labour input.

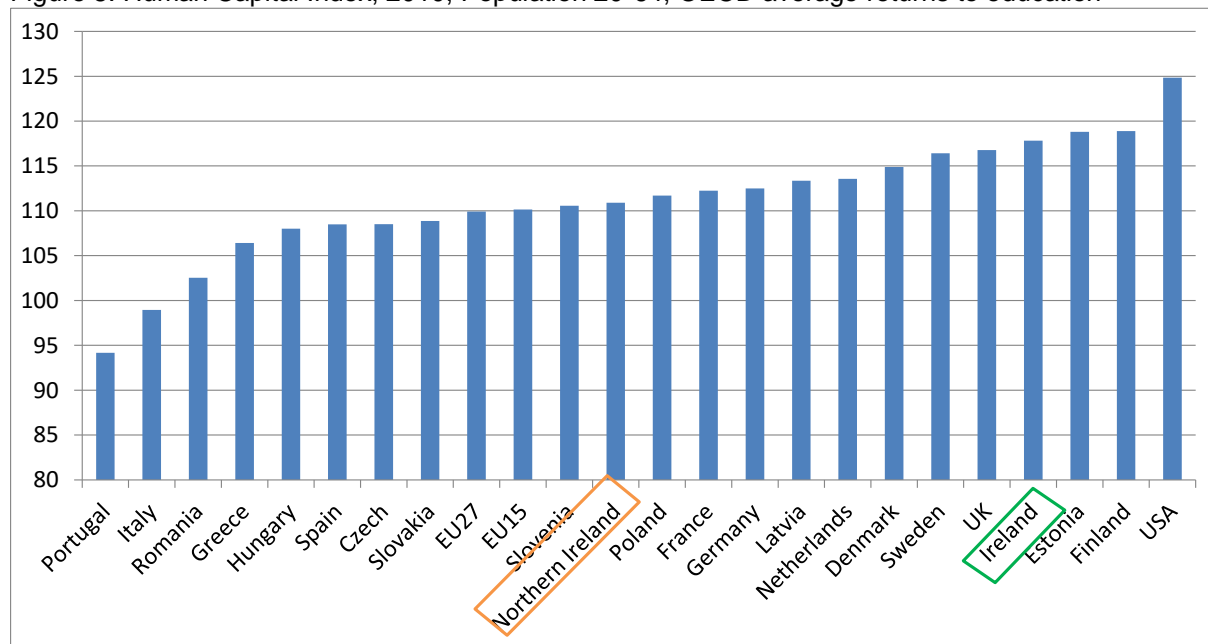
Applying this approach to the growth in the Irish economy between 1960 and 1992 they estimated that almost 20% of the growth over that period was accounted for by the increase in human capital. Average growth in GNI over that period was 3.2% a year so that the Durkan *et al.*, analysis would suggest that the investment in education produced a return in terms of growth of over 0.6% a year. FitzGerald *et al.*, 2005 replicated these results, estimating, *ex post*, that growing human capital added between 0.5% and 0.8% a year to the effective growth in employment between 1990 and 2005 and output.

Using the Durkan *et al.* approach, FitzGerald, 2012, develops an index of human capital for each EU economy in 2010, including Northern Ireland⁷, and the results are shown in Figure 8. The average returns to different levels of education across the OECD are weighted by the proportion of the population with each level of educational attainment. The OECD average returns are preferred to using national returns because, for Scandinavia, the returns to education are rather low, given a very

⁷ The results from FitzGerald, 2012 are supplemented using data on educational attainment from the 2011 Census for Northern Ireland.

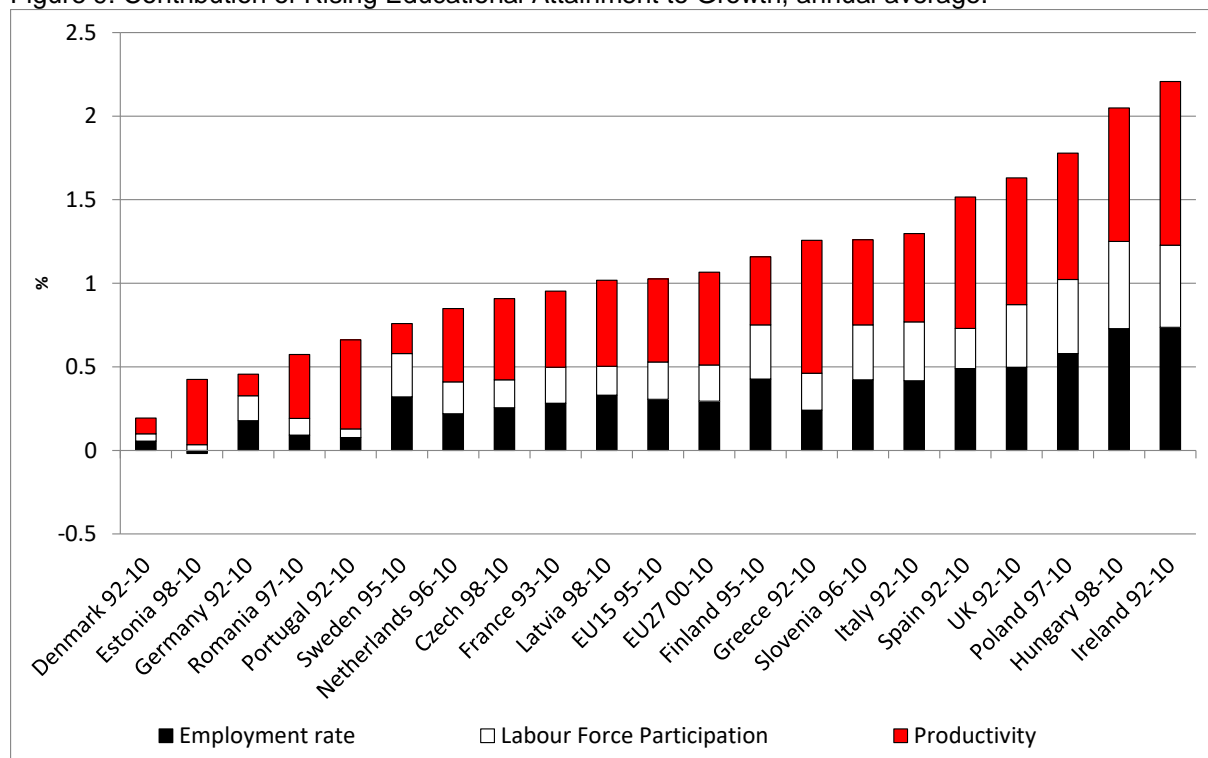
even dispersion of earnings. Use of national returns would, as a result, show Scandinavian countries towards the bottom of the index. This reflects the problems in comparing results across countries.

Figure 8: Human Capital Index, 2010, Population 20-64, OECD average returns to education



Source: FitzGerald, 2012 with data for Northern Ireland from the Census for 2011.

Figure 9: Contribution of Rising Educational Attainment to Growth, annual average.



Source: FitzGerald, 2012

To the extent that the private returns to education reflect the productivity of individuals, the changes over time in the index for a country should reflect changes in the productivity of labour.

Figure 8 shows Ireland as having among the highest endowments of human capital in the working age population in Europe, very similar to that of the UK. However, Northern Ireland is ranked rather lower at around the EU15 level. Clustered at the bottom are Portugal, Italy, Romania and Greece.

Barrett *et al.*, 2002, showed that, if anything, the returns to education increased over the 1990s as a result of increasing demand for labour with high levels of education. This increase occurred in spite of a substantial increase in the supply of skilled labour, partially as a result of immigration. This suggests a significant outward shift in the demand curve for skilled labour, consistent with what is happening elsewhere in the EU.

In modelling the effects of human capital, Barrett *et al.* took a different approach to Durkan *et al.*. They developed a small model of the labour market, differentiating skilled (well educated) and unskilled labour. In line with the evidence from Kearney, 1997, the elasticity of substitution between skilled and unskilled labour was assumed to be zero. Effectively this meant that the economy employed skilled and unskilled labour in fixed proportions. The model shows that, by increasing the supply of skilled labour through immigration, output was able to expand more rapidly. In turn, because the economy required a fixed (small) proportion of unskilled labour relative to the big increase in demand for skilled labour, the higher output expanded unskilled employment. In turn this helped reduce the unemployment rate as the bulk of those unemployed had limited education.

The Barrett *et al.* model is further developed in Bergin and Kearney, 2007. This latter paper confirms the low elasticity of substitution between skilled and unskilled labour. The results in this paper suggest that, by raising the educational attainment of the population of working age sufficient to increase the supply of skilled labour by one per cent a year, this would add around 0.4 per cent a year to the growth rate.

A quantification of the effects of rising human capital through the three channels was provided in FitzGerald 2012. The results are summarised in Figure 9. This suggests that the biggest impact on growth from rising human capital over the period 1990-2010 occurred in Ireland, adding around 2 percentage points a year to growth. The higher productivity of the workforce contributed around one percentage point a year, somewhat higher than suggested in the studies suggested above. The investment increased labour supply by around a half a percentage point a year through increased participation by women, especially women with a good education. By raising the educational attainment of those who would previously have been unemployed, the investment in education added a further 0.7 percentage points a year to growth.

FitzGerald, 2012 also suggests that the UK, which has seen a major increase in participation at third level since 1990, also saw a significant boost to growth from rising human capital. Spain and Hungary, which still had low levels of human capital in 2010 (Figure 8) have made substantial progress between 1990 and 2010, reflecting the low base from which they were starting.

Borooah, 2015, looking at Northern Ireland, adopted a rather similar approach to Breen and Shortall, considering the possible benefits to the individuals concerned of raising the educational attainment of early school leavers. In particular he looked at the effects on the lifetime earnings of individuals in Northern Ireland if they completed high school instead of dropping out without qualifications. On this basis, using 2009 data, he estimated that there would be an increase in lifetime earnings of each individual of £370,000.

Table 5: Regional growth and share of population with third level education

	Real GDP Average growth 1999-2016	Population Third Level aged 30-34
United Kingdom	1.7	48.3
North East	1.4	39.1
North West	1.8	43.7
Yorkshire and Humber	1.3	41.1
East Midlands	1.6	41.8
West Midlands	1.4	39.8
East of England	1.5	40.2
London	2.6	66.0
South East	1.7	47.7
South West	1.6	46.3
Wales	1.5	39.2
Scotland	1.9	57.5
Northern Ireland	1.3	35.3

Source: Eurostat

On the basis of Borooh's work, if the educational profile of Northern Ireland evolved to be more like that of Ireland or Scotland over a 20 year period, the benefits from increased productivity could amount to an additional 0.25% onto the growth rate.⁸ The participation and unemployment reduction effects, discussed above, would provide additional benefits.

For the UK regions Table 5 shows the average annual growth in real GDP since 2000 and the proportion of the population aged 30-34 with third level education in 2017. Within the UK, since 2000 the London region has grown more rapidly than any other region. It also has much the highest share of its adult population with third level qualifications of any UK region. This reflects continuous skilled immigration into the city from other UK regions and from outside the UK.

After London, Scotland has the highest proportion of people with third level qualifications in their early 30s and the next highest growth rate to London. This result is certainly consistent with the results for other countries, such as Ireland, that suggest that investment in human capital can play an important role in growth. By contrast, Northern Ireland has the lowest share of the population with third-level qualifications and the lowest growth rate.

Looking at the pattern of growth for all UK regions there is a correlation of 0.9 between the growth over the period 1999 to 2016 and the share of the population with third level education. However, the direction of causation between a high share of skilled labour and higher growth is not clear. In the case of London it almost certainly has a high share of the population with third level education because it has grown rapidly – attracting immigrants. By contrast, because Northern Ireland has had a poor growth performance since 2000, it has attracted less graduates from outside and, as discussed earlier, it has seen a continuing outflow of graduates (or students at third level) over a prolonged period.

⁸ This is based on the enhanced individual earnings from reducing the number of early school leavers by two thirds and raising the share of those with third level education to Scottish levels.

These data can be used to provide a simple calibration of the relationship between human capital and growth, where the 2016 value of an index (I) of real GDP to the base 2000 is regressed on the share of graduates in the population of working age (E):

$$I = 0.91 + .0086E \quad R^2 = 0.87$$

(20.0) (8.6)

As discussed above, this relationship cannot establish cause and effect. However, with that caveat in mind, the calibration would imply that, if over a 20 year period Northern Ireland upgraded its human capital to a Scottish level by reforming its educational system and making changes so as to attract back graduates living abroad, this would be consistent with a higher growth rate of around one percentage point a year.

A recent study by Siedschlag and Koecklin, 2019, using data on Foreign Direct Investment in EU regions, shows the importance of the share of third level graduates in the population for the attraction of FDI to a region. Their results suggest that if Northern Ireland had a similar share of graduates to Scotland, this would increase its probability of being selected for FDI by over 3 percentage points. Thus the small share of third level graduates in the Northern Ireland work force has had a serious negative impact on the attractiveness of the regional economy for FDI.

While the precise effects of upgrading the human capital of Northern Ireland are uncertain, the available evidence from Ireland and other economies strongly suggests that there would be major long-term benefits from investing effectively in human capital.

5. Conclusions

Ireland's investment in human capital lagged behind Northern Ireland until free second level education was introduced in 1967. Since 1967 there has been a dramatic change in the educational attainment of the Irish population. Having in the 1960s had an exceptionally high proportion of children leaving school without completing the leaving certificate, or even the junior certificate, Ireland now has one of the lowest rates of educational drop-out in the EU. It also has one of the highest proportions of the working age population with third level qualifications.

In the past there was a major drain from Ireland of well-educated young people emigrating permanently to the UK or elsewhere. This is no longer the case: while many graduates do leave Ireland after graduating, the evidence is that the bulk of them return having developed their skills and expertise while abroad.

The failure to follow the rest of Northern Europe in investing in education immediately after the Second World War was an important factor in Ireland's poor economic performance in the 1950s, 1960s and 1970s. However, a range of studies have concluded that the rising stock of human capital in Ireland has played a very important role in the economy's rapid growth in recent decades, especially since 1990.

These studies suggest that, as a result of the investment in human capital in Ireland, there was an addition to growth of between 0.6% and 0.8% a year over the period from 1980 to the early years of the last decade. One study, FitzGerald, 2012, suggests that the growth bonus could have been more than double that over the shorter period from 1990 to 2010.

Whatever, the precise effects, over the next 20 years, as a younger cohort of very well educated workers gradually replaces those aged over 45 who have more limited education, the rising average educational attainment of the population will continue to contribute to growth. However, this contribution will gradually decline as the educational attainment of the population asymptotes out at the current profile for those aged 25. It will certainly be much less than the growth bonus seen over the period 1990 to 2010.

For Ireland there is little scope to raise participation in education at third level. Instead the priority must be to improve the quality of the education that is provided at second and third level.

The huge increase in student numbers at third level has not seen a commensurate increase in resources. The fact that there is little or no research measuring the quality of the third level education provided weakens the case for further investment. Nonetheless, there are grounds for arguing that a significant increase in resources to improve the quality of third level education would be beneficial.

At second level, while drop-out rates have fallen to low levels, further work is needed to ensure that the children who are remaining on in school today benefit fully from the experience (Smyth, 2015). Also, there are concerns that the nature of the education provided, with more emphasis on the transmission of knowledge than the development of analytical skills, needs to adjust to the future needs of Irish society over the coming decades.

In the immediate post-war years Northern Ireland, along with the rest of the UK, began a major upgrade of its second level education system, providing free second level education for all children. This had a significant effect on educational attainment in the 1950s and 1960s.

In a symposium in this Society in 1995 Borooah, commented on the problem posed by the elitist nature of the education system in Northern Ireland. This problem reflects the fact that grammar schools select about 30% of children by ability, with secondary schools accepting all-comers. The results for the bulk of children who attend secondary schools are very much worse than for grammar schools, where a very high proportion of pupils progress to third level education. While in England and Wales the system has evolved over the last 50 years to make it less elitist, there has been little change in Northern Ireland.

The system of selection by ability into different schools contributes to the high level of early school leaving, perpetuating the cycle of deprivation⁹, as well as failing to channel children into third level education. By contrast, the success of the Scottish and Irish education systems, which do not involve such selection, highlights the need for major reform in Northern Ireland.

For Northern Ireland, though there has been some improvement in the drop-out rate in recent decades, it is still very high. It is particularly elevated for children from a deprived Protestant background.

The share of the Northern Ireland population of working age with third level qualifications is the lowest of all UK regions, and much lower than in Ireland. This is due more to emigration than to a

⁹ "In effect, the tax payer pays grammar schools to transmit deprivation through generations.", Borooah, 2015, p. 82

low progression rate to third level. The data suggest that Northern Ireland is losing about a quarter of its young people with third level qualifications through emigration. In particular, the fact that a quarter of all students take their first degree in GB increases the likelihood that they will not return. Anecdotal evidence suggests that this permanent emigration of graduates (or future graduates) particularly affects young people from a Protestant background.

While the evidence is more limited for Northern Ireland than for Ireland on the impact on growth of investment in human capital, it does point to lower levels of educational attainment being a crucial factor in explaining Northern Ireland's recent poor economic performance.

Borooah, 2015, shows that tackling the early school leaver problem in Northern Ireland could produce very substantial returns for the individuals who are currently being failed by the education system. These potential gains at an individual level would also convert into a substantial bonus in terms of increased productivity at the level of the economy.

In the case of third level education Northern Ireland suffers from a number of problems. Too few of the cohort of young people passing through the educational system are qualifying for third level. Of those that do, many of them are either studying in GB and not returning, or emigrating there after graduating. The fact that most of those that leave do not return adds to the lack of adequate human capital that the Northern Ireland economy is suffering from.

Even if the education system in Northern Ireland were radically overhauled, Northern Ireland suffers from this drain of well-educated young people to GB, never to return. If the Northern Ireland economy is to change gear and grow more rapidly, the factors that discourage Northern Ireland graduates from returning home, in the same way that Irish graduates return home, need to be addressed. If that does not happen, any policy to increase progression to third level within Northern Ireland may end up as a drain on the local economy rather than a gain.

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